Lodhas, 34,795, (8) Gadariyas, 21,926; and (9) Kolis, 20,391. The density of population is 395 persons to the square mile. The district exhibits a striking variety of surface and scenery. The greater portion lies within the Duáb or level alluvial plain between the Ganges and the Jumna. This part falls naturally into two sections, divided by the deep and fissured valley of the river Sengar. The tract to the north-east of that stream is rich and fertile, being watered by the Cawnpur and Etáwah branches of the Gánges canal, which will soon be supplemented by other important works now in progress. The south-western region has the same natural advantages, but possesses no great irrigation system, and is consequently less fruitful than the opposite slopes. Near the banks of the Jumna, the plain descends into the river valley by a series of wild ravines and terraces, inhabited only by a scattered race of hereditary herdsmen. Beyond the Jumna again a strip of British territory extends along the tangled gorges of the Chambal and the Kuári Nadi, far into the borders of the Gwalior state. This outlying tract embraces a series of rocky glens and mountain torrents, crowned by the ruins of native strongholds, and interspersed with narrow ledges of cultivable alluvium.

The East Indian Railway runs through the centre of the district. The Jumna forms a great water-way for the heavy traffic; while good roads connect most of the local centres with one another, and with the neighbouring cities. The principal crops are wheat, barley, pulses, millets, sugar cane, cotton, and indigo. The district is essentially agricultural, and its exports consist entirely of the rural produce. Four towns in 1872 possessed a population exceeding 5000:—Etáwah, 30,549; Phaphund, 6536; Auráiya, 6459; and Jaswantnagar, 5310. In 1873 the total revenue of Etáwah district amounted to £191,097, of which sum £128,540 was contributed by the land-tax. The town of Etáwah has the only municipality in the district. The climate, once hot and sultry, has now become comparatively moist and equable under the influence of irrigation and the planting of trees.

Etáwah was marked out by its physical features as a secure retreat for the turbulent tribes of the Upper Duáb, and it was not till the 12th century that any of the existing castes settled on the soil. After the Mussulman conquests of Delhi and the surrounding country, the Hindus of Etáwah appear to have held their own for many generations against the Mahometan power: Bábar conquered the district with the rest of the Duáb, and it remained in the hands of the Mongols until the decay of their empire in the last century. After passing through the usual vicissitudes of Marhattá and Ját conquests during the long anarchy which preceded the British rule, Etáwah was annexed by the vazír of Oudh in 1773. The vazír ceded it to the English in 1801, but it still remained so largely in the hands of lawless native chiefs that some difficulty was experienced in reducing it to orderly government. During the mutiny of 1857, serious disturbances occurred in Etáwah, and the district was occupied by the rebels from June to December; order was not completely restored till the end of 1858.

Etáwah Town, the capital of the district, is picturesquely situated amongst the ravines on the bank of the Jumna, 70 miles S.E. of Agra. According to the census of 1872, its population amounts to 30,549 souls, comprising 21,241 Hindus, 9256 Mohametans, and 52 Christians. Deep fissures intersect the various quarters of the town, over which broad roads connect the higher portions by bridges and embankments. A fine modern square, known as Humeganj, from the name of its founder, stands in the centre of the city, and contains the chief public buildings. A handsome mosque, the Jama Masjid, forms the chief architectural ornament of Etáwah. It was originally a Hindu or Buddhist temple, and has been adapted to its present use by the Mahometan conquerors. Several Hindu temples also stand about the ruins of the ancient fort. The chief trade is in *ghi*, grain, cotton, and oil-seeds. The Etáwah municipality had an income of £3064 in 1875–76, of which £2435 was raised by taxes; the incidence of municipal taxation was 1s. 7¼d. per head of the population.

ETCHMIADZIN, Edchmiadzin, or Itsmiadsin, a town and monastery in the Russian government of Erivan, famous as the seat of the Catholicus or primate of the Armenian church. It is situated in the plain of the Aras or Araxes, about 2985 feet above the sea, 12 miles W. of Erivan and 30 N. of Mount Ararat. The monastery comprises a pretty extensive complex of buildings, and is surrounded by brick walls 30 feet high, which, with their loopholes and towers, present the appearance of a fortress. Its architectural character has been considerably impaired by additions and alterations in the modern Russian style. On the western side of the quadrangle is the residence of the primate, on the south the refectory, built by the Catholicus Abraham (1730–1735), on the east the lodgings for the monks, and on the north the cells. The cathedral is a small but fine cruciform building with a Byzantine cupola at the intersection, a large tower at the western end, and a smaller tower above each wing of the transepts. Of special interest is the porch, built of red porphyry, and profusely adorned with sculptured designs somewhat similar to those of Gothic architecture. The interior of the church is decorated with Persian frescoes of flowers, birds, and scroll-work. It is here that the Catholicus confers episcopal consecration by the sacred hand of St Gregory; and here every seven years he prepares with great solemnity the holy oil which is to be used throughout the churches of the Armenian communion. Of the numerous relics the chief are the head of the spear which pierced the Saviour's side, a piece of Noah's ark, presented by an angel to St James of Nisibis, and a piece of the true cross. Outside of the main entrance are the alabaster tombs of the primates Alexander I. (1714), Alexander II. (1755), Daniel (1806), and Narses (1857), and in hospitable contiguity a white marble monument erected by the East India Company to mark the resting-place of Sir John Macdonald, who died at Tabriz in 1830, while on an embassy to the Persian court. The library of the monastery is said at one time to have contained 15,000 volumes, and in spite of depredation and neglect, it still remains a rich storehouse of Armenian literature. Brosset's *Catalogue de la Bibliothèque d'Etchmiadzin*, St Petersburg, 1840, contained only 635 numbers, but the new list drawn up by the monks (a copy of which was presented by Major Cunnyngham to the Oriental Library at Cambridge) mentions 2500 volumes, many of great size. Among the more remarkable manuscripts are a copy of the gospels in a massive binding of carved ivory dating from the 10th or 11th century, and three bibles of the 13th century, one of which had belonged to Aytoun II., king of Armenia. A type-foundry, a printing-press, and a bookbinding establishment are maintained by the monks, who publish a weekly Armenian newspaper called *The Ararat*, and supply religious and educational works for their co-religionists. The number of inmates in the monastery varies considerably. In 1834, according to Dubois, there were 50 monks and 13 bishops and archbishops; and in 1872, according to Telfer, there were 5 bishops and archbishops, 20 monks, and 25 novices. The revenue, estimated at £10,000, is derived from the conventual domains, which, though much less extensive than they once were, still comprise, not only a number of estates, but five villages presented or rather restored by the Russian emperor. The Catholicus has an annual income of 10,000 rubles. To the east of the monastery is a college and seminary of modern erection. At the distance of about half a mile stand the churches of St Rhipsime and St Gaiana, two of the early martyrs of Armenian Christianity; the latter is of special interest as the burial-place of all those primates who are not deemed worthy by the synod of interment beside the cathedral. From a distance the three churches form a fairly striking group, and accordingly the Turkish name for Etchmiadzin is simply Utch-Kilissi, or the Three Churches. A fourth of less importance is ignored. The town of Etchmiadzin, or as it should be called Vagharshapat, contains about 8000 inhabitants, but has long ceased to be of any individual importance. According to Armenian historians it dates from the 6th century B.C., and takes its name from King Vagarsh, who in the 2d century A.D. chose it as his residence and surrounded it with walls. The great apostle of Armenia, St Gregory the Illuminator, having seen the Saviour descend in a flood of light in the neighbourhood of the palace, was ordered by an angel to erect a church on the spot. He obeyed the divine command in 309, and gave the building the commemorative name of Edch-Miadain, or Descended the Only Begotten. In 344 Vagharshapat ceased to be the Armenian capital, and in the 5th century the patriarchal seat was removed to Tovin. The monastery was founded by Narses II., who ruled from 524–33; and a restoration was effected by Gomidas in 618. At length in 1441 the primate George or Kevork brought back the see to the original site, and from that day to the present time Etchmiadzin has been the centre of the Armenian church. In the Russo-Persian war of 1827, though the monastery was declared neutral territory by both belligerents, it was occupied by Russian troops.

See Dubois du Montpéreux, *Voyage autour du Caucase*, vol. iii., 1839; Viscount Pollington, *Half Round the Old World*, 1867; S. C. Malan, *St Gregory the Illuminator*; Thielman, *Journey to the Caucasus, &c.*, 1875; Telfer, *The Crimea and Transcaucasia*, 1876.

ETEOCLES, a mythical king of Thebes, son of Œdipus and Jocasta. He and his brother Polynices were cursed by their father for shutting him up in a prison; and in order to prevent the fulfilment of his prayer that they might engage in fratricidal combat for his throne, they resolved to reign alternately, each for a year. Eteocles as the elder ascended the throne first, but at the expiry of the year he refused to surrender the throne to Polynices. The latter therefore, with the aid of Adrastus, king of Argos, whose daughter he had married, headed the famous expedition of the Seven against Thebes. After a series of unavailing skirmishes between the rival forces, the two brothers met in single combat, and both were slain. The Theban rulers decreed that only Eteocles should receive the honour of burial, and that the body of Polynices should be cast out to the dogs and birds, but notwithstanding the decree, the burial rite was performed to Polynices by his sister Antigone. The fate of Eteocles and Polynices forms the subject of Æschylus's tragedy, *The Seven against Thebes*, and of Euripides's *Phœnissæ*.

ETHELBERT, or Æthelberht, king of Kent, ascended the throne in 560. In 568 he was defeated by the West Saxons, and his authority limited to Kent, but ultimately he conquered the Saxons of Middlesex and Essex, and about 590 he was acknowledged as over-lord as far north as the Humber. About 575 he married Bertha or Bercta, daughter of the Frankish king Charibert. The Franks had already been converted to Christianity, and when Pope Gregory the Great heard that a Frankish princess was married to the king of Kent, he seized the opportunity to send Augustine to attempt the conversion of the Anglo-Saxons. In 597 Augustine and his companions landed in the Isle of Thanet, and on learning of their arrival Ethelbert, prompted doubtless by Bertha, at once invited them to an interview. Not being certain whether they might not use enchantments against him, he received them, for greater security, in the open air; and after listening to a long sermon from Augustine, he was so far impressed, that although not prepared at once to forsake his old religion, he granted liberty to the monks to preach to his people. According to the accounts that have been handed down their success was almost unprecedented, and as many as 10,000 baptisms are said to have taken place in a single day. Very shortly afterwards Ethelbert gave in his adhesion to Christianity, and immediately all the inhabitants of Kent followed his example. He gave up his palace for the monks to live in, and adjoining it he built a church, on the site of which was afterwards erected the cathedral of Canterbury. He died in 616, and was canonized, his day being the 24th February. The earliest code of Anglo-Saxon laws now extant was issued by Ethelbert in 600. With the exception of a provision for the protection of the property of God and the church, it consists chiefly of enactments against crimes—the various kinds of which, with the penalties attaching to commission of them, are stated in minute detail.

ETHELRED (or Æthelred) II., surnamed the Unready (968–1016), an Anglo-Saxon king, the son of Edgar and Elfrida, was born in 968. On the murder of Edward the Martyr in 979, Ethelred succeeded him on the Anglo-Saxon throne. He is said to have owed his surname "Unready" (*i.e.*, without *rede* or counsel) to Dunstan, who even when he placed the crown on Ethelred's head prophesied that during his reign, on account of the sins of Elfrida, evils should fall upon the English such as they had never yet suffered. Such evils did fall upon them, and were doubtless chiefly due to the king. He possessed considerable energy when roused to exert himself, but it was only exercised fitfully, and generally misdirected, being always awanting at critical periods, and never used but to the disadvantage of his kingdom. Careless of everything but his immediate comfort or the gratification of an immediate whim, and listless and fond of ease, he allowed his kingdom and himself to be managed by worthless favourites, whose acts of, as it seems to us, open treachery were not only allowed to pass unpunished, in a manner which appears to us unaccountable, but seemed almost to form steps in their ladder of advancement to special influence and favour with the king. The successes attending the Danish invasions in the reign of Ethelred were due almost wholly to three causes,—the unpreparedness of the Anglo-Saxons, the treachery of the earls, and the failure of the king to follow up victories which were often won with no special preparation, and without adequate leaders. About two years after Ethelred mounted the throne the Danish invasions recommenced, but it was not till a later period that their inroads assumed the serious aspect of an attempt to conquer the Anglo-Saxon kingdom. In 988 they were defeated at Watchet in Somersetshire, and in 991 at Maldon, immediately after which latter victory, Ethelred purchased peace from his defeated enemies by money raised through means of the oppressive tax known as the "Danegeld." The Danes were allowed to stay in England, and they on their part agreed to help Ethelred against any other foreign fleet that might attack him; but for some reason now unknown, a dispute arose in 992, and in a battle between the rival fleets, the Anglo-Saxons, notwithstanding the treachery of Elfric, were again victorious. After this the Danes sailed to the north of England and ravaged both sides of the Humber. In 994 Swend, king of the Danes, and Olaf king of the Norwegians, combined their forces and attacked London, but their attempt was completely frustrated by the valour of the citizens; and they sailed away to accomplish the easier task of ravaging the southern coasts, when

Ethelred as usual did nothing to oppose them, but bought them off with a large sum of money. His efforts at conciliation were completely successful with Olaf, who, after being converted to Christianity, and adopted by Ethelred as his son, remained faithful ever afterwards to his promise of friendship. In the years 997, 998, and 999 the Danes ravaged the coasts of Wessex, Sussex, and Kent. In 1000 Ethelred, energetic at the wrong time and for wrong objects, invaded Normandy, but suffered a disastrous defeat. He concluded a treaty with that country soon afterwards, and in 1002 married Emma, daughter of Richard duke of Normandy. In the spring a treaty had been concluded with the Danes, but in the winter of the same year, Ethelred suspecting that they were plotting treachery, ordered a general massacre of all the Danes in England. Among others murdered was Gunold, sister of Swend; and the Danish king, to revenge her death and that of his countrymen, invaded the coast of Devonshire with a large force. He met with scarcely any opposition, and committed the usual ravages till 1007, when peace was concluded by Ethelred's consenting, as at other times, to the payment of a large sum of money. In 1009 Ethelred collected the "largest fleet that had been seen in the reign of any king," but it was soon afterwards nearly wholly destroyed by a violent storm, just before the Danes renewed their invasion. Ethelred, though he had gathered an army, was dissuaded from attacking them by Edric, and afterwards the English, through the treachery of their leaders, suffered a series of defeats; but in 1012 peace was again bought, and Thurkill, one of the Danish leaders, entered the English service. In 1013 Swend, with a more formidable fleet than any he had yet collected, sailed up the Humber, and then marched southward to London; but meeting there with a strenuous resistance, he was compelled to give up the attack and marched to Bath. Here he was proclaimed king, apparently by the Witan, and with the general consent of the English people, who were doubtless wearied of Ethelred's incompetency, of the treachery of the nobles, and of the oppressive taxes which had been paid for no purpose. London itself soon acknowledged the Danish king, and Ethelred, after for a time taking refuge in Thurkill's fleet, escaped to Normandy. Swend died on February 1014, and on his death Ethelred was recalled by the Witan, on the promise of ruling better in future. In the same year he defeated Cnut, son of Swend, but in 1015 Cnut renewed his attack with a large fleet, and being joined by the traitor Edric, ravaged Wessex and Mercia, and was preparing to attack London, when Ethelred died April 23, 1016. (See Palgrave's *History of the Anglo-Saxons*; Freeman's *Norman Conquest*, vol. i.; and Green's *History of the English People*.)

ETHELWULF, or ÆTHELWULF, an Anglo-Saxon king, succeeded his father Egbert about 836. His reign, like that of his father, was almost wholly occupied with wars against the Danish invaders. For a long time he held them in check, and when in 851 they took Canterbury and London, and defeated Beohrtwulf, king of the Mercians, he met them at Ockley in Surrey, and there "made the greatest slaughter among the heathen army that we have heard tell of unto the present day, and there got the victory." But the Northmen were persevering in their efforts; and it is stated that in 855 they, for the first time, remained over winter in Sheppey. In the same year Ethelwulf made a journey to Rome, accompanied by his youngest and favourite son Alfred, to get the latter consecrated as his successor; and as his first wife Osburga had been for some time dead, he delayed a few months in France to marry Judith, daughter of the king of the Franks. Ethelbald, his eldest surviving son, indignant at his youngest brother being preferred to him as successor to his father's throne, took advantage of his father's absence to stir up a revolution against him, and obtained the support of so powerful a party that an unnatural civil war was only prevented by Ethelwulf agreeing to grant to his son the government of Wessex, he himself being recognized as over-lord, and retaining the rest of the kingdom. He died in 858.

ETHER, $(C_2H_5)_2O$, the *Æther* or *Æther Sulphuricus* of pharmacy, is a colourless, volatile, highly inflammable liquid, of specific gravity 0·723, boiling-point when pure 35·6° C, and fusing-point −31° C. It has a strong and characteristic odour, and a hot sweetish taste, is soluble in ten parts of water, and in all proportions in alcohol, and dissolves bromine, iodine, and, in small quantities, sulphur and phosphorus, also the volatile oils, most fatty and resinous substances, gun-cotton (see COLLODION, vol. vi., p. 149), caoutchouc, and certain of the vegetable alkaloids. The vapour mixed with oxygen or air is violently explosive. The making of ether by the action of sulphuric acid on alcohol was known to Raymond Lully, who wrote in the 13th century; and later Basil Valentin and Valerius Cordus described its preparation and properties. The name ether appears to have been applied to the drug only since the times of Froben, who in 1730 termed it *spiritus ætherеus*. Ether is manufactured by the distillation of 5 parts of 90 per cent. alcohol with 9 parts of concentrated sulphuric acid, at a temperature of 140°–145° C., a constant stream of alcohol being caused to flow into the mixture during the operation. (See CHEMISTRY, vol. v. p. 566). It is purified by treatment with lime and calcium chloride, and subsequent redistillation. According to P. Stefanelli (*Ber. deutsch. Chem. Ges.*, 1875, p. 439), the presence of as small a quantity as 1 per cent. of alcohol may be detected in ether by the colour imparted to it by aniline violet; if water or acetic acid be present, the ether must be shaken with anhydrous potassium carbonate before the application of the test. Ether when drunk has a rapid though evanescent intoxicating effect, estimated to be more than three times that of the same bulk of whisky, instead of which it is largely consumed in some parts of Ireland. (See H. N. Draper, *Med. Press and Circular*, iv. 117). Mixed with twice its volume of rectified spirit, it is administered internally as a remedy for nervous headache, flatulence, hiccough, hysteria, and spasmodic vomiting and asthma, occasionally also in angina pectoris, intermittent fevers and typhus, and as an antidote for narcotic poisons, and for relieving the pain caused by biliary calculi. It has been shown by Longet that ether when swallowed even in fatal doses does not at any time produce anæsthesia. Much heat being rendered latent by its evaporation, ether is sometimes employed as a refrigerant in the reduction of hernia. By the use of Dr Richardson's ether spray apparatus for effecting local anæsthesia, a temperature of −6° F. can be obtained. When not allowed to evaporate, ether acts as a rubefacient. Its vapour when inhaled causes at first considerable irritation of the air-passages, and increased rapidity of the pulse, accompanied by much excitement. With the establishment of complete anæsthesia the pulse sinks to 60° or 70° the face becomes pallid, and the muscles are relaxed. Ether occasions more excitement, and requires a somewhat longer period for its exhibition than chloroform, but does not exercise upon the heart the sedative influence of that drug. A history of the employment of ether as an anæsthetic will be found under ANÆSTHESIA, vol. i. p. 786. See also CHLOROFORM, vol. v. p. 680.

ETHER, or ÆTHER (*αἰθήρ*, probably from *αἴθω*, I burn, though Plato in his *Cratylus* (410, b) derives the name from its perpetual motion—*ὅτι ἀεὶ θεῖ περὶ τὸν ἀέρα ῥέων, ἀειθὴρ δικαίως ἂν καλοῖτο*), a material substance of a more subtle kind than visible bodies, supposed to exist in those parts of space which are apparently empty.

The hypothesis of an æther has been maintained by different speculators for very different reasons. To those who maintained the existence of a plenum as a philosophical principle, nature's abhorrence of a vacuum was a sufficient reason for imagining an all-surrounding æther, even though every other argument should be against it. To Descartes, who made extension the sole essential property of matter, and matter a necessary condition of extension, the bare existence of bodies apparently at a distance was a proof of the existence of a continuous medium between them.

But besides these high metaphysical necessities for a medium, there were more mundane uses to be fulfilled by æthers. Æthers were invented for the planets to swim in, to constitute electric atmospheres and magnetic effluvia, to convey sensations from one part of our bodies to another, and so on, till all space had been filled three or four times over with æthers. It is only when we remember the extensive and mischievous influence on science which hypotheses about æthers used formerly to exercise, that we can appreciate the horror of æthers which sober-minded men had during the 18th century, and which, probably as a sort of hereditary prejudice, descended even to the late Mr John Stuart Mill.

The disciples of Newton maintained that in the fact of the mutual gravitation of the heavenly bodies, according to Newton's law, they had a complete quantitative account of their motions; and they endeavoured to follow out the path which Newton had opened up by investigating and measuring the attractions and repulsions of electrified and magnetic bodies, and the cohesive forces in the interior of bodies, without attempting to account for these forces.

Newton himself, however, endeavoured to account for gravitation by differences of pressure in an æther (see art. ATTRACTION, vol. iii. p. 64); but he did not publish his theory, "because he was not able from experiment and observation to give a satisfactory account of this medium, and the manner of its operation in producing the chief phenomena of nature."

On the other hand, those who imagined æthers in order to explain phenomena could not specify the nature of the motion of these media, and could not prove that the media, as imagined by them, would produce the effects they were meant to explain. The only æther which has survived is that which was invented by Huygens to explain the propagation of light. The evidence for the existence of the luminiferous æther has accumulated as additional phenomena of light and other radiations have been discovered; and the properties of this medium, as deduced from the phenomena of light, have been found to be precisely those required to explain electromagnetic phenomena.

Function of the æther in the propagation of radiation.—The evidence for the undulatory theory of light will be given in full, under the article on LIGHT, but we may here give a brief summary of it so far as it bears on the existence of the æther.

That light is not itself a substance may be proved from the phenomenon of interference. A beam of light from a single source is divided by certain optical methods into two parts, and these, after travelling by different paths, are made to reunite and fall upon a screen. If either half of the beam is stopped, the other falls on the screen and illuminates it, but if both are allowed to pass, the screen in certain places becomes dark, and thus shows that the two portions of light have destroyed each other.

Now, we cannot suppose that two bodies when put together can annihilate each other; therefore light cannot be a substance. What we have proved is that one portion of light can be the exact opposite of another portion, that as $+a$ is the exact opposite of $-a$, whatever a may be. Among physical quantities we find some which are capable of having their signs reversed, and others which are not. Thus a displacement in one direction is the exact opposite of an equal displacement in the opposite direction. Such quantities are the measures, not of substances, but always of processes taking place in a substance. We therefore conclude that light is not a substance but a process going on in a substance, the process going on in the first portion of light being always the exact opposite of the process going on in the other at the same instant, so that when the two portions are combined no process goes on at all. To determine the nature of the process in which the radiation of light consists, we alter the length of the path of one or both of the two portions of the beam, and we find that the light is extinguished when the difference of the length of the paths is an odd multiple of a certain small distance called a half wave-length. In all other cases there is more or less light; and when the paths are equal, or when their difference is a multiple of a whole wave-length, the screen appears four times as bright as when one portion of the beam falls on it. In the ordinary form of the experiment these different cases are exhibited simultaneously at different points of the screen, so that we see on the screen a set of fringes consisting of dark lines at equal intervals, with bright bands of graduated intensity between them.

If we consider what is going on at different points in the axis of a beam of light at the same instant, we shall find that if the distance between the points is a multiple of a wave-length the same process is going on at the two points at the same instant, but if the distance is an odd multiple of half a wave-length the process going on at one point is the exact opposite of the process going on at the other.

Now, light is known to be propagated with a certain velocity ($3{\cdot}004 \times 10^{10}$ centimetres per second in vacuum, according to Cornu). If, therefore, we suppose a movable point to travel along the ray with this velocity, we shall find the same process going on at every point of the ray as the moving point reaches it. If, lastly, we consider a fixed point in the axis of the beam, we shall observe a rapid alternation of these opposite processes, the interval of time between similar processes being the time light takes to travel a wave-length.

These phenomena may be summed up in the mathematical expression

$$u = A \cos (nt - px + \alpha)$$

which gives u, the phase of the process, at a point whose distance measured from a fixed point in the beam is x, and at a time t.

We have determined nothing as to the nature of the process. It may be a displacement, or a rotation, or an electrical disturbance, or indeed any physical quantity which is capable of assuming negative as well as positive values. Whatever be the nature of the process, if it is capable of being expressed by an equation of this form, the process going on at a fixed point is called a *vibration*; the constant A is called the *amplitude*; the time $\frac{2\pi}{n}$ is called the *period*; and $nt - px + \alpha$ is the *phase*.

The configuration at a given instant is called a *wave*, and the distance $\frac{2\pi}{p}$ is called the *wave-length*. The velocity of propagation is $\frac{n}{p}$. When we contemplate the different parts of the medium as going through the same process in succession, we use the word undulatory to denote this character of the process without in any way restricting its physical nature.