

graphic precision, they are singularly cold in colour and void of imagination. Marstrand (1810-1875) was by far the most richly-gifted of the pupils of Eckersberg; his best works are full of brilliant qualities, and would command admiration in any country. Sonne (born 1801) has made himself a name by painting a series of large canvases representing the victories of the Danish people in 1848, and their misfortunes in 1864. He has tenderness and a skill in composition that make up for the absence of greater gifts. Vernehen (born 1823) has shown an eminent talent in depicting the Danes in their country-life, at serious or mournful occasions; he carries stiffness and reserve to their greatest excess. Exner (born 1825) is far more genial and charming, a genre-painter of a high order, full of delicate fancy, and rejoicing in sunlight, humour, and soft gay colours. He has produced a large number of studies of the fast-disappearing habits and dresses peculiar to the peasants. Dalsgaard (born 1824) has followed the practice of Marstrand with originality and success. Skovgaard was the most eminent Danish landscape painter. Among the more recent artists the most powerful is Carl Bloch, who has produced some very brilliant work.

In sculpture the single name of Berthel Thorwaldsen (1770-1844) has raised Denmark to a great pre-eminence. As the opponent of the smooth and effeminate style of Canova, Thorwaldsen inaugurated a true revival of the masculine spirit of the ancients. He had an extraordinary fecundity, and conceived designs with such rapidity that he almost abandoned the use of the chisel in his later years. All the works he was able to leave he bequeathed to the Danish state. The Thorwaldsen Museum, in which these works were placed, is one of the greatest attractions of the capital, and is truly a national monument. Two disciples of Thorwaldsen's continued his tradition with ability, and one with a spark of his great genius. The few works completed during the short life of Bissen prove that he possessed very considerable force and imagination. Jerichas had a milder and more common-place talent.

In architecture the Danes have little to boast of. The most picturesque buildings in Copenhagen belong to the style of Christian IV., a sort of Tudor. One of the most important, the palace of Rosenborg, was actually designed by Inigo Jones. A few cathedral churches, as those of Ribe and Viborg, deserve attention. The country towns are poorly and monotonously built.

The Danes have a great delight in music. Their first great composer was Christoph Weyse (1774-1842), who represented in music the romanticism of Oehlenschläger in poetry and Steffens in philosophy. The comic operas of Weyse are especially admired. Frederick Kuhlau (1786-1832) was a talented and a hated rival of Weyse, who put to charming music a great many of Oehlenschläger's lyrical dramas. The two most eminent living Danish composers are Hartmann (born 1805), who is allied to the latest German school, and whom Wagner has warmly commended, and Gade (born 1817), the pupil and friend of Mendelssohn, whose concerted pieces are admired and performed in all parts of Europe. Heise is the best Danish song-writer, a most imaginative and delicate musician.

No good work exists on Danish literature. See, however, Nyrup, *Den danske Digtekunsts Historie*, 1800-1808, and *Armindeligt Litteraturlexikon*, 1813-1820; Petersen, *Litteraturhistorie*; Overskou, *Den danske Skueplads*, 1854; Brandes, *Kritiker og Portrætter*, 1870; Brandes, *Danske Digtere*, 1877.

On the fine arts the following works may be consulted:—*Sammendrag af statistiske Oplysninger angaaende Kongeriget Danmark*, Copenhagen, 1876; Trap (J. P.), *Statistisk-topographisk Beskrivelse af Kongeriget Danmark*, 4 vols., Copenhagen, 1857-63; Julius Lange, *Nutids-Kunst*, Copenhagen, 1873; Carl Thrane, *Danske Komponister*, Copenhagen, 1875; E. C. Otté, *Scandinavian History*, London, 1874; N. M. Petersen, *Danmarks Historie i Hedenold*, 3 vols., Copenhagen, 1854-55. (E. W. G.)

DENNIS, JOHN (1657-1734), a critic and poet of some celebrity in his own day, was the son of a saddler in London, where he was born in the year 1657. He received the first branches of education at Harrow and at Caius College, Cambridge, from which after four years' residence he removed to Trinity Hall. In 1683 he graduated M.A. When he quitted the university he made the tour of Europe, in the course of which he acquired a strong prejudice against foreign manners and customs, and became confirmed, as was natural in one born and brought up a Whig, in his dislike of foreign Governments. On his return to England he became acquainted with Dryden, Wycherly, Congreve, and Southerne, whose conversation, inspiring him with a passion for poetry, and a contempt for every attainment that had not in it something of the *belles lettres*, diverted him from entering any profession. He lived for a time on a small fortune he had inherited from an uncle, but this was soon squandered. Through the patronage of the duke of Marlborough, to whom he had recommended himself by his zeal for the Protestant succession, he obtained a place in the customs worth £120 per annum. After some years, however, his extravagance reduced him to the necessity of disposing of it; but, in selling it, he reserved to himself an annuity for a term of years. Outliving this term, he was in the closing years of his life reduced to extreme necessity.

Dennis was the author of several small poems of little merit, and one or two plays which possess none, though one at least of the latter was received with considerable favour at the time of its production, on account of its hitting the strongest popular prejudice then existing. His tragedy of *Love Asserted*, produced at Lincoln's Inn Fields theatre in 1704, was fiercely anti-French, and as such met with warm sympathy and approval. Dennis conceived the insane idea that by writing it he had roused the implacable resentment of the French Government, and amusing stories are told of the precautions he thought it necessary to take in consequence. He is said to have visited the duke of Marlborough, previous to the negotiations for the peace of Utrecht, and asked him to secure the insertion of a special clause in the treaty protecting his person from vengeance. On another occasion the appearance of an approaching vessel is said to have caused him to flee to London from a friend's house on the coast of Sussex. His tragedy of *Appius and Virginia*, produced at Drury Lane in 1709, was unsuccessful. It is memorable only on account of a peculiar kind of thunder used in the performance, which was both novel and effective. A few nights after the failure of his play Dennis, sitting in the pit, heard the thunder introduced into the tragedy of *Macbeth*, whereupon he rose and cried to the audience, "They won't act my tragedy, but they steal my thunder."

But for his inordinate vanity, and an infirmity of temper that fell little short of insanity, Dennis might have made some mark in literature as a critic. His reviews of Pope's *Essay on Man* and Addison's *Cato* showed considerable discernment and not a little wit; but they were disfigured by bitter personal feeling. As his attacks were almost always on persons of abilities greatly superior to his own, like Addison, Steele, and Pope, their replies usually turned opinion strongly against him, irritating his testy temper, and rendering him a perpetual torment to himself. Pope pilloried him in the *Dunciad*, and in the following epigram—

Should Dennis publish you had stabb'd your brother,
Lampoon'd your monarch, or debauch'd your mother,—
Say, what revenge on Dennis can be had?
Too dull for laughter, for reply too mad;
On one so poor you cannot take the law;
On one so old your sword you scorn to draw.
Uncag'd then let the harmless monster rage,
Secure in dulness, madness, want, and age.

At length, after a long life of vicissitudes, he was compelled to receive obligations from those whom he had been continually reviling. In the very close of his days a play was acted for his benefit at the little theatre in the Haymarket, through the united interests of Thomson, Mallet, and Pope. It is much to the credit of Pope especially that, notwithstanding the gross manner in which Dennis had calumniated him on many occasions, he took part in the arrangements, and even wrote an occasional prologue to the play, which was spoken by Cibber. Not long after this Dennis died, on the 6th of January 1734.

DENON, DOMINIQUE VIVANT, BARON DE (1747-1825), artist and archæologist, was born at Châlon-sur-Saône on the 4th January 1747. His parents sent him to Paris to study law, but he showed from the first a decided preference for art and polite literature, and he soon gave up his professional studies. In his twenty-third year he produced a comedy, *Le bon père*, which obtained a *succès d'estime*, its author having already made himself a favourite in society by his agreeable manners and exceptional conversational powers. He brought himself under the notice of Louis XV. with such address as to establish at once his position in court favour. The king intrusted him with the collection and arrangement of a cabinet of medals and antique gems for Madame de Pompadour, and subsequently appointed him attaché to the French embassy at St Petersburg. On the accession of Louis XVI. Denon was transferred to Sweden; but he returned, after a brief interval, to Paris with the ambassador M. de Vergennes, who had been appointed foreign minister. In 1775 Denon was sent on a special mission to Switzerland, and availed himself of the opportunity to visit Voltaire at Ferney. He took a portrait of the philosopher, which was engraved and published on his return to Paris. His next diplomatic appointment was to Naples, where he spent seven years, first as secretary to the embassy and afterwards as *chargé d'affaires*. He devoted this period to a careful study of the monuments of ancient art, collecting many specimens and making drawings of others. He also perfected himself in etching and mezzotint engraving. The death of his patron, M. de Vergennes, in 1787, led to his recall, and the rest of his life was given mainly to artistic pursuits. On his return to Paris he was admitted a member of the Academy of Painting. After a brief interval he returned to Italy, and resided for some years chiefly at Venice. He also visited Florence and Bologna, and afterwards went to Switzerland. While there he heard that his property had been confiscated, and his name placed on the list of the proscribed, and with characteristic courage he resolved at once to return to Paris. His situation was critical, but he found support and protection in the friendship of the painter David, who obtained for him a commission to furnish designs for republican costumes. This he did to the satisfaction of the Revolutionists, and his name was removed from the list of emigrants. When the terrors of the Revolution were over, Denon was one of the numerous band of eminent men who found a congenial resort in the house of Madame de Beauharnais. Here he formed the acquaintance of Bonaparte, to whose fortunes he attached himself with the happy instinct of one who was always quick to discern the coming power. On the special invitation of the general he joined the expedition to Egypt, and thus found the opportunity of gathering the materials for his most important literary and artistic work. He accompanied General Desaix to Upper Egypt, and made numerous sketches of the monuments of ancient art, sometimes under the very fire of the enemy. The results were published in his *Voyage dans la basse et la haute Egypte* (2 vols. fol., with 141 plates, Paris, 1802), a work which crowned his reputation both as an archæologist and as an

artist. In 1804 he was appointed by Napoleon to the important office of director-general of museums, which he filled greatly to the benefit of art and artists until the restoration in 1815, when he had to retire. He was a devoted friend of Napoleon, whom he accompanied in his expeditions to Austria, Spain, and Poland, taking sketches with his wonted fearlessness on the various battle-fields, and guiding the conqueror in his choice of spoils of art from the various cities that were pillaged. After his retirement he occupied himself with the preparation of a profusely illustrated history of ancient and modern art, in which he had the co-operation of several skilful engravers. He died at Paris on the 27th April 1825, leaving the work unfinished. It was published posthumously, with an explanatory text by Amaury Duval under the title *Monumens des Arts du dessin chez les peuples tant anciens que modernes, recueillis par Vivant Denon* (4 vols. fol. Paris, 1829).

DENTISTRY. The province of dentistry embraces the art of treating diseases and lesions of teeth, and supplying artificial substitutes in the place of these organs when lost. Disease of the teeth is not always a mere local affection, but may, and very generally does, arise from constitutional causes. With cases of the latter description the dentist, unless qualified as a surgeon or physician, is not in a position to deal, except in so far as to repair or ameliorate the local affections produced. The morbid conditions of the system leading in some way to disorders of the dental tissues are various and dissimilar in their nature; and the exact connection between such morbid conditions and their effects upon the teeth is not well understood. In this way the diagnosis, the treatment, and the removal of the cause might be considered more properly the duty of the general practitioner than of the specialist. Up to a very recent date this has been more particularly the case, dentists until lately having in the greater number of instances been educated with a view to proficiency in the mechanical rather than the surgical department of their profession; while what surgical knowledge they, in a few cases, did acquire was confined to certain facts connected exclusively with the organs upon which they were expected to operate. From the *Lancet* for 3d June 1876 it appears that not much more than fifty of all the numerous body of so-called surgeon-dentists of the United Kingdom then possessed in reality any medical or surgical diploma at all.¹

¹ Indeed it is comparatively of late years that dentistry has occupied anything like a properly recognized position among the different departments of minor surgery; for long it was practised to a large extent as a superadded means of livelihood by persons engaged in some other pursuit, and without any professional education whatever. The blacksmith, barber, watchmaker, and others of the same class were the dentists of every village and country town; while even in some of our larger cities dentists of the kind were till lately to be found practising under the very shadow of universities and medical schools. The explanation of this seems to have been that mere tooth-drawing constituted the surgical dentistry of these days; and as the operation is one demanding muscular strength and manual dexterity more than anatomical knowledge or surgical skill, and was performed as successfully in many cases by the irregular as by the regular practitioners, it had not many attractions for medical men. It was accordingly consigned to the uneducated and the charlatan, who did not fall with proverbial unscrupulousness to parade their speciality as sufficient to confer a surgical status on those performing it, and entitle them to the designation of *surgeon dentist*,—a designation which has ever since been applied without discrimination or distinction to qualified or unqualified practitioners in this particular branch. In 1840 or 1841 this state of matters seems to have attracted the attention of the profession, since, after much consideration, some anxiety was manifested by its more respectable members to be recognized in the new Medical Act of 1843, then being introduced by Sir James Graham. Both then and later, however, the fully qualified medical men objected to the fractionally qualified being made to appear as on an equal footing with themselves. The profession may at this time be said to have divided itself into three sections—1st, those who desired to see all dentists fully qualified surgeons; 2d, those who wished them to have only a certain amount of surgical knowledge,

A special examination in dentistry now exists in connection with the Royal College of Surgeons of England for students training in that profession, a certain amount of information being required in various branches of medicine and surgery. A curriculum of study in these departments has been arranged; and candidates who can produce certificates of attendance on it are admitted for examination, and, if found fit, receive a certificate entitling them to practise as dentists.

In America this special system has for long been adopted and carried to a much greater extent. Colleges of dentistry are established in many of the leading cities there, each with what they designate a faculty of professors in the various departments of the art. In the *Dental Cosmos*, vol. xvii. No. 11, an American periodical, advertisements appear of seven different dental colleges, with seventy-eight professors, demonstrators, &c. The professorships in these institutions comprehend those of mechanical dentistry, operative dentistry, dental physiology, dental pathology, dental therapeutics, mechanical dentistry and metallurgy, institutes of dentistry, &c. In each a diploma in dentistry—"doctor of dental surgery," or of "dental medicine," as the case may be—is conferred, the general fee for which seems to be \$30, on the candidates having fulfilled the curriculum and passed the examination.

In the medical schools and examining boards in Scotland all this is different. No special or partial diploma is there given by the Royal College of Surgeons or other licensing body, while diseases of the teeth and adjacent structures are understood to be made subjects of lecture and examination in the same manner as other regional or special diseases occurring in the practice of medicine or surgery; and great as the improvements certainly are which such arrangements as those of England and America are on the old system, still it is to be hoped, and it is likely, that ere long practitioners devoting themselves to dental surgery will—like oculists, or aurists, or obstetricians, or other physicians or surgeons restricting themselves to or selecting one branch of practice in preference to another—be at the same time fully qualified medical men.

Number of Teeth.¹—The complement of teeth in the adult human subject amounts to 32—16 in the upper, and 16 in the lower jaw. These are divided into what are termed incisors, canines, bicuspid or small grinders, and molars or the large grinding teeth. The order in which these different forms of teeth are placed in each jaw is the following:—there are four incisors in front; immediately behind these on each side is placed the canine or eye tooth; next come the bicuspid, two on each side; and behind these again are placed on each side the three molar teeth, the last of which is sometimes termed the wisdom tooth, from its generally appearing so late as from eighteen to twenty-five.

In the infant or milk teeth, or, as they are more pro-

perly denominated, the temporary teeth, the number and class of these organs is different. Here only 20 members of the series exist, and are divided into four incisors, two canines, and four molar teeth, similarly placed—ten in each jaw. The four temporary molar teeth represent or rather precede the four bicuspid teeth of the adult set, while the six molars above and below of the adult are not represented in the temporary set at all. In other words, the true permanent molar teeth have no predecessors.

Dentition.—The temporary set appear, or are cut, as follows. The two lower central incisors appear between the sixth and eighth months of infant life—these are generally succeeded in a few weeks by those of the upper jaw; the two lateral incisors of the upper jaw next appear about the eighth or ninth month, and those of the lower jaw quickly follow; the anterior molars of the lower jaw are cut about the twelfth, fourteenth, or sixteenth month, and those of the upper jaw immediately after; the canines appear about the seventeenth or eighteenth month, generally those in the upper jaw first; and before the age of two and a half years the second milk molars have usually commenced to appear, thus completing the temporary set of teeth at the age of about three years.

The temporary set of teeth begin to be shed between the sixth and eighth years of life. Previous to this, however, the first permanent molars are cut, generally about the age of seven. These are followed by the central and then by the lateral incisors. Next come the anterior bicuspid about nine years old; the posterior about ten or eleven; the canines about twelve; the second molars at thirteen; and the last molars, or wisdom teeth, from the eighteenth to the twenty-fifth years of life. Deviations from the order and time of appearance of both sets occur, but the above may be regarded as the general rule in the evolution of the temporary and permanent teeth of the human subject.

Structure and Form of Teeth.—The structure of both sets may be said to be the same. The body of each tooth is composed of a dense bony substance termed dentine. This is invested on the crown by a cap of still more dense material termed enamel; while the root, or fang, is coated externally by a layer of a softer substance, closely resembling ordinary bone, and termed cement. In the centre of each fang, and extending into the body of the tooth, is a hollow canal termed the pulp cavity, for the passage of vessels and nerves.

In form the incisors of both jaws are single-fanged, as are also the canines. The bicuspid of the lower jaw are also single-fanged, while those of the upper jaw are occasionally double-fanged, or have a single fang bifid at its extremity. The lower molars, both temporary and permanent, possess two fangs, one behind the other. These two fangs are widely separated in the temporary molars; while, on the other hand, in the posterior molars of the permanent set they are not uncommonly united into one. The upper molars of both sets possess three fangs—two external or cheek fangs placed one behind the other, and a third situated on that side of the tooth next the palate.

No such spaces exist between any of the teeth in the dental arch of man as occur in the lower animals. In this way, where the jaw is small, or where unusually rapid or simultaneous appearance of the members of the second, or persistence of those of the first set occurs, irregularity of the teeth results. This is sometimes increased by the evolution of supernumerary teeth, these being generally out of the line of the others; and occasionally matters are rendered worse by the natural teeth being themselves of unusually large size. Cases also occur in which the number of the teeth is defective, and some rare instances have been recorded where these organs never appeared at all.

The remedy in cases of dental irregularity is to remove

by extraction such teeth as are in the way, and by mechanical contrivances, known as regulating plates, to apply pressure in such a manner as will move the misplaced tooth or teeth into their normal position, and retain them there for some time afterwards. Such plates are constructed on the same principles, and of the same materials, as the bases of artificial sets, which will come to be treated of afterwards. It not unfrequently happens that nature, if left to herself, effects a wonderful improvement in cases of dental irregularity. This is frequently observable where it is the upper canines which are misplaced. These teeth when appearing, as they often do, outside and much above the necks of the adjoining teeth, occupy a long time in descending, and in certain cases the anterior portion of the maxillary arch seems to enlarge sufficiently to afford space for their almost perfect arrangement during this period. The same thing occurs, but to a less marked extent, in the case of other teeth; in general, however, nature requires to be assisted by art in some way, as has been above indicated, where the irregularity exists to any great amount.

Diseases of Teeth.—The teeth being living organisms are, like other structures in the animal body, subject to disease. Some of the diseases bear a close resemblance to mere chemical decomposition, such as occurs in dead or moribund matter, and at a certain stage of some dental affections a process of the kind does no doubt occur, but this is so mixed up with, and accompanied and preceded by vital action, that to consider it as a mere chemical or physical lesion would be pathologically incorrect. Various arguments have been advanced by its advocates in support of the chemical theory of dental caries; but however ingenious or specious these at first sight appear, they fail to explain many phenomena in the origin, the period of occurrence, and the stages and progress of this disease, unless the vital element in its nature be also taken into account.

Dental caries, or decay of the teeth, may briefly be described as consisting in a previous imperfect development, or in the access of some morbid action interfering with the nutrition or vitality of their tissues, thus rendering them liable to any destructive agencies to which they may be subjected, by which they become disorganized, disintegrated, and broken down, leaving the sensitive pulp exposed, whereby acute pain is occasioned, especially when the destruction of the protective tooth substance has been rapid. Sometimes the process of decay is insidious and unobserved. Its advent is then supposed to have been sudden, and its progress more speedy than has really been the case. This, however, in many instances arises from the condition of matters being overlooked until the enamel, which resists destruction longest, being undermined and falling in, reveals for the first time the cavity existing underneath. Pain, probably also for the first time, is then experienced from exposure and irritation of the dentinal pulp, and toothache, as it is termed, is produced.

Necrosis, or death of a whole tooth, is another lesion to which these organs are liable. This may result from either acute or chronic inflammation in the tissues connecting them with the jaw, or from a blow, or from any other cause leading to their vascular supply being cut off. The necrosis may involve the whole tooth, or it may be partial—as, for example, where it is limited to one fang of a multiple fanged tooth. In these cases there may be no breaking down of texture, but the tooth becomes discoloured, loosened, extruded, and at last detached from its socket, from which after a time, and generally after considerable uneasiness, it drops out.

Exostosis, or a morbidly increased growth of certain parts of a tooth, being in almost every instance confined to the cement substance described as covering the fang or root, is an affection somewhat obscure in its outward

symptoms. It is generally a consequence of previous disease of the tooth, leading to chronic inflammation of the textures covering the fang and lining the socket (or alveolus) in which it is implanted. This leads to a deposition of new material in the cement till that substance appears in nodular masses attached to or surrounding the apex of each fang, and sometimes uniting several of such fangs into one. The presence of this additional and increasing bulk of hard tissue within the inclosing socket produces pain of a severe and somewhat anomalous character by pressure on the adjacent nerves, which is often mistaken for neuralgia or tic of a less unaccountable origin. It further acts within the unyielding bony socket referred to as a means of rendering removal of the tooth much more difficult, owing to the bulbous extremity of the enlarged fang acting like a rivet in its fixation. Generally, however, the teeth in which exostosis occurs have been too long the subjects of irritation and decay not to be suspected when obscure pain of a less localized nature exists in their vicinity, and not unfrequently there is found round the necks of teeth or stumps so affected a red and tumid condition of the gum, sufficiently indicative of the state of matters below to warrant their extraction.

Alveolar abscess, or gum boil, as it is popularly denominated, is a localized inflammation going on to suppuration, and generally confined to the tissues surrounding the apex of a tooth fang. The pain usually commences with a feeling of tenderness and enlargement or lengthening of the whole tooth. The gum becomes swollen and tender over the whole depth of the root, generally to a greater extent on the outer side of the jaw. The face also becomes swollen, and the glands in the neighbourhood of the jaw feel enlarged and tender. The pain is not commonly continuous, but rather remitting in its character, sometimes ceasing altogether—only, however, to be followed by an increased attack, while its repeated exacerbations night and day lead in many cases to very considerable constitutional disturbance. After a time the purulent matter secreted makes its way to the surface, sometimes finding an escape alongside of or through the pulp cavity of the fang, and very frequently, as the name given to the disease indicates, by pointing and discharging itself through the gum.

Occasionally, instead of pointing on the surface of the gum, the matter takes a more indirect course and points on the surface of the cheek, bursting and leaving an open sore there which seldom closes until the tooth or stump has been extracted. At an early stage of this disease fomentations and other modes of relieving inflammatory action do good, but evacuating the matter by means of incisions or extraction of the offending tooth are the only reliable remedies at a later period.

Teething.—What is termed dentition, although in its widest sense properly including the development of the teeth within, as well as their subsequent appearance through, the superimposed tissues, is generally restricted in its application to the latter division of this process, more especially as it occurs in connection with the temporary or milk set, during the period of early infancy. The genesis, increment, and evolution of these organs involve so much of what is purely physiological, and would entail the discussion of so many points of a histological nature, that only the latter stages of evolution or cutting of the teeth can be referred to here. Regarding this occurrence, the most vague and contradictory opinions have been entertained. Erroneous notions of its nature, and of the exact manner in which to account for many of its phenomena, have been and still are promulgated. A number of morbid affections incident during infancy are set down as clearly attributable to the tooth's penetration of its inclosing tissues, and considered by many authorities as of every day

¹ For anatomy of the dental system see p 232 of the present volume.

occurrence; while the views advanced with reference to the pathology and treatment of such cases, suppositional or otherwise, are equally various and conflicting. The probable solution of the difficulty seems to be that, while evil consequences may in certain instances be traceable to dentition, the frequency and importance of such cases is very much exaggerated.

Extraction.—This constitutes the most important operation of a surgical nature falling under the care of the dentist, and is chiefly called for where the condition of the tooth, from disease or injury, precludes the possibility of saving it by stopping or other means. The operation is also frequently resorted to where the teeth are too crowded in the jaw, or where they are irremediably misplaced, or where supernumerary members of the series exist and occasion inconvenience. In order to extract any tooth successfully, there is demanded a knowledge of what its configuration normally ought to be, and of the proper instrument to use; and, along with these, the condition to which decay or other disease may have reduced the tooth must be kept in mind while proceeding with the operation.

In seizing a tooth in order to its extraction the part upon which the hold is taken should be sufficiently sound and strong to withstand the force necessary for dislodging the fangs; and to obtain such a hold it is necessary to thrust the grasp of the instrument as far as possible beyond the spot affected by decay. It should then be detached from the walls of its socket in that direction where least resistance is likely to be met. This must be judged of according to circumstances, but in general is indicated by an acquaintance with the anatomy of the structures concerned. After being thus loosened it has merely to be lifted from the jaw to complete the operation. Sometimes a tooth is so firmly secured in the jaw that its own tissue will give way before it will separate from the alveolar cavity in which it is fixed. This is particularly the case in friable teeth; and frequently even in the strongest teeth the root or fangs may be malformed or bent, or secured in such a manner as renders their extraction extremely difficult or altogether impossible by any ordinary means.

The instruments employed in extraction may be divided into those which grasp the tooth between their blades and literally extract or draw it out, such as forceps, and those which apply the dislodging force by acting as a lever in the manner of a crow bar, such instruments being termed elevators. The key, an instrument of great power, but now very properly almost disused, partakes in a measure of the properties of both these instruments, but that in a very imperfect and disadvantageous manner. In some rare cases, however, it may be found of much service when used with circumspection. It is impossible here to enter into detail regarding the different forms of forceps, elevators, and other instruments required in dental surgery; but one great principle may be laid down with respect to all of them, which applies especially to forceps, and that is that their form should be as simple as possible consistently with fitting and grasping securely the particular tooth they are intended to remove, and with conveniently reaching that part of the mouth in which it is situated.

Regulation of Teeth.—In the extraction of teeth for the purpose of affording space in cases of dental irregularity from overcrowding, it often becomes necessary to remove a healthy organ, and before doing so among the permanent teeth certain questions present themselves for consideration. Unless there be a fair probability of such a step being successful it endangers the loss of two teeth should the originally misplaced one be so objectionable and so unyielding to treatment as to require this. In the temporary set the principal disadvantage connected with the removal of

any of their number is when to make room for one permanent tooth two or more temporary ones would require extraction,—as of course space is thus provided at the expense of the second permanent tooth, for which one of the two temporary ones was keeping a place. In this set, however, the objection to removal of any of its series is greatly obviated by the fact that, while the teeth are very soon to be lost at all events, the jaw is increasing in size and progressively affording more and more room itself for the incoming second set. Along with extraction, in the great majority of instances pressure requires to be applied to the misplaced teeth in order to effect their regulation. This has generally to be continuously kept up for a considerable period, and in many cases requires to be maintained after the teeth have been restored to their natural position in order to keep them there until they seem settled in the new locality. Various forms of what are called regulating plates are used for the purpose of applying pressure in this manner, and may be said generally to consist of a framework fitted and fixed to the adjoining teeth something in the same manner as an artificial set, and calculated to afford a fixed point or fulcrum from which to act on the tooth to be moved.

In disease of the dental tissues it is not always necessary to remove the affected organ; such an extreme measure as this is only called for when other remedial means have failed, or appear hopeless. The chief of all dental diseases demanding the dentist's care is, as has been already stated, that known as caries, or decay. It is this affection directly or indirectly that leads to by far the larger number of extractions performed; but it by no means follows that extraction is the only remedy at our command. Many teeth are extracted which might be saved, and the principal method by which this can be effected is by what is termed stopping, or plugging, or filling the teeth.

Stopping.—The operation of stopping a decayed tooth consists in cleaning out the carious cavity and removing all the softened or disintegrated tissue, and shaping and trimming it so as to reduce it to a form fit for receiving and retaining the material with which it is to be filled up. Along with these proceedings it in general becomes necessary to diminish the sensitive condition in which the interior surface of the prepared cavity is left, to remove or destroy any of the vascular and highly nervous pulp which may be protruding into it, and to subdue any inflammation and arrest any discharge which may have been going on in the fang. Various applications and other remedial measures are resorted to for these purposes, the most common being the applying for a time some of the more convenient escharotics on a plug inserted into and left within the cleaned-out cavity till this end is achieved. When thus prepared, the cavity is ready to be filled with whatever substance has been selected to replace the lost tissue, and as nearly as possible to restore the contour of the tooth. The substances employed as permanent stoppings are generally metallic. Gold in the form of foil, or in that condition known as sponge gold, tin in the form of foil, and amalgams, composed of various metals either in a simple or compound condition combined with mercury, are the principal materials in use as stoppings. The oxychlorides, from their being capable of insertion in a plastic state, and quickly acquiring a density and hardness approaching that of tooth bone, are also favourites with many as serviceable fillings; and various preparations of gutta-percha, gum resins, sulphur, and other matters have long been known as valuable, though not very durable, when employed in certain cases.

Dexterity in the insertion of a gold or other foil filling is a matter which can be acquired by experience alone. The general principles are that, the cavity being prepared and

shaped as already described, the gold plug should be secured and consolidated piece by piece, until there is built up a mass filling every part of the vacant space with a uniform consistency of metal which, when finished, ought to present the feeling of being as hard as a piece of solid gold.

The other fillings are more easily dealt with. The same careful preparatory steps are requisite in all fillings, but the insertion of the plug in amalgam and other stoppings being performed while the material is in a plastic condition, the process is rendered much more simple. The cavity should be completely filled, but not over-filled, and the amalgams ought to be used with as little mercury as is at all possible. A number of instruments are necessary for effecting all these various manipulations, but to describe them here would be as unintelligible as it appears unnecessary. Excavators, enamel cutters, burr head drills, points, pluggers, burnishers, &c., are only some of those required; while their modes of use are either by the hand or by mechanical-apparatus, such as what are termed burring-engines, &c. Stopping may be regarded as one of the most valuable operations in modern dentistry; and although it is no guarantee that the tooth stopped is ever after safe from the renewed attack of caries any more than its unstopped neighbours are from its original attack, yet it is surprising how few well-filled teeth are lost by caries recommencing in the stopped cavity.

Besides those already mentioned, the teeth and jaws are subject to a number of disorders and lesions which it would be out of place here to do more than enumerate. Fracture and dislocation of the teeth, ulceration and absorption of the gum, necrosis and exfoliation of the jaw, alteration in the secretions of the mouth, the deposit of tartar or salivary calculus on the teeth or in the salivary ducts, the effect of various medicines and poisonous agents on the teeth, jaws, and mouth generally,—these and the like matters are all of much interest, and more or less connected with dentistry proper. But for information in regard to them the reader must be referred to the various excellent publications treating of them, which have appeared in considerable numbers since dental surgery has occupied more notice and taken a place as one of the recognized specialties of medicine.

Mechanical dentistry, properly so called, consists in the construction of artificial substitutes to supply the place of lost teeth. Stopping and such like operations might also be classed with mechanical dentistry as contrasted with purely surgical treatment; as yet, however, these matters are not quite decided; and the day when the dental surgeon and the mechanical dentist—like the ophthalmic surgeon and the optician—should each occupy a separate sphere has not arrived. All that can here be given is a mere outline of the principles involved in mechanical dentistry. The subject is one comprehending a knowledge of many departments of mechanical science; and to do more than indicate the nature of the various modes of construction, and the processes carried on in the manufacture of artificial teeth, would be useless and inexpedient.

The removal of roots and stumps as a preparatory step in the fitting of artificial teeth is a matter to be decided by the circumstances of the case. The length of time which can be afforded for cicatrization and absorption of the alveolar walls and gum; the presence of adjoining teeth to be left standing, especially front teeth; the fitness of the patient for the operation of extraction,—these and other circumstances must determine what amount of surgical preparation is to precede the supplying of false teeth. As a general rule, the clearer the gums are of stumps and decayed teeth the better; but at the same time certain advantages, transitory as they may be, are in some instances to be derived from their retention.

The jaw, gum, and teeth being then considered as in a suitable condition, the first step in the process is to obtain a plaster cast of the parts,—“the model,” as it is termed. This is done by pressing softened beeswax or some similarly plastic composition against them until they are imbedded and leave an impression in it, giving an exact mould of the gums, remaining teeth, and all other parts on its removal. Plaster of Paris is now run into the mould so obtained, and when this is set and hardened a perfect facsimile of the structures to be fitted is the result.

Any further proceedings now depend upon the mode and material in which the future artificial set is to be constructed. Every set of artificial teeth consists of representatives of the lost organs, modelled in a species of porcelain, and mounted upon a base adjusted to the gum and remaining natural teeth. This base is manufactured in a variety of materials, the principal of which are—(1) metal plate, of gold, platinum, silver, or different alloys; (2) vulcanized caoutchouc, or vulcanite, as it is called; and (3) celluloid base, a composition of collodion and camphor, which has not been long enough tested as yet to rank with the other substances; while (4) the teeth may be mounted merely with as much extraneous material as will support a pin or pivot by which they may be attached as new crowns to a root in which such pivot is firmly inserted. When it is intended that the base shall be of gold or other plate, a metal die and counter have to be made from the plaster model, between which dies the plate is embossed, and the requisite form obtained. The die and counter die are generally made the one in zinc or gun metal, the other in lead or tin; and—unlike the dies from which jewellery patterns, &c., are embossed, and which may serve for thousands of times—the dental dies, having served to emboss the plate for one patient, are of no further use for any other case. The plate being thus far advanced next requires to be adjusted to the mode in which the patient closes the opposing jaw or teeth against it in shutting the mouth—in other words, the “bite” has to be taken, and the artificial teeth, which are to be mounted on the plate, arranged accordingly. Any fastenings supporting or steadying the set have also to be adjusted; and after this, if everything has gone well, the false set should be ready for placing in its destined locality and for use by the wearer.

Should it be proposed to make the base of vulcanite, celluloid base, or a similar material, a different mode of procedure must be adopted. These materials necessitate a greater bulk of substance occupying the mouth than is the case where metal plate is employed. This, however, is in some cases an advantage—since, for instance, where the gum has been greatly diminished in size through absorption, it requires some bulk of material to restore the parts to their normal size, and to give the former natural expression to the features. In preparing a vulcanite base no metal die is necessary. The base is built up in wax directly on the plaster model, and the porcelain teeth adjusted in their places, the bite and attachments being carefully attended to, as described in speaking of plate cases. The set thus made up, and presenting the exact counterpart of what the finished work is intended to be, is now, after testing it and finding it correct and perfect in the mouth, imbedded in Paris plaster as follows. A small box, or “flask,” as it is denominated, of iron or other metal, like one saucer inverted on the top of another, is opened and the model with the wax-built set on it is placed in the lower saucer, which is then filled up with plaster to the level of the wax set. This being allowed to harden is soaped or oiled all over its surface, and the lid of the flask, or what corresponds to the upper saucer, is now placed upon the under portion of the flask. An opening in this covering portion enables plaster to be next poured into it till the enclosed

wax-mounted set is shut up like a fossil in the heart of its stony covering. On the two halves of the flask being separated, the set of course remains firmly secured in the lower portion. Boiling water is now poured over it, and the wax thus melted out, leaving the porcelain teeth undisturbed and *in situ*. A cavity is thus left when the two sides of the flask are again closed, representing exactly the form of the wax removed. Raw vulcanite, or whatever other material of the kind is to be used, is now introduced with care into the space thus left by the removal of the wax. The two sides of the flask are next brought together and maintained there by the pressure of a clamp and screw. The whole is then placed in a vessel termed a vulcanizer, where it is subjected, for the space of from an hour and a quarter to two hours or more, to the action of steam at a temperature ranging up to 320° Fahr., at the end of which time the piece will be found hard and ready for finishing and polishing as may be desirable. In firing and manipulating the celluloid base some modification of this process is required, but as yet the substance is comparatively little used, and would scarcely justify further remark in this place.

What is termed a pivot tooth, again, is an artificial tooth having a metal or sometimes a wooden pin firmly attached to it; and this being inserted into the opened pulp cavity of a healthy fang, the artificial forms a secure and very perfect substitute for the original crown when destroyed by caries, broken off, or otherwise lost.

The use of artificial teeth, especially by those previously unaccustomed to them, requires considerable practice and no small amount of perseverance. The larger the artificial set,—that is, the greater the number of teeth replaced,—the greater the difficulties and the more the discomfort experienced. Time, however, works wonders here as in many other instances. It is not an uncommon thing to find a set which never has fitted well, or one which owing to many years of use does not fit well, being felt so comfortable, through mere habit of wearing it, that on a new and perfectly fitting set being made, the old one, with all its faults, is preferred to the other. A few days' wear, however, of the new one generally brings all the shortcomings of the old glaringly out on its being again attempted to be worn. And in the same manner, a week or two's perseverance generally enables any ordinary set to be worn and used with comfort and facility even by patients who are for the first time under the dentist's care. Various modes of fixation are adopted for the retaining of artificial teeth in their proper situation. Atmospheric pressure, or "suction," as it is termed, is the simplest of all, being merely the hold established between the palate and the set in the same way as occurs between a wet leather "sucker" and the stone it lifts. Another method is by what are termed "spiral springs," a mode only applicable, however, where both an upper and lower set are worn at the same time. And a third style of fixation is where the set is supported upon certain natural teeth among those remaining in the patient's jaw. Each mode has its own advantages, and sometimes one or other method is the only one at all possible to be adopted. This, however, is seldom a difficult matter to decide by any one who has had much experience of either the operating room or the dental workshop.

The art of dentistry is difficult to acquire, and comprehends in itself processes appertaining to several separate branches of manufacture. It is, however, an art which is an extremely useful one, and has done valuable service, since it is not too much to say that in all probability many lives have been saved and a still greater number prolonged through the instrumentality of the aid afforded by the use of artificial teeth.

Literature of the subject and authorities on Dental Surgery.—Goodsir, *Edinburgh Medical Journal*, 1838; Heath, *On Diseases of the Jaws*, 1868; Owen, *On the Skeleton and Teeth*, 1855; Tome's *Dental Surgery*, 1873; Taft's *Operative Dentistry*, 1877; Salter's *Dental Pathology*, 1874; Smith's *Dental Anatomy and Surgery*, 1864, and various papers in *Edinburgh Medical Journal*, *Proceedings of Royal Society of Edinburgh*, &c., from 1852; Cole's *Dental Mechanics*, 1876; Waldeyer, in *Stricker's Handbuch*, 1870; Turner's *Human Anatomy*, 1877; Richardson's *Mechanical Dentistry*, 1860; Wedl's *Pathology of the Teeth*, 1860; various papers, by Kolliker, Arnold, Boll, Robin and Magitot, Huxley, &c., in British and Continental journals. (J. S.)

DENVER, a city of the United States of America, capital of the State of Colorado, and of Arapahoe county, occupies a commanding position on the south bank of the South Platte river, where it is joined by the Cherry creek, 500 miles west of the Missouri,—its elevation above the level of the sea being 5267 feet. The town, which is of recent origin, and mostly built of brick, contains some large public buildings connected with the State administration, as well as a large public school, a State library, and churches belonging to the different denominations. It forms the centre of an important railway system, and has several factories engaged in smelting, iron founding, and wood work, besides a mint for assaying gold and silver ore, breweries, wool mills, &c. The population, which numbered 4759 in 1870, and was estimated at 15,000 in 1873, is rapidly increasing.

DEODAND (*Deo dandum*), in English law, was a personal chattel (any animal or thing) which, on account of its having caused the death of a human being, was forfeited to the king for pious uses. Blackstone, while tracing in the custom an expiatory design, alludes to analogous Jewish and Greek laws,¹ which required that that what occasions a man's death should be destroyed. In such usages the notion of the punishment of an animal or thing, or of its being morally affected from having caused the death of a man, seems to be implied. The forfeiture of the offending instrument in no way depends on the guilt of the owner. The imputation of guilt to inanimate objects or to the lower animals, repugnant as it is to our habits of thought, is not inconsistent with what we know of the ideas of uncivilized races. In English law, deodands came to be regarded as mere forfeitures to the king, and the rules on which they depended were not easily explained by any key in the possession of the old commentators. The law distinguished, for instance, between a thing in motion and a thing standing still. If a horse or other animal in motion killed a person, whether infant or adult, or if a cart run over him, it was forfeited as a deodand. On the other hand, if death were caused by falling from a cart or a horse at rest, the law made the chattel a deodand if the person killed were an adult, but not if he were a person below the years of discretion. Blackstone accounts for the greater severity against things in motion by saying that in such cases the owner is more usually at fault, an explanation which is doubtful in point of fact, and would certainly not account for other instances of the same tendency. Thus, where a man's death is caused by a thing not in motion, that part only which is the immediate cause is forfeited, as "if a man be climbing up the wheel of a cart, and is killed by falling from it, the wheel alone is a deodand;" whereas, if the cart were in motion, not only the wheel but all that moves along with it (as the cart and the loading) are forfeited. A similar distinction is to be found in Britton. Where a man is killed by a vessel at rest the cargo is not deodand; where the vessel is under sail, hull and cargo are both deodand. For the distinction between the death of a child and the death of an adult Blackstone accounts by suggesting that the child "was presumed incapable of

¹ Compare also the rule of the Twelve Tables, by which an animal which had inflicted mischief might be surrendered in lieu of compensation.

actual sin, and therefore needed no deodand to purchase propitiatory masses; but every adult who died in actual sin stood in need of such atonement, according to the humane superstition of the founders of the English law." Sir Matthew Hale's explanation was that the child could not take care of himself, whereon Blackstone asks why the owner should save his forfeiture on account of the imbecility of the child, which ought to have been an additional reason for caution. The finding of a jury was necessary to constitute a deodand, and the investigation of the value of the instrument by which death was caused occupies an important place among the provisions of our early criminal law. It became a necessary part of an indictment to state the nature and value of the weapon employed—as, that the stroke was given by a certain penknife, of the value of sixpence—so that the king might have his deodand. Accidents on the high seas did not cause forfeiture, being beyond the domain of the common law; but it would appear that in the case of ships in fresh water, the law as quoted above from Britton held good. The king might grant his right to deodands to another.

In later times these forfeitures, so unintelligible in their purpose, so capricious and unjust in operation, became extremely unpopular; and juries, with the connivance of judges, found deodands of trifling value, so as to defeat the inequitable claim. But deodands were not abolished till the 9 and 10 Vict. c. 62 was passed, whereby it is enacted that "there shall be no forfeiture of any chattel for or in respect of the same having caused the death of a man; and no coroner's jury sworn to inquire, upon the sight of any dead body, how the deceased came by his death, shall find any forfeiture of any chattel which may have moved to or caused the death of the deceased, or any deodand whatsoever; and it shall not be necessary in any indictment or inquisition for homicide to allege the value of the instrument which caused the death of the deceased, or to allege that the same was of no value." The date of this Act (1846) may suggest the great inconvenience which the law, if it had remained in operation, would have caused to railway and other enterprise in which loss of life is a frequent occurrence.

DEPRÈS, JOSQUIN (1440-1521), also called Desprez, and, by a Latinized form of his name, Jodocus Pratenensis or a Prato, a celebrated musical composer, was born about 1440 at Vermand, near St Quentin, in French Flanders. He was a pupil of Ockenheim, the great contrapuntist, and himself one of the most learned musicians of his time. In spite of his great fame, the accounts of his life are vague and scanty, and even the place of his birth has only lately been established beyond dispute—Belgians, Germans, Italians, and Frenchmen claiming him as their countryman. M. Fétis, the well-known historian of music, has contributed greatly towards elucidating the doubtful points, and to that author's *Biographie Universelle* the reader is referred for more detailed information. In his early youth Josquin seems to have been a member of the choir of the collegiate church at St Quentin; when his voice changed he went (about 1455) to Ockenheim to take lessons in counterpoint; afterwards he again lived at his birth-place for some years, till Pope Sixtus IV. invited him to Rome to teach his art to the musicians of Italy, where musical knowledge at that time was at a low ebb. In Rome Deprès lived till the death of his protector (1484), and it was there that many of his works were written. His reputation grew rapidly, and he was considered by his contemporaries to be the greatest master of his age. Luther, himself an excellent musical amateur, is credited with the saying that "other musicians do with notes what they can, Josquin what he likes." The composer's journey to Rome is in itself a most important event in the history of musical progress; for it marks in a

manner the transference of the art from its Gallo-Belgian birth-place to Italy, which for the next two centuries remained the centre of the musical world. To the school of the Netherlands, of which Deprès and his pupils Arcadelt, Mouton, and others are the chief representatives, modern music owes its rise. But far more important than this school itself was its outgrowth and successor, the so-called Roman school, immortalized by the name of Palestrina. After leaving Rome Deprès went for a time to Ferrara, where the art-loving duke Hercules I. offered him a home; but before long he accepted an invitation of King Louis XII. of France to become the chief singer of the royal chapel. According to another account, he was for a time at least in the service of the emperor Maximilian I. The date of his death has by some writers been placed as early as 1501. But this is sufficiently disproved by the fact of one of his finest compositions, *A Dirge (Déploration) for Five Voices*, being written to commemorate the death of his master Ockenheim, which took place after 1512. The real date of Josquin's decease has since been settled as the 27th August 1521. He was at that time a canon of the cathedral of Condé. The most complete list of Deprès's compositions—consisting of masses, motets, psalms, and other pieces of sacred music—will be found in Fétis. The largest collection of his MS. works, containing no less than 20 masses, is in the possession of the Papal chapel in Rome. The well-known works by Drs Burney and Hawkins give specimens of his music.

DEPTFORD, a town of England situated at the junction of the Ravensbourne with the Thames, $3\frac{1}{2}$ miles east of London Bridge. It forms the western portion of the parliamentary borough of Greenwich, occupying an area of about 1650 acres, situated mostly in the county of Kent, and partly in Surrey. It comprises two parishes—that of St Nicholas, including Lower Deptford on the Thames, and St Paul's, or the landward part of the town, which extends into Surrey and includes Hatcham Manor. Lower Deptford consists of irregular narrow streets, and the houses are mostly of a mean description. It contains the site of the old dockyard, and the royal victualling yard is also situated there. The former was discontinued as a dockyard in 1869; it was filled up and converted into a foreign cattle market by the corporation of London, but this was given up in 1873. The victualling yard immediately to the west of it is the most important establishment of its kind in the kingdom, supplying the navy with provisions, medicines, furniture, &c., which are manufactured or stored in the large warehouses that constitute the establishment. As many as 500 hands are employed in the warehouses and at the lading wharf. The only other industrial employment of importance in the place is to be found in the engineering works, which are carried on near the river. Of public buildings the most noteworthy are St Nicholas Church, with a square embattled tower, built on the site of an older structure at the beginning of the last century, and St Paul's, of classic design, erected in 1730. There is also the hospital for master mariners, maintained by the corporation of the Trinity House, which was originated here. Of the mansion known as Sayes Court, with which Deptford is historically identified, nothing now remains but the garden. The house—taken down in 1729—was the residence of the duke of Sussex in Queen Elizabeth's time; it was occupied in the following century by John Evelyn, the author of *Sylva*, and by Peter the Great during his residence in England in 1698. The population of Deptford in 1871 amounted to 60,188 persons, seven-eighths living in the landward parish of St Paul's.

DE QUINCEY, THOMAS (1785-1859), an eminent English author, was born at Greenhay, near Manchester,

Dr. A. Carrillo.

Calle del Rable 49.

MONTERREY, N. L. MEX.