

the Transition style, surmounted by five towers. The town also possesses a "Rathhaus," of modern erection, a court-house, a hospital, a gymnasium, and a theatre. By far the finest of its buildings, however, is its famous university, which occupies the larger part of the southern frontage of the town. The present establishment only dates from 1818, and owes its existence to the king of Prussia; but as early as 1786 the academy which had been founded about nine years before was raised by Archbishop Maximilian Frederick of Cologne to the rank of a university, and continued to exercise its functions till 1794, when it was dissolved by the last elector. The building now occupied was originally the electoral palace, constructed about 1717 out of the materials of the old fortifications. It was remodelled after the town came into Prussian possession. There are five faculties in the university—a legal, a medical, and a philosophic, and one of Catholic and another of Protestant theology; in 1873 it was attended by 752 students, ranking as eighth among the German universities. The library numbers upwards of 200,000 volumes; and the antiquarian museum contains a valuable collection of Roman relics discovered in the neighbourhood. A separate building for anatomical operations is situated in the extensive garden to the south of the university; and an academy of agriculture, with a natural history museum and botanic garden attached, is established in the palace of Clemensruhe at Poppelsdorf, which is reached by a fine avenue about a mile long, bordered on both sides by a double row of chestnut trees. A splendid observatory, long under the charge of Argelander, stands on the south side of the road. Among the numerous men of learning who have taught or teach in Bonn are the theologians Bleek and Lange, Hermes and Achterfeldt; the jurists Walter and Böcking; Harless, Mayer, and Rindfleisch in the medical faculty; and Niebuhr, Welcker, Ritschl, Brandis, Lassen, Simrock, Diez, and Sybel, in various branches of literature and history. Beethoven was born in the town, and a statue was erected to him in the Münsterplatz in 1845. Niebuhr is buried in the cemetery outside of the Sternthor, where a monument was placed to his memory by Frederick William IV. But for its university Bonn would be a place of comparatively little importance, its industry and commerce being of moderate dimensions. Its principal manufactures are cotton and silk, earthenware, soap, vitriol, and tobacco; and its trade, chiefly carried on by the Rhine, consists largely of corn and wine. Population in 1871, 26,030. Bonn (*Bonna* or *Castra Bonnensia*), originally a town of the Ubii, became at an early period the site of a Roman military settlement, and as such is frequently mentioned by Tacitus. It was the scene, in 70 A.D., of a battle, in which the Romans were defeated by Claudius Civilis, the valiant leader of the Batavians. Greatly reduced by successive barbarian inroads it was restored about 359 by the Emperor Julian, but its importance only dates from 1268, when it became the residence of the electors of Cologne. During the various wars that devastated Germany in the 16th, 17th, and 18th centuries, the town was frequently besieged and occupied by the several belligerents, but continued to belong to the electors till 1794, when the French took possession of it. At the peace of Lunéville they were formally recognized in their occupation; but by the Vienna Congress of 1814 the town was made over to Prussia. The fortifications had been dismantled in 1717.

BONNER, or BONEER, EDMUND, an English prelate, notorious for his persecutions of the Protestants during the reign of Queen Mary, was born at Hanley in Worcestershire, about the end of the 15th century, and generally passed for the natural son of George Savage, a priest who

was the natural son of Sir John Savage of Clifton in the same county. Strype in his *Memorials of Cranmer*, however, says he was positively assured that Bonner was the legitimate offspring of a poor man, who lived in a cottage long afterwards known as Boner's place. About 1512 he entered as a student of Broadgate Hall (now Pembroke College), Oxford; and in 1519 he was admitted as bachelor of the canon and of the civil law. Having been admitted into orders, he obtained some preferment in the diocese of Worcester. In 1525 he took his degree as doctor, and attracted the notice and patronage of Wolsey. Bonner was with the cardinal at Cawood when he was arrested on charge of high treason. After the death of Wolsey he adopted Lutheran sentiments, and insinuated himself into the favour of Henry VIII., who made him one of his chaplains, and employed him in several embassies abroad. In 1532 he was sent to Rome with Sir Edward Carne, to answer for the king, who had been cited to appear in person or by proxy in regard to the divorce of Queen Catharine. In 1533, being again despatched to Pope Clement VII., then at Marselles, to intimate Henry's appeal to a future general council from the sentence pronounced against his divorce, he threatened the Pope with so much resolution, that his holiness talked of having him burned alive or thrown into a cauldron of melted lead. Clement did not foresee that the man whom he had thus menaced with the flames was destined to burn heretics in England in support of the very faith which, under Henry, he had lent his aid to overthrow. In 1538, being then ambassador at the court of France, he was nominated bishop of Hereford; but before consecration, he was translated to the see of London, and was enthroned in April 1540. When Henry VIII. died in 1547, Bonner was ambassador at the court of the Emperor Charles V. During Henry's reign he was constantly zealous in his opposition to the Pope, and favoured the Reformation in obedience to the king, who exacted rigid compliance with all his caprices. On the accession of Edward, however, Bonner refused to take the oath of supremacy, and was committed to the Fleet, where he remained until he promised obedience to the laws. After his release he assented to the Reformation, but with such manifest reluctance, that he was twice reprimanded by the Privy Council, and in 1549 was, after a long trial, committed to the Marshalsea, and deprived of his bishopric, to which, however, he was restored on the accession of Mary; and soon afterwards he was appointed, in place of Cranmer, vicegerent and president of the Convocation. From this time he became the chief instrument of persecution, and is said to have condemned no less than 200 Protestants to the flames in the space of three years. On the accession of Elizabeth he appeared with the rest of the bishops at Highgate, to congratulate her; but the queen refused to permit him to kiss her hand. Having, in the second year of her reign, refused to take the oath of supremacy, he was again committed to the Marshalsea, where he died, September 5, 1569, after a confinement of ten years. The character of Bonner was remarkable for obstinacy and inflexibility in everything save principle; yet even in this respect it exhibits some striking contrasts. In his early career he accommodated his principles to his convenience and ambition; after his return to Catholicism, he remained steadfast to the church, and, when disgraced, bore his deprivation and imprisonment with apparent resignation. The charge of atheism brought against one so defiled with blood was superfluous. He was constitutionally merciless and austere, fitted by nature for a persecutor, and equally capable of employing the same ardent zeal either against or in favour of any cause that he espoused. Among his works are, *Responsum et Exhortatio in Laudem Sacerdotii*,

a preface in Gardener's treatise *De Vera Obedientia*, and several homilies.

BONNET, CHARLES, an eminent naturalist and philosophical writer, was born at Geneva on the 13th March 1720. The Bonnets, a French family whom the religious persecution in the 16th century had driven into Switzerland, were accustomed to fill important posts in the Genevese Government; and young Charles Bonnet was expected to qualify himself to make use of the family influence by becoming a lawyer. But dry legal technicalities proved to be anything but attractive to his rich and imaginative mind, all the more that he found in the study of nature an employment which was not also a task. He made law his profession, but he never seems to have permitted it to interfere seriously with his favourite pursuits. The account of the ant-lion in Pluche's *Spectacle de la Nature*, which he chanced to read in his sixteenth year, turned his attention in particular to the wonders of insect life. He procured Réaumur's work on insects, and with the help of live specimens succeeded, after minute and patient investigation, in adding many observations to those of Réaumur and Pluche. The result of two years' labour he made known to Réaumur, who was naturally not a little surprised to find so much sagacity and power of research in a youth of eighteen. In 1740 Bonnet communicated to the Academy of Sciences a paper containing a series of experiments establishing what is now termed parthenogenesis in aphides or tree-lice, which obtained for him the honour of being admitted a corresponding member of the academy. In 1741 he instituted a set of experiments respecting the reproduction of worms by fission; and in the following year he discovered that the respiration of caterpillars and butterflies is performed by pores, to which the name of *stigmata* has since been given. In 1743 he was admitted a fellow of the Royal Society; and in the same year he became a doctor of laws,—his last act in connection with a profession which had ever been distasteful to him. His first published work appeared in 1745, entitled *Traité d'Insectologie*, in which were collected his various discoveries regarding insects, along with a preface on the development of germs and the scale of organized beings. Botany, particularly the leaves of plants, next attracted the attention of Bonnet; and after several years of diligent study, rendered irksome by the increasing weakness of his eyesight, he published, in 1754, one of the most original and interesting of his works, *Traité de l'usage des feuilles*; in which among other things he advances many considerations tending to show that plants are endowed with powers of sensation and discernment. But Bonnet's eyesight, which threatened to fail altogether, now caused him to turn his thoughts from investigation to speculation. In 1754 his *Essai de Psychologie* was published anonymously in London. This was followed in 1760 by the *Essai analytique sur les facultés de l'âme*, in which he develops his views regarding the physiological conditions of mental activity. He returned to physical science, but to the speculative side of it, in his *Considérations sur les corps organisés*, Amsterdam, 1762. The principal objects of this work were to give, in an abridged form, all the most interesting and well-ascertained facts respecting the origin, development, and reproduction of organized bodies, to refute the theory of *epigenesis*, and to explain and defend the doctrine of pre-existent germs. In his *Contemplation de la Nature*, which next appeared (1764-5), one of his most popular and delightful works, he sets forth, in eloquent language, the theory that all the beings in nature form a gradual scale rising from lowest to highest, without any break in its continuity. His last important work is entitled *Palingénésie Philosophique*, (Geneva, 1769); in it he treats of the past and future of living beings, and supports the idea of the survival of all

animals, and the perfecting of their faculties in a future state. Bonnet's life was singularly uneventful. He seems never to have passed beyond the limits of his native country; nor does he appear to have taken any part in public affairs except for the comparatively short period between 1752 to 1768, during which he was a member of the council of the republic. The last twenty-five years of his life he spent in the country, simple and regular in his mode of life, easy in his circumstances, and happy in a small circle of friends. His wife, whom he married in 1756, was a lady of the family of De la Rive. They had no children, but Madame Bonnet's nephew, the celebrated De Saussure, was brought up as their son. Bonnet died, after a long and painful illness, on the 20th May 1793.

The outlines of Bonnet's philosophical system may be set forth in a few sentences. Man, according to him, is a mixed being, composed of two distinct substances,—mind and body,—the one immaterial and the other material. In what manner the two are connected we do not know, but of this at least we are certain, that bodily activity is a necessary condition of thought. All knowledge originates in sensations; sensations themselves follow (but whether as physical effects or merely as sequents Bonnet will not say) vibrations in the various nerves appropriate to each; and lastly, the nerves are made to vibrate by the action of outward objects upon them. A nerve once set in motion by a particular object contracts a certain tendency to reproduce that motion; so that when it a second time receives an impression from the same object it vibrates with less resistance. It is the sensation accompanying this increased flexibility in the nerve that is, according to Bonnet, the condition of memory. When reflection—that is, the active as distinguished from the merely passive element in mind—is applied to the acquisition and combination of sensations, those abstract ideas are formed which are usually placed in opposition to sensations, but which are thus, no matter how refined they may appear, sensations in combination only. That which puts the mind into activity is pleasure or pain; happiness is the end of human existence. Bonnet's metaphysical theory is based on two principles borrowed from Leibnitz,—first, that there are not successive acts of creation, but that the universe is completed by the original act of the divine will, and thereafter moves on by its own inherent force; and, secondly, that there is no gap in the continuity of existence. The divine Being, according to Bonnet, originally created a multitude of germs in a graduated scale, each with an inherent power of self-development. At every successive step in the progress of the globe, these germs, or what has been developed in their place, advance nearer to perfection; if some advanced and others did not there would be a gap in the continuity of the chain. Thus not man only but all other forms of existence are immortal. Nor is it man's mind merely; his body also will pass into the higher stage, not, indeed, the body he now possesses, but a finer one of which the germ at present exists within him. This is equally true of the other animals, who also possess a germ that will develop itself in the next stage; and every individual begins each successive stage with that amount of perfection and of knowledge which he had when he left the previous stage. It is impossible, however, to reach absolute perfection, because the distance is infinite. It is difficult to reconcile this last proposition with the law of continuity, if that law is to be accepted, as Bonnet seems to accept it, as an absolute principle of the universe, embracing all existence divine and created, for surely the interval between the divine Being and the highest created being, constantly lessening though it be, is a break in the continuity of the chain. It is also difficult to understand whether the constant advance to perfection is performed by every individual on his own account, or only by each race of beings as a

deteriorated. At first only one side was written on, the back being frequently stained. Parchments written on both sides are called by Pliny *opisthographi*. The term *booc-fell* is found, in early English, to designate this material. Its dearness in classical times led to the practice of erasing the original writing for the purpose of substituting new. Parchments so obliterated are known as *palimpsests*, from a Greek word signifying twice rubbed, or prepared for writing; and they are alluded to under that name by Cicero (*ad Div.* vii. 18). Paper made from cotton (*charta bombycina*) came into use, according to Montfaucon, towards the end of the 9th or the beginning of the 10th century; and the invention was opportune, as it checked the further use of palimpsests, which, from the scarcity of parchment and the demand for books of devotion, had imperilled the preservation of much classical literature. Cicero's *De Republica* was discovered by Angelo Mai in the Vatican library written under a commentary of St Augustine on the Psalms; and the Institutions of Gaius, in the library of the chapter at Verona, were deciphered in like manner under the works of St Jerome. But the invention of linen paper gave the first real impulse to book production. The precise date of this invention is disputed; Mabillon refers it to the 12th century. Montfaucon, however, found no specimens earlier than 1270, and Maffei none before 1300; the most numerous of them belong to the 14th century. Scaliger ascribes the invention to the Germans, Maffei to the Italians, and others to certain Greek refugees at Basel; while Duhalde refers it to the Chinese, and Prideaux to the Saracens in Spain. For further particulars respecting the various substances of early books, the reader may consult the first volume of the *Nouveau traité de diplomatique*, by the Benedictines of St Maur, and the *Essai sur l'histoire du Parchemin et du Vélin*, by Peignot, who has given a list of authorities on this subject.

The form of ancient books differed with the materials of which they were composed. When flexible matter came into use, it was found convenient to make books in the form of rolls, and the two names are synonymous in legal phraseology to this day. The papyrus, and afterwards the parchment, was joined together to form one sheet, and then rolled upon a staff into a volume (*volumen*). When an author divided his work into portions or "books," in the literary sense of the word, each division was usually a *volumen* by itself,—thus Ovid speaks of his fifteen books of the *Metamorphoses* as so many *volumina*; and the same was done when an entire work was too bulky to be rolled on one stick. The staff in the Herculaneum rolls is concealed by the papyrus, but it usually projected, the ends being ornamented with bosses (*umbilici*) of wood and ivory. The title (*titulus index*) was either suspended like a ticket to the roll, or pasted on the outside. These rolls were frequently protected by a parchment cover; they were deposited in a cylindrical box (*capsa* or *scrinium*), or were arranged horizontally in cases round the walls of a library, as at Herculaneum. Many books could probably be stowed away in small compass by this means; and the smallness of the rooms devoted in ancient times to such collections is readily explained in this manner. The *volumen*, however, in most cases, was far from containing as much as our ordinary books, even in an octavo form. The square form, originally applied to the *codices* or wax tablets joined together in the way described above, was resorted to afterwards for separate leaves, the same name being retained with altered materials. Martial speaks of this later kind of *codex* as a novelty in his day. It was common, however, in Greek MSS., among the earliest of which Montfaucon discovered few specimens of rolls. The term *liber* in the 4th century is found applied to both rolls and squared leaves, but the former were discontinued in the

Middle Ages, and covers of boards were gradually introduced, the leaves being stitched together as well as folded.

The internal arrangement of books has undergone many modifications, which belong, however, chiefly to the subject of early writing. At first the letters were divided only into lines, then into separate words, and these by degrees were noted with accents, and distributed by points and stops into periods, paragraphs, chapters, and other divisions. In some countries, as among the Orientals, the direction of the characters was from right to left, in others, as among the Northern and Western nations, from left to right. The early Greeks followed the two directions alternately,—a method which was called *boustrophedon*, from its analogy to the path of oxen when ploughing. In most countries the lines run from side to side, but in some, particularly among the Chinese, their direction is vertical.

The diffusion of early books concerns especially the literary historian. Their scarcity before printing is illustrated by the conditions attached to purchase or loan; but it must be remembered that a particular book might easily bear a monopoly price, and that this is no test of the cost of those which might be multiplied by transcription. When, however, the small number of copyists in the Dark Ages and even later is considered, the high prices recorded in many instances do not appear surprising. A curious collection of scattered notices of this kind is given in the first volume of Warton's *History of English Poetry*. A catalogue of the books in the Sorbonne in 1292, consisting of upwards of 1000 volumes, is mentioned by Chevillier¹ as having been valued at 3812 livres, equivalent, according to an English writer, to as many pounds sterling of the present day. In 1425, when the English became masters of Paris, the duke of Bedford, regent of France, sent the whole of the royal library into England; and the collection, which amounted to only 853 volumes, was valued at 2223 livres.

The characteristics of early printed books are noticed under the head of BIBLIOGRAPHY (*q. v.*) The folio and quarto sizes, originally adopted from the largeness of the types in the infancy of printing, are now generally restricted to works of bulk, as dictionaries and other books of reference. The size of a printed book is named from the dimensions of the paper and the number of leaves into which it is folded. The ordinary sizes for a long time were royal, demy, and crown; and the demy 8vo is now the commonest size in use. Post and foolscap are frequently but inaccurately described in catalogues as duodecimo. "Paper-moulds," says Mr W. Blades,² a competent authority on this subject, "have fixed conventional sizes; but since the introduction of machines for making paper, and the consequent disuse of moulds, makers work more by a given number of inches than by names of sizes. Consequently, the correct description of book sizes has become impossible, and the trade describe the new by the names of the old size they most resemble. To determine the real size of a bound book," he adds, "find the signature (a letter or figure at the bottom of the page), and count the leaves (not pages) to the next. A further test is the binder's thread in the middle of the sheet; the number of leaves from each thread to the next will give the same result. But these rules do not apply to old black-letter books and those of the 15th and 16th centuries, in which the most satisfactory test is the water-mark. The rule is:—a folio volume will have all the water-marks in the middle of the page; a quarto has the water-mark folded in half in the back of the book, still midway between the top and bottom; in an octavo it is at the back, but at the top, and often

¹ *Origines de l'imprimerie de Paris*, p. 370.

² *Notes and Queries*. 3d series, ix. 83.

considerably cropped by the binder's plough; and a 12mo and 16mo have the water-mark on the fore-edge." For further information regarding MS. books see PALÆOGRAPHY, and for printed books BIBLIOGRAPHY. (E. F. T.)

Bookselling.

The trade in books is of a very ancient date. The early poets and orators recited their effusions in public to induce their hearers to possess written copies of their poems or orations. Frequently they were taken down *viva voce*, and transcripts sold to such as were wealthy enough to purchase. In the book of Jeremiah the prophet is represented as dictating to Baruch the scribe, who, when questioned, described the mode in which his book was written. These scribes were, in fact, the earliest booksellers, and supplied copies as they were demanded. Aristotle, we are told, possessed a somewhat extensive library; and Plato is recorded to have paid the large sum of one hundred minæ for three small treatises of Philolaus the Pythagorean. When the Alexandrian library was founded about 300 B.C., various expedients were resorted to for the purpose of procuring books, and this appears to have stimulated the energies of the Athenian booksellers, who were termed *βιβλίων κάπηλοι*. In Rome, towards the end of the Republic, it became the fashion to have a library as part of the household furniture; and the booksellers, *librarii* (Cic. *De Leg.*, iii. 20) or *bibliopoleæ* (Martial, iv. 71, xiii. 3), carried on a flourishing trade. Their shops (*taberna librarii*, Cicero, *Phil.*, ii. 9) were chiefly in the Argiletum, and in the Vicus Sandalarius. On the door, or on the side posts, was a list of the books on sale; and Martial (i. 118), who mentions this also, says that a copy of his First Book of Epigrams might be purchased for five denarii. In the time of Augustus the great booksellers were the Sosii. According to Justinian (ii. 1, 33), a law was passed securing to the scribes the property in the materials used; and in this may, perhaps, be traced the first germ of the modern law of copyright.

The spread of Christianity naturally created a great demand for copies of the Gospels and other sacred books, and later on for Missals and other devotional volumes for church and private use. Benedict Biscop, the founder of the abbey at Wearmouth in England, brought home with him from France (671) a whole cargo of books, part of which he had "bought," but from whom is not mentioned. Passing by the intermediate ages we find that, previous to the Reformation, the text writers or stationers (*stacyoneres*), who sold copies of the books then in use,—the A B C, the Paternoster, Creed, Ave Maria, and other MS. copies of prayers, in the neighbourhood of St Paul's, London,—were, in 1403, formed into a guild. Some of these "stacyoneres" had stalls or stations built against the very walls of the cathedral itself, in the same manner as they are still to be found in some of the older Continental cities. In Mr Anstey's *Munimenta Academica*, published under the direction of the Master of the Rolls, we catch a glimpse of the "sworn" university bookseller or stationer, John More of Oxford, who apparently first supplied pupils with their books, and then acted the part of a pawnbroker. Mr Anstey says (p. 77), "The fact is that they (the students) mostly could not afford to buy books, and had they been able, would not have found the advantage so considerable as might be supposed, the instruction given being almost wholly oral. The chief source of supplying books was by purchase from the university sworn stationers, who had to a great extent a monopoly. Of such books there were plainly very large numbers constantly changing hands." Besides the sworn stationers there were many booksellers in Oxford who were not sworn; for one of the statutes, passed in the year 1373, expressly recites that, in consequence of their pres-

ence, "books of great value are sold and carried away from Oxford, the owners of them are cheated, and the sworn stationers are deprived of their lawful business." It was therefore enacted that no bookseller except two sworn stationers, or their deputies, should sell any book being either his own property or that of another, exceeding half a mark in value, under pain of imprisonment, or, if the offence was repeated, of abjuring his trade within the university.

"The trade in bookselling seems," says Hallam, "to have been established at Paris and Bologna in the 12th century; the lawyers and universities called it into life. It is very improbable that it existed in what we properly call the Dark Ages. Peter of Blois mentions a book which he had bought of a public dealer (*a quodam publico mangone librorum*); but we do not find many distinct accounts of them till the next age. These dealers were denominated *stationarii*, perhaps from the open stalls at which they carried on their business, though *statio* is a general word for a shop in low Latin. They appear, by the old statutes of the University of Paris, and by those of Bologna, to have sold books upon commission, and are sometimes, though not uniformly, distinguished from the *librarii*, a word which, having originally been confined to the copyists of books, was afterwards applied to those who traded in them. They sold parchment and other materials of writing, which have retained the name of stationery, and they naturally exercised the kindred occupations of binding and decorating. They probably employed transcribers; we find at least that there was a profession of copyists in the universities and in large cities."

The modern system of bookselling dates from soon after the introduction of printing. The earliest printers were also editors and booksellers; but being unable to sell every copy of the works they printed, they had agents at most of the seats of learning. Antony Koburger, who introduced the art of printing into Nuremberg in 1470, although a printer, was more of a bookseller; for, besides his own sixteen shops, we are informed by his biographers that he had agents for the sale of his books in every city of Christendom. Wynkin de Worde, who succeeded to Caxton's press in Westminster, had a shop in Fleet Street.

The religious dissensions of the Continent, and the Reformation in England under Henry VIII. and Edward VI., created a great demand for books; but in England neither Tudor nor Stuart could tolerate a free press, and various efforts were made to curb it. The first patent for the office of king's printer was granted to Thomas Berthelet by Henry VIII. in 1529, but only such books as were first licensed were to be printed. At that time even the purchase or possession of an unlicensed book was a punishable offence. In 1556 (3 and 4 Philip and Mary) the London Company of Stationers was incorporated, and very extensive powers were granted in order that obnoxious books might be repressed. In the following reigns the Star Chamber exercised a pretty effectual censorship; but in spite of all precaution, such was the demand for books of a polemical nature, that many were printed abroad and surreptitiously introduced into England. Queen Elizabeth interfered but little with books except when they emanated from Roman Catholics, or touched upon her royal prerogatives; and towards the end of her reign, and during that of her pedantic successor, James, bookselling flourished. Archbishop Laud, who was no friend to booksellers, introduced many arbitrary restrictions; but they were all, or nearly all, removed during the time of the Commonwealth. So much had bookselling increased during the Protectorate that, in 1658, was published *A Catalogue of the most Vendible Books in England, digested under the heads of Divinity, History, Physic, &c., with School Books, Hebrew, Greek, and Latin, and an Introduction, for the use of*

