

placed underneath. It is allowed to rest till a greasy substance—bergamot camphor—deposits, after which it is bottled for use. Bergamot oil is a limpid greenish-yellow fluid of a specific gravity of 0.869, of a powerful but pleasant citrine odour and an aromatic bitterish taste. It consists of a mixture of two essential oils, the most volatile of which is a pure hydrocarbon isomeric with oil of turpentine; the other, containing oxygen, being regarded as a hydrate of lemon oil. The chief use of bergamot oil is in perfumery and as a flavouring material in cookery.

BERGEN, a city and seaport on the west coast of Norway, capital of the province of South Bergen, in 5° 29' E. long. and 60° 23' N. lat. It is situated on a rocky promontory at the head of a deep bay called the Vaag, has a fine harbour with two good entrances, and is surrounded by hills, some of which attain the height of 2000 feet. Towards the sea it is defended by the ancient fortress of Bergenhuus, the citadels of Fredericksberg and Sverresberg, and some lesser works. The appearance of the town, which rises in the form of an amphitheatre and is generally well built, is decidedly picturesque, with its wooden houses painted of various colours. It contains a cathedral, several churches, of which the oldest, St Mary's, dates from the 12th century, hospitals, a lazaretto, a national museum, a diocesan college, a naval academy, a school of design, public libraries, various charitable institutions, and a theatre. It is the seat of a bishopric, and possesses a tribunal of secondary jurisdiction and one of the three public treasuries of Norway. Bergen has a considerable export trade, which consists of stockfish, lobsters, fish-roses, herrings, whale oil, horns, skins, rock moss, and timber, and is chiefly carried on with the northern countries of Europe. In 1867 the number of steamships that entered the port was 164, with a tonnage of 28,454. The imports of that year amounted to £92,600, and the exports to £344,000. Bergen was founded in the 11th century by Olaf the Peaceful, king of Norway. In 1445 the Hanseatic League established a factory in the city, and continued to have almost the sole control of the trade till 1558, when it was expelled by the Norwegians, who found its presence oppressive. There is still a kind of German colony in the place, which keeps up the Hanseatic tradition, and the old German church, hospital, and "factory" or *contor* are still extant, the latter furnishing excellent warehouse accommodation. A large part of the town was burnt down in 1855, and has since been rebuilt in a more regular and open manner. It is the second largest town in Norway. Population (1870), 30,252.

BERGEN-OP-ZOOM, a town of Holland, in the province of North Brabant, situated on both sides of the River Zoom, near its confluence with the East Scheldt, in 51° 29' N. lat. and 4° 17' E. long. It is about 15 miles N. of Antwerp, and 22 W.S.W. of Breda. The houses are well built, the market-places and squares handsome and spacious. It possesses a port and an arsenal, and contains a town-house, a Latin school, and an academy of design and architecture. The tower of the old castle is remarkable for an increase of its breadth from the bottom upwards, and for its liability to be rocked when struck by a strong wind. There are numerous tile-works and potteries of fine ware; and a considerable trade is carried on in anchovies caught in the Scheldt.

In the 13th century Bergen-op-Zoom became the seat of Count Gerhard of Wesemael, who surrounded it with walls. In 1533 it was erected by Charles V. of Germany into a marquisate, which was successively held by the families of Berghes, Merode, Witthem, Heerenbergh, Hohenzollern, Tour d'Avvergne, and Sulzbach, and thus passed to the house of Bavaria, which, however, in 1801 abdicated its rights in favour of the Dutch republic. In 1576 the town joined the United Netherlands, and was shortly afterwards fortified. In 1588 it was unsuccessfully besieged by the duke of Parma (see

Motley's *United Netherlands*, chap. xx.), and in 1605 it was suddenly attacked by Du Terail (*Ibid.* chap. xlv.) In 1622 it defied the utmost attempts of Spinola, who was forced to abandon the enterprise after a siege of ten weeks and the loss of 1200 men. Its fortifications were greatly strengthened in 1688 by Coehoorn, who, it was believed, had almost rendered it impregnable; and in 1725 they were further extended. In 1747, however, the town was taken by the French general Lowendal. Restored at the end of the war, it was again in 1795 taken by Pichegru. The English, under Sir Thomas Graham, afterwards Lord Lynedoch, in March 1814 made an attempt to take it by a *coup de main*, but were driven back with great loss by the French, who, however, surrendered the place by the treaty of peace in the following May.

BERGERAC, the chief town of an arrondissement in the department of Dordogne, in France, situated in a fertile plain, 30 miles S.S.W. of Périgueux, on both banks of the Dordogne, which is here crossed by a fine bridge of five arches and rendered navigable by a large dam. The town is rather poorly built, and, in spite of its age, contains no monuments of antiquarian interest. It is, however, a place of great industrial activity, has a communal college, tribunals of primary jurisdiction and commerce, and a public library; and manufactures paper, iron and copper wares, hats, hosiery, and leather. The wines of the neighbourhood are in good repute, and form an important article in the trade of the town, which is principally carried on with Bordeaux and Libourne. Bergerac owes its origin to the abbey of St Martin, which was founded in 1080, and during the English invasions it played an important part as a fortress. In the 16th century it was a very flourishing and populous place, but most of its inhabitants having embraced Calvinism it suffered greatly during the religious wars. Its fortifications and citadel were demolished by Louis XIII. in 1621, and it was injuriously affected by the revocation of the Edict of Nantes. Population in 1872, 8679.

BERGMANN, TORBERN OLOF, Swedish chemist and naturalist, was born at Catherinberg, West Gothland, in 1735. At the age of seventeen he entered the University of Upsala, and distinguished himself by extraordinary assiduity in study, directing his attention more particularly to the natural sciences. During a residence at home rendered necessary by his weak health, he employed himself in collecting specimens of insects and plants, which he forwarded to Linnæus, who was much pleased with them. In 1756 he gained great reputation by his memoir on the *Coccus aquaticus*, which, contrary to the opinion of Linnæus, he proved to be nothing but the ovum of a certain species of leech. Some years later he was made professor of physics at Upsala, and published numerous scientific memoirs. In 1767 the chair of chemistry and mineralogy having become vacant through the resignation of Wallerius, Bergmann resolved to become a candidate. He had not hitherto devoted special attention to chemistry, but in a very short period by incredible application he produced as evidence of his fitness for the post a paper on the composition of alum, which is still regarded as a masterpiece. He was appointed to the chair, which he held till his death in 1784. In 1776 he had declined an offer from the king of Prussia inviting him to settle in Berlin. Bergmann was an unusually acute and sagacious analytical chemist, and made extensive and constant use of the laboratory. He described very carefully the properties of carbonic acid gas, and gave a valuable analysis of mineral waters. His researches in mineralogy, to which he applied his geometrical knowledge, were even more important, and led the way to Haüy's discovery and classification. The theory of elective or chemical affinities, which he worked out very fully, has had great influence in the history of chemistry. A collection of Bergmann's papers was published from 1779 to 1788, *Opuscula Physica et Chemica*, 6 vols. They have been translated into French, German, and English.

BERKELEY, a market-town in the county of Gloucester, near the River Severn, on the Midland Railway. It is pleasantly situated on a gentle eminence, in a rich pastoral vale to which it gives name, and which is celebrated for its dairies, producing the famous cheese known as "double Gloucester." The town has a handsome church, a grammar school, a town-hall, a market-house, and some trade in coal, timber, malt, and cheese. Berkeley was the birthplace of the celebrated Dr Jenner, whose remains are interred in the church. Berkeley castle, on an eminence S.E. of the town, was built in the reign of Henry I. out of the ruins of a nunnery which had been in existence some time before the Conquest. It suffered considerably during the civil wars of the 17th century, but is still one of the noblest baronial castles existing in England. It is noted as the scene of the barbarous murder of Edward II. Since the time of Henry II. it has been in the hands of the Berkeley family. Population of the parish in 1871, 4607,—about a fourth of the number being in the town.

BERKELEY, GEORGE, bishop of Cloyne, one of the most subtle and original English metaphysicians, was born on the 12th March 1685, at Dysert castle, on the banks of the Nore, about two miles below Thomastown, Ireland. Not much is known of his family, who seem to have been connected with the noble English house of the same name. His father, William Berkeley, was an officer of customs, and appears to have had at one time the rank of captain in the army. We know next to nothing of the mental character of either him or his wife. George, their eldest son, was entered in 1696 at the famous Kilkenny school, of which he was not the only pupil afterwards distinguished. He was remarkably well advanced in studies for his years, and in 1700 was qualified to matriculate at Trinity College, Dublin. There, for the first time, we begin to have a fair knowledge of the circumstances in which he was placed, and of the peculiar mental qualities with which he was endowed. From his own account, and from the few notices of contemporaries, we can gather that his was a mind of peculiar subtilty, keen to probe to the very foundation any fact presented to it, and resolutely determined to rest satisfied with no doctrine which had only the evidence of authority or custom, and was not capable of being realized in consciousness. This turn of mind naturally led him somewhat off the beaten track of university studies; he was not understood by his college companions, and began to be looked upon as either the greatest dunce or the greatest genius in the university. To such a reputation his eccentricity of manner, which seems to have resulted from his occasional absorption or passionate enthusiasm, largely contributed. Of the greatest importance for the development of his rare powers in a definite direction was the general condition of thought at the time of his residence at Dublin. The older text-books of physics and philosophy were no doubt in use (Dublin in this respect has always been conservative), but alongside of them the influences of the new modes of thinking were streaming in. The opposed physical systems of Descartes and Newton had begun to be known; the new and powerful calculus was being handled; the revolution in metaphysical speculation inaugurated by Descartes had reached Dublin; and, above all, the first great English work on pure philosophy, the *Essay* of Locke, had been translated into Latin, and its doctrines were being eagerly and minutely discussed by the young Trinity College students. Add to this the undoubted influence exercised by the presence in Dublin of such men as the university provost, Peter Browne, afterwards bishop of Cork, and King, archbishop of Dublin from 1703, and it will readily be seen that Berkeley, to use Professor Fraser's words, "entered an atmosphere which was beginning to be charged with the elements of reaction

against traditional scholasticism in physics and in metaphysics."

Although more competent than any man of his time to appreciate these new movements of thought, Berkeley did not neglect the routine work of the university. He had a distinguished career, was made scholar in 1702, took his B.A. degree in 1704, and obtained a fellowship in 1707. That his interest, however, was mainly directed towards subjects purely philosophical, is evidenced partly by the share he took in setting afloat a speculative society in which the problems suggested by Descartes and Locke seem to have been discussed with infinite vigour, but, above all, by his *Common Place Book*, containing his thoughts on physics and philosophy from about the year 1703. This curious document, one of the most valuable autobiographical records in existence, throws a flood of light on the growth of Berkeley's own conceptions, and enables us to understand, far more clearly than we otherwise could, the significance of his first published works. In the *Common Place Book*, if in any writing, is to be found the keen consciousness of possessing a fresh, creative thought, the application of which will change the whole aspect of speculative science. The very first sentences refer to some new principle, and the whole book thereafter is occupied turning over and over again the new conception, showing the different aspects it assumes, and the various applications it has, bringing it face to face with possible objections, and critically considering the relation in which it stands to the fundamental thoughts of his great predecessors, Descartes, Malebranche, and Locke. So far as reading goes, the *Common Place Book* shows but a slight acquaintance with ancient or scholastic philosophies; it is evident that the author does not appreciate Spinoza; he does not refer to Leibnitz; Malebranche is frequently mentioned, but hardly in such a way as to manifest sympathetic understanding of him; Norris, the English follower of Malebranche, seems to be unnoticed; More and the Mystics, when referred to, are quoted on isolated points, and to their system the young philosopher evidently felt no attraction. Descartes and Locke, above all the latter, are his real masters in speculation, and it is from the careful consideration of their systems that the new principle has sprung to light. And what is this principle? As Professor Fraser has said, there are many ways of expressing it, and Berkeley himself has never given any very definite enunciation. To put it in a form as nearly as possible resembling the statements in the *Common Place Book*, it may be expressed in the proposition that no existence is conceivable and therefore possible which is not either conscious spirit or the ideas (*i.e.*, objects) of which such spirit is conscious. Existing things consist of ideas or objects perceived or willed, while perception and volition are inconceivable and impossible save as the operations of mind or spirit. In the language of a later philosophy, the principle is that of the absolute synthesis of subject and object; no object exists apart from mind. Mind is therefore the deepest reality; it is the *præsum* both in thought and in existence, if for the moment we assume the popular distinction between these two. From this primitive truth, which, it seems to Berkeley, merely requires careful consideration in order to be at once accepted, he never wavers. Let attention be but confined to the only possible *meaning* which existence can have, and, Berkeley thinks, the principle must appear self-evident. Thus he puts in a new light the perennial problems of philosophy, and instead of discussing the nature and relations of assumed entities, such as matter, substance, or cause, would ask us to consider whether or not these have any significance apart from the perceptions or volitions of conscious spirit, what in that case they do mean, and whether the supposed difficulties connected with them do

not vanish when their true interpretation is thoroughly grasped. Of all these difficulties that concerned with the nature of matter is of greatest importance to Berkeley. From misconceptions of the true nature of material substance have flowed, according to him, the materialism, scepticism, and infidelity which disfigured the age; and all these are completely banished by the new principle. The applications of his principle and his own inclinations led Berkeley into other departments of science which he was not so well qualified to handle. The first result of the principle, as he conceived it, is undoubtedly empiricism in the theory of cognition. The ultimate elements of knowledge are the minima of consciousness, presentative or representative; pure thought and abstract ideas are not capable of being realized by the mind, and are therefore impossible. The only mathematical processes to which these minima can be subjected are addition and subtraction; and consequently great part of the *Common Place Book* is occupied with a vigorous and in many points exceedingly ignorant polemic against the fundamental conceptions of the fluxional and infinitesimal calculus, a polemic which Berkeley carried on to the end of his days.

He soon began to appear as an author. In 1707 he published two short tracts on mathematics, and in 1709 the *New Theory of Vision*, in which he applied his new principle, though without stating it explicitly. The new theory is a critical examination of the true meaning of the externality which is apparently given in visual consciousness, and which, to the unphilosophical mind, is the strongest evidence of the independent existence of outer objects. Such visual consciousness is shown to be ultimately a system of arbitrary signs, symbolizing for us certain actual or possible tactual experience—in fact, a language which we learn through custom. The difference between the contents of the visual and the tactual consciousness is absolute; they have no element in common. The visible and visual signs are definitely connected with tactual experiences, and the association between them, which has grown up in our minds through custom or habit, rests upon, or is guaranteed by, the constant conjunction of the two by the will of the Universal Mind. But this synthesis, whether on the objective side as the universal thought or course of nature, or on the subjective side as mental association, is not brought forward prominently by Berkeley. It was at the same time perfectly evident that a quite similar analysis might have been applied to tactual consciousness, which does not give externality in its deepest significance any more than visual; but it was with deliberate purpose that Berkeley at first drew out only one side of his argument. In 1710 the new doctrine received its full statement in the *Principles of Human Knowledge*, where externality in its ultimate sense as independence of all mind is considered; where matter, as an abstract, unperceived substance or cause, is shown to be an impossible and unreal conception; where true substance is affirmed to be conscious spirit, true causality the free activity of such a spirit, while physical substantiality and causality in their new meaning are held to be merely arbitrary but constant relations among phenomena connected subjectively by suggestion or association, conjoined objectively in the Universal Mind. In ultimate analysis, then, nature is conscious experience, and forms the sign or symbol of a divine, universal intelligence and will.

In the preceding year Berkeley had been ordained as deacon, and in 1711 he delivered his *Discourse on Passive Obedience*, in which he deduces moral rules from the intention of God to promote the general happiness, thus working out a theological utilitarianism, which may with advantage be compared with the later expositions of Austin and Mill. From the year 1707 he had been engaged as

college tutor; in 1712 he paid a short visit to England, and in April of the following year he was presented by Swift at court. His splendid abilities and fine courteous manners, combined with the purity and uprightness of his character, made him a universal favourite. While in London he published his *Dialogues* (1713), a more popular exposition of his new theory; for exquisite facility of style these are perhaps the finest philosophical writings in the English language. In November of the same year he became chaplain to Lord Peterborough, whom he accompanied on the Continent, returning in August 1714. He travelled again in 1715 as tutor to the son of Dr Ashe, and was absent from England for five years. On his way home he wrote and sent to the French Academy the essay *De Motu*, in which is given a full account of his new conception of causality, the fundamental and all-comprehensive thought in his philosophy. In 1721, during the disturbed state of social relations consequent on the bursting of the great South Sea bubble, he published an *Essay towards preventing the Ruin of Great Britain*, which shows the intense interest he took in all practical affairs. In the same year he returned to Ireland as chaplain to the duke of Grafton, and was made divinity lecturer and university preacher. In 1722 he was appointed to the deanery of Dromore, a post which seems to have entailed no duties, as we find him holding the offices of Hebrew lecturer and senior proctor at the university. The following year brought him an unexpected addition of fortune, Miss Vanhomrigh, Swift's Vanessa, having left him half her property. It would appear that he had only met her once at dinner. In 1724 he was nominated to the rich deanery of Derry, but had hardly been appointed before he was using every effort to resign it in order to devote himself to his enthusiastically conceived scheme of founding a college in the Bermudas, and extending its benefits to the Americans. With infinite exertion he succeeded in obtaining from Government a promise of £20,000, and, after four years spent in preparation, sailed in September 1728, accompanied by some friends and by his wife, daughter of Judge Forster, whom he had married in the preceding month. Their destination was Rhode Island, where they resolved to wait for the promised grant from Government. Three years of quiet retirement and study were spent in the island. Berkeley bought a farm, made many friends, and endeared himself to the inhabitants. But it gradually became apparent that Government would never hand over the promised grant, if indeed they had ever seriously contemplated doing so. Berkeley was therefore compelled reluctantly to give up his cherished plan. Soon after his return he published the fruits of his quiet studies in *Alciphron, or the Minute Philosopher* (1733), a finely written work in the form of dialogue, critically examining the various forms of free-thinking in the age, and bringing forward in antithesis to them his own theory, which shows all nature to be the language of God. The work was extremely popular. In 1734 he was raised to the bishopric of Cloyne, and at once went into residence. The same year, in his *Analyst*, he attacked the higher mathematics as leading to freethinking; this involved him in a hot controversy. The *Querist*, a practical work in the form of questions on what would now be called social or economical philosophy, appeared in three parts, 1735, 1736, 1737. In 1744 was published the *Siris*, partly occasioned by the controversy with regard to tar-water, but rising far above the petty circumstance from which it took its rise, and in its chain of reflections revealing the matured thoughts and wide reading of its author, while opening up hidden depths in the Berkeleyian metaphysics. In 1751 his eldest son died, and in 1752 he removed with his family to Oxford for the sake of his son George who was studying there. On the even-

ing of the 14th January 1753, he expired suddenly and painlessly in the midst of his family. And thus quietly closed one of the purest and most beautiful lives on record. His remains were deposited in Christ Church, Oxford.

Although Berkeley's new principle is susceptible of brief statement, it is by no means equally possible to give in short compass an adequate account of its systematic application to the several problems of philosophy. It may be sufficient here to indicate generally the relation of the new conception to preceding systems, and to inquire how far the principle is metaphysically justifiable. In the philosophies of Descartes and Locke a large share of attention had been directed to the idea of matter, which was held to be the abstract, unperceived background of real experience, and was supposed to give rise to our ideas of external things through its action on the sentient mind. Knowledge being limited to the ideas produced could never extend to the unperceived matter, or substance, or cause which produced them, and it became a problem for speculative science to determine the grounds for the very belief in its existence. Philosophy seemed about to end in scepticism or in materialism. Now Berkeley put this whole problem in a new light by pointing out that a preliminary question must be raised and answered. Before we deduce results from such abstract ideas as cause, substance, matter, we must ask what in reality do these mean,—what is the actual content of consciousness which corresponds to these words? Do not all these ideas, when held to represent something which exists absolutely apart from all knowledge of it, involve a contradiction? Are they not truly, when so regarded, inconceivable, and mere arbitrary figments which cannot possibly be realized in consciousness? In putting this question, not less than in answering it, consists Berkeley's distinct originality as a philosopher. The essence of the answer, as has been already seen, is that the universe is inconceivable apart from mind,—that existence, as such, denotes conscious spirits and the objects of consciousness. Matter and external things, in so far as they are thought to have an existence beyond the circle of consciousness, are impossible, inconceivable, absurd. External things are things known to us in immediate perception. To this conclusion Berkeley seems, in the first place, to have been led by the train of reflection that naturally conducts to subjective or egoistic idealism. It is impossible to overstep the limits of self-consciousness; whatever words I use, whatever notions I have, must refer to and find their meaning in facts of consciousness. And there can be no doubt that in certain, earlier aspects of his theory, where, for example, it appears as a mere analysis of what is meant by reality, it does not rise above this subjective stand-point. But this is by no means the whole or even the principal part of Berkeley's philosophy; it is essentially a theory of causality, and this is brought out gradually under the pressure of difficulties in the first solution of the early problem. To merely subjective idealism, sense percepts differ from ideas of imagination in degree, not in kind; both belong to the individual mind. To Berkeley, however, the difference is fundamental; sense ideas are not due to our own activity, they do not result from our will; they must therefore be produced by some other will,—by the divine intelligence. Sense experience is thus the constant action upon our minds of supreme active intellect, and is not the consequence of dead inert matter. It might appear, therefore, that sensible things had an objective existence in the mind of God; that an idea so soon as it passes out of our consciousness passes into that of God. This is an interpretation, frequently and not without some justice, put upon Berkeley's own expression. But it is not a satisfactory account of his theory. Berkeley is compelled to see that an immediate perception is not a thing, and that what we consider permanent or substantial is not a sensation but a group of qualities, which in ultimate analysis means sensations either immediately felt or such as our experience has taught us would be felt in conjunction with these. Our belief in the reality of a thing may therefore be said to mean assurance that this association in our minds between actual and possible sensations is somehow guaranteed. Further, Berkeley's own theory would never permit him to speak of possible sensations, meaning by that the ideas of sensations called up to our minds by present experience. He could never have held that these afforded any explanation of the permanent existence of real objects. His theory is quite distinct from this, which really amounts to nothing more than subjective idealism. External things are produced by the will of the divine intelligence; they are caused, and caused in a regular order; there exist in the divine mind archetypes, of which sense experience may be said to be the realization in our finite minds. Our belief in the permanence of something which corresponds to the association in our minds of actual and possible sensations means belief in the orderliness of nature; and that is merely assurance that the universe is pervaded and regulated by mind. Human science is occupied in endeavouring to decipher the divine ideas which find realization in our limited experience, in trying to interpret the divine language of which natural things are the words and letters, and in striving to bring human conceptions into harmony with the divine thoughts.

Instead, therefore, of fate or necessity, or matter, or the unknown, a living, active mind is looked upon as the centre and spring of the universe, and this is the essence of the Berkeleyian metaphysics.

It may be safely said that the deeper aspects of Berkeley's new thought have been almost universally neglected or misunderstood. Of his spiritual empiricism only one side has been accepted by later thinkers, and has been looked upon as the whole. The subjective mechanism of association which with Berkeley is but part of the true explanation, and is dependent on the objective realization in the divine mind, has been received as in itself a satisfactory theory. *Sunt Cogitationes* has been regarded by thinkers who profess themselves Berkeleyians as the one proposition warranted by consciousness; the empiricism of his philosophy has been eagerly welcomed, while the spiritual intuition, without which the whole is to Berkeley meaningless, has been cast aside. For this he is himself in no small measure to blame. The deeper spiritual intuition, present from the first, was only brought into clear relief in order to meet difficulties in the earlier statements; and the extension of the intuition itself beyond the limits of our own consciousness, which completely removes his position from mere subjectivism, rests on foundations uncritically assumed, and at first sight irreconcilable with certain positions of his system. The necessity and universality of the judgments of causality and substantiality are taken for granted; and there is no investigation of the place held by these notions in the mental constitution. The relation between the divine mind and finite intelligence, at first thought as that of agent and recipient, is complicated and obscure when the necessity for explaining the permanence of real things comes forward. The divine archetypes, according to which sensible experience is regulated and in which it finds its real objectivity, are different in kind from mere sense ideas, and the question then arises whether in these we have not again the "things as they are," which Berkeley at first so contemptuously dismissed. He leaves it undetermined whether or not our knowledge of sense things, which is never entirely presentative, involves some reference to this objective course of nature or thought of the divine mind. And if so, what is the nature of the notions necessarily implied in the simplest knowledge of a thing, as distinct from mere sense feeling? That in knowing objects certain thoughts are implied which are not presentations or their copies, is at times dimly seen by Berkeley himself; but he was content to propound a question with regard to those notions, and to look upon them as merely Locke's ideas of relation. Such ideas of relation are in truth the stumbling-block in Locke's philosophy, and Berkeley's empiricism is equally far from accounting for them.

With all these defects, however, Berkeley's new conception marks a distinct stage of progress in human thought. His true place in the history of speculation may be seen from the simple observation that the difficulties or obscurities in his scheme are really the points on which later philosophy has turned. He once for all lifted the problem of metaphysics to a higher level, and, in conjunction with his great successor, Hume, determined the form into which later metaphysical questions have been thrown.

The classical edition of Berkeley's works is that by Professor Fraser (4 vols.—vols. i.—iii., *Works*; vol. iv., *Life, Letters, and Dissertation on his Philosophy*, Clarendon Press, 1871), who has been the first, there and in various essays, to exhibit the true form of Berkeley's philosophy. See also Ueberweg's notes to his translation of the *Principles* (1869); Krauth's American edition of the *Principles*, with Prof. Fraser's introduction and notes, and a translation of those of Ueberweg; Collyns Simon, *Universal Immaterialism* (1847); *Nature and Elements of the External World* (1862); Friedrich, *Ueber Berkeley's Idealismus* (1870). Discussions on various points of Berkeley's doctrine will be found in Fichte's *Zeitschrift*, vol. lvi. sqq.; Mill's *Dissertations*, vols. ii. and iv.; Huxley, *Critiques and Addresses*, p. 320, sqq.; Ferrier, *Remains*, vol. ii. Two adverse reviews of the *Theory of Vision* may also be noted—Bailey, *Review of Berkeley's Theory of Vision* (1842); and Abbott, *Sight and Touch* (1864); with the last may be compared Monck, *Space and Vision*. (R. AD.)

BERKHAMPSTEAD, GREAT, a market-town of England, in the county of Herts, 26 miles N.W. of London, on the Junction Canal and the North-Western Railway. It has a spacious cruciform church, with a tower of the 16th century, a market-house, erected in 1860, which includes a corn exchange and a library, a grammar school, a free school, several almshouses, a jail, &c. Straw-plaiting and the manufacture of small wooden wares are the principal industries. The town is of considerable antiquity, and was one of the royal residences under the Mercian kings, a distinction which it again enjoyed under Henry II. The castle, at that time a fortress of some importance, was bestowed on the Black Prince, and since then the manor has remained an appanage of the successive princes of

Wales. The poet Cowper was born in the rectory in 1731. Population in 1872, 4083.

BERKSHIRE, one of the south-eastern counties of England, bounded on the N.E. by Buckinghamshire, from which it is separated by the Thames; N. by Oxfordshire and a small portion of Gloucester; W. by Wilts; S. by Hants; and S.E. by Surrey. It is of a very irregular figure, extending from east to west fully 60 miles; while from north to south, in its widest part, it is about 35 miles, and in its narrowest part, at Reading, not more than 7. Area, 450,132 acres.

In respect to the character of its surface and soil, the county may be conveniently regarded as consisting of two divisions—the eastern, containing the six districts east and inclusive of Bradfield, and the western, embracing the remaining six districts. The surface of the eastern division is partly level and partly undulating, and in many places, as at Windsor, it is beautifully wooded. The highest ground is at Bagshot Heath, a sandy plateau 460 feet high, at the south-east corner of the county. The character of the soil in the eastern division is considered poorer than in the west, and consists mostly of blue clay and gravel, resting on a chalk formation. In this division, tillage, dairy farming, and manufacturing are more extensively pursued than in the other, and it is consequently more thickly populated. The western or upland division contains a large proportion of elevated ground, and its soil is a reddish gravelly loam. Here a line of chalk hills, reaching from Aldworth to Ashbury (which includes the Ilsley Downs), runs east and west, separating the two fertile valleys of the Kennet and the Thames. Another range of chalk downs, known as the Cuckamsley Hills, extends from the neighbourhood of Wantage to the border of Wiltshire, the highest point being White-Horse Hill, 893 feet high. In this part of the county the rearing of sheep is largely carried on, while in the district of Hungerford, which is situated in the basin of the Kennet, the soil allows a large breadth of tillage, and a greater number of persons are engaged in agricultural pursuits there than any other district in the county.

Wheat and beans are extensively cultivated; and a species of peat found on the banks of the Kennet yields ashes that are of great value to the soils near that river. In the vales of Kennet and White-Horse dairy farming predominates. Near Faringdon pigs are extensively reared, and the breed is celebrated. The estate of Pusey, in the district of Faringdon, presents one of the best examples of high class farming, while in the eastern division the model farms in the district of Wokingham, the property of John Walter, Esq., M.P. for the county, may be referred to as the best specimens of the recent improvements in agriculture. Mr Walter's mansion at Bearwood, too, is an instance of a baronial residence seldom equalled in extent and admirable disposition.

Few parts of England are better supplied with the facilities of water communication than the county of Berks. It is connected by means of the Thames with London on the one hand, and on the other with the Severn at two separate points on that river;—one through the Thames and Severn canal, some miles below Gloucester, the other through the River Kennet and the Kennet and Avon canal by Bath and Bristol. Besides the navigable rivers, it enjoys the benefit of the Wilts and Berks canal, which connects the Thames at Abingdon with the Avon at Trowbridge in Wiltshire, and communicates with the Kennet and Avon canal. The other rivers, which all finally fall into the Thames, are the Ock, the Loddon, the Enborne, and the Lambourn.

The turnpike roads are generally good. The principal of these are the roads from London to Bath and Oxford,

both of which enter the county at Maidenhead, and soon afterwards separate, the former running S.W. to Reading, the latter nearly N.W. to Henley. Eight branches of railway intersect the county, viz., the Great Western, from Maidenhead to Reading, and from Reading to Shrivenham; the branch from Didcot to Hincksey and Oxford; the Berks and Hants railway branches from Reading to Mortimer and Basingstoke, and from Reading to Newbury and Hungerford; the Reading, Guildford, and Reigate line; and the Reading, Wokingham, and Staines branch of the South-Western Railway.

Berkshire is not a manufacturing county, although the woollen manufacture was introduced here as long ago as the time of the Tudors. There are some paper-mills, particularly in the neighbourhood of Newbury, and an extensive biscuit manufactory at Reading. The chief trade consists in agricultural produce.

From its vicinity to the metropolis, the salubrity or the climate, and the general beauty of the country, few counties have more numerous seats of the nobility and gentry than are to be found in Berkshire. Among these stands pre-eminent the royal castle of Windsor, the favourite residence of our monarchs during many centuries. There may also be mentioned Wytham Abbey (earl of Abingdon); Ashdown Park and Hamstead Marshall (earl of Craven); Coleshill (earl of Radnor); Shrivenham House (Viscount Barrington); Easthampstead Park (marquis of Downshire); Englefield House (R. Benyon, Esq., M.P.); Aldermaston House (Higford Burr, Esq.); South Hill Park (Rt. Hon. Sir W. G. Hayter, Bart.); Pusey House (Sydney Bouverie Pusey, Esq.); Bearwood (John Walter, Esq., M.P.); and Lockinge House (Col. Loyd Lindsay, V.C., M.P.)

The county comprises 20 hundreds, 6 municipal boroughs, and 142 parishes, besides 14 others chiefly or partially included in Berks. The county is in the diocese of Oxford and the ecclesiastical province of Canterbury. It forms an archdeaconry by itself, and is divided into the four rural deaneries of Abingdon, Newbury, Reading, and Wallingford. It is in the Oxford circuit, and the assizes are held at Reading. County courts are held at Abingdon, Faringdon, Hungerford, Maidenhead, Newbury, Reading, Wallingford, Wantage, Windsor, and Wokingham.

Berkshire returns 3 members to parliament for the county, 2 for the borough of Reading, and 1 for each of the boroughs of Abingdon, Wallingford, and Windsor.

At the three decennial enumerations the population of the county was as follows:—

	Houses.	Population.	Increase per cent.
1851.....	35,075	170,065	5
1861.....	37,324	176,256	4
1871.....	41,821	196,475	10

The chief increase has taken place in the eastern division of the county, where the density of the population amounted in 1871 to about 1 person to 1.5 acre; while in the western it was 1 person to 3.5 acres. The principal towns in the county are Reading (pop. 32,324), Windsor (11,769), Newbury (6602), Maidenhead (6173), Abingdon (5799), Wantage (3295), and Wallingford (2972). The population of the parliamentary districts differs from the above, as these districts include persons located beyond the boundaries of the boroughs.

Antiquities, both Roman and Saxon, are numerous in various parts of this county. Watling Street enters Berkshire from Bedfordshire at the village of Streatley, and leaves it at Newbury. Another Roman road passes from Reading to Newbury, where it divides into two branches, one passing to Marlborough in Wiltshire, and the other to Cirencester in Gloucestershire. A branch of Icknield Street passes from Wallingford to Wantage. Near Wan-

tage is a Roman camp, of a quadrangular form; and there are other remains of encampments at East Hampstead near Wokingham, at Pusey, on White-Horse Hill, and at Sindun Hill, near Wallingford. At Lawrence Waltham there is a Roman fort, and near Denchworth a fortress said to have been built by Canute the Dane, called Cherbury Castle. Barrows are very numerous in the downs in the N.W. of the county, particularly between Lambourn and Wantage. Dragon Hill is supposed to have been the burying-place of a British prince called Uther Pendragon, and near to it is Uffington Castle, supposed to be of Danish construction. On White-Horse Hill, in the same vicinity, is the rude figure of what is called a horse; although it bears a greater resemblance to a greyhound. It has been formed by cutting away the turf and leaving the chalk bare. It occupies nearly an acre of land, and is said to have been executed by Alfred to celebrate a victory over the Danes in the reign of his brother Ethelred, in the year 872. This memorial, not having been "scoured" for many years, is nearly obliterated by the growth of the turf over the chalk. It is part of the property of the earl of Craven.

Berkshire comprehended the principality inhabited by the *Atrébates*, a tribe of people who originally migrated from Gaul. Under the Romans it formed part of *Britannia Prima*, and during the Saxon heptarchy was included in the kingdom of the West Saxons. When Alfred divided the country into shires, hundreds, and parishes, it obtained the name of *Beroceshire*, which was subsequently changed to that which it now bears. It was frequently the scene of military operations from the time of Offa down to the troubles in the reign of Charles I. During the civil war two battles were fought at Newbury. In 1643, after a siege, Reading was taken by the Parliamentary forces, and the Royalist party were expelled from the whole of the county except Wallingford.

BERLIN is the chief city of the province of Brandenburg, the capital of the kingdom of Prussia, and since 1871 the metropolis of the German empire. It is situated in 52° 30' 16" N. lat. and 13° 23' 16" E. long., and lies about 120 feet above the level of the Baltic. Its longest day is 16 hours 47 minutes; its shortest day is 7 hours 36 minutes. Its average annual temperature is 48.2° Fahr., the maximum recorded heat being 99.5° in 1819, and the maximum cold -16.1° Fahr. in 1823. The average rainfall is 21.74 Prussian inches, and Berlin has on the average 120 rainy, 29 snowy, and 17 foggy days in a year.

The city is built on what was originally in part a sandy and in part a marshy district on both sides of the River Spree, not far from its junction with the Havel, one of the principal tributaries of the Elbe. By its canals it has also direct water communication with the Oder. The Spree rises in the mountain region of Upper Lusatia, is navigable for the last 97 English miles of its course, enters Berlin on the S.E. as a broad sluggish stream, retaining an average width of 420 feet, and a depth of 6 or 7 feet, until it approaches the centre of the city, where it has a sudden fall of 4 feet, and leaves the city on the N.W., after receiving the waters of the Panke, again as a dull and sluggish stream, with an average width of only 160 feet, but with its depth increased to from 12 to 14 feet. Within the boundaries of the city it feeds canals, and divides into branches, which, however, reunite. The river, with its canals and branches, is crossed by about 50 bridges, of which very few have any claim to architectural beauty. Among these latter may be mentioned the Schlossbrücke, built after designs by Schinkel in the years 1822-24, with its eight colossal figures of white marble, representing the ideal stages of a warrior's career. The statues are for the most part of high artistic merit. They stand on granite pedestals, and are the work of Drake, Wolff, and other

eminent sculptors. The Kurfürstenbrücke is another bridge which merits notice, on account of the equestrian bronze statue of the Great Elector by which it is adorned.

The etymology of the word "Berlin" is doubtful. Some derive it from Celtic roots—*ber*, small, short, and *lyn*, a lake. Others regard it as a Wend word, meaning a free, open place. Others, again, regard it as coming from the word *wert*, a river island. Professor Paul Cassel, in a recently published dissertation, derives it from the German word "Brühl," a marshy district, and the Slavonic termination "in;" thus Brühl, by the regular transmutation Bühr (compare Germ. *bren-nen* and Eng. burn), Bührlin. The question is likely to remain in the stage of more or less probable conjecture.

Similar obscurity rests on the origin of the city. The hypotheses which carried it back to the early years of the Christian era have been wholly abandoned. Even the Margrave Albert the Bear (d. 1170) is no longer unquestionably regarded as its founder, and the tendency of opinion now is to date its origin from the time of his great-grandsons, Otho and John. When first alluded to, what is now Berlin was spoken of as two towns, Cöln and Berlin. The first authentic document concerning the former is from the year 1237, concerning the latter from the year 1244, and it is with these dates that the trustworthy history of the city begins. Fidelein, in his *Diplomatische Beiträge zur Geschichte der Stadt Berlin*, vol. iii., divides the history of the town, from its origin to the times of the Reformation, into three periods. The first of these, down to the year 1307, is the period during which the two towns had a separate administration; the second, from 1307 to 1442, dates from the initiation of the joint administration of the two towns to its consummation. The third period extends from 1442 to 1539, when the two towns embraced the reformed faith.

In the year 1565 the town had already a population of 12,000. About ninety years later, after the close of the Thirty Years' War, it had sunk to 6000. At the death of the Great Elector in 1688, it had risen to 20,000. The Elector Frederick III., afterwards King Frederick I., sought to make it worthy of a royal "residence," to which rank it had been raised in 1701. From that time onwards Berlin grew steadily in extent, splendour, and population. Frederick the Great found it, at his accession in 1740, with 90,000 inhabitants. At the accession of Frederick William IV. in 1840 it had 331,894, and in the month of July 1874, thirty-four years later, the population had nearly trebled, the exact numbers in that year being 949,144. The two original townships of Cöln and Berlin have grown into the sixteen townships into which the city is now divided, covering about 25 English square miles of land, and Berlin now takes its place as the fourth, perhaps the third, greatest city in Europe, surpassed only by London, Paris, and possibly Vienna. Its importance is now such that a bill, at present submitted by the Government to the consideration of the Legislature, proposes to raise it to the rank of a province of the kingdom.

Progress and prosperity have, however, been chequered by reverses and humiliations. The 17th century saw the Imperialists and Swedes, under Wallenstein and under Gustavus Adolphus, as enemies, within its walls; the 18th century, the Austrians and Russians, during the Seven Years' War; the 19th century, Napoleon I. and the French; and the year 1848 witnessed the bloody scenes of the March Revolution. But the development of constitutional government, and the triumphs of 1866 and 1870, have wiped out the memory of these dark spots in the history of the Prussian capital.

The town has grown in splendour as it has increased in numbers. Daniel, in the fourth volume of his *Handbook*