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Contributors

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PRACTICAL DENTISTRY

SURGICAL AND MECHANICAL.

With Appendix, Numerous Formulæ, and Guide How to become a Registered Dentist.

BY

A DENTAL SURGEON.

ILLUSTRATED.

PUBLISHED AT THE OFFICES OF

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PREFACE.

The desire has often been expressed by students and others for a small, but comprehensive work, dealing with the main features of both branches of the dental art.

This want it is attempted to supply in the following pages, and it is hoped they will meet with the approval of dental students and practitioners.

The aim throughout has been to treat each operation in as concise and practical a manner as possible.

The first part is devoted to the surgical branch of the art, the principal operations being briefly considered and explained.

Under the head of mechanical dentistry, descriptions of the most improved methods of manufacturing artificial dentures will be found, together with notes in dental metallurgy.

Pharmacists practising dentistry will find the work especially suitable to their requirements.

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PRACTICAL DENTISTRY:

SURGICAL AND MECHANICAL.

Introduction.

The art of Dentistry may be said to be composed of two distinct branches, viz., the operative or surgical and the mechanical.

The former embraces the general treatment of the teeth and their diseases, together with their preservation, regulation, and extraction, &c., while the latter consists of the several processes in dental mechanics and metallurgy necessary to the making and fitting of artificial dentures in as perfect a manner as possible.

To achieve success in both branches requires constant practice and experience. A man may be a skilful operator and yet an indifferent mechanic, or *vice versa*. Sometimes one branch is studied to the neglect of the other, yet he who aims at becoming a successful dental practitioner must acquire an intimate and practical knowledge of both if he would claim to be a master of his art.

To become a smart operator he must possess tact, nerve, and confidence in himself, combined with a thorough knowledge of the anatomy and physiology of the teeth; while, as a mechanic, he should be practically acquainted with the several and best methods of making dental plates and

fixing artificial teeth, and be able to complete them in a finished and workmanlike manner.

Dental science has made rapid strides during the past few years, and the dentist of to-day, in his capacity as a specialist of the teeth and mouth, should merit the confidence bestowed in him. He is expected to have a thorough scientific knowledge of the art of dentistry, and as the oculist, or other specialist of the healing art, be competent to apply it in the treatment of such diseases that may come within his domain. To advise on the care of the teeth, and when operation is necessary be able to bring to his aid the proper curative remedies, a certain knowledge of some drugs and their properties is necessary. An intimate acquaintance with the anatomy of the mouth, together with the growth and structure of the teeth is also of the greatest importance to the dentist.

With the development of dental surgery there has arisen the desire to mitigate the pain attending its operations, and the use of anæsthetics has become an every-day occurrence in dental practice.

In the following chapters it is proposed to deal in as practical and concise a manner as possible with the principal operations, surgical and mechanical, the dentist may be called upon to perform, with the object of aiding those who have not had the opportunity of a large practical experience of the art, and also to assist the student in gaining an insight into some of its elementary principles.

In the dental, as in other practical arts, actual practice in the operating room and the workshop is of the greatest importance and absolutely necessary, and we can here but barely outline some of the methods employed in the most important operations.

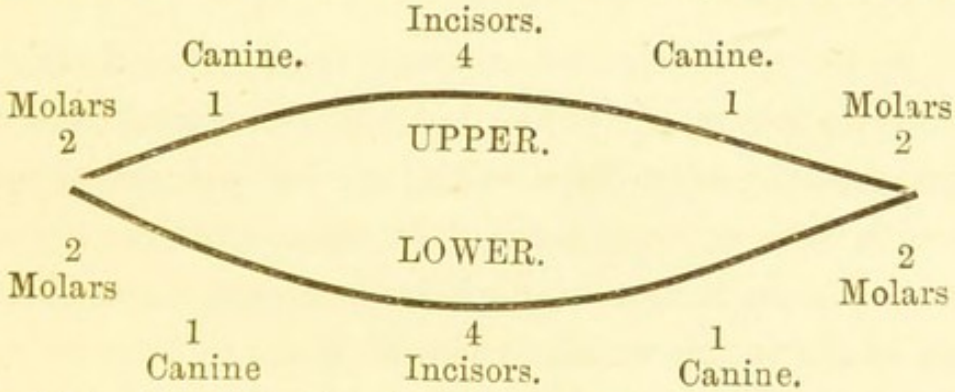
PART I.

SURGICAL DENTISTRY.

THE TEETH AND THEIR DEVELOPMENT —FIRST DENTITION—SECOND DENTITION.

In the human being two sets of teeth make their appearance during the ordinary course of life, the first being termed the temporary or milk teeth, and the second the permanent teeth. The former usually remain until the seventh or eighth year of childhood, when they are replaced by the later, or permanent set.

The temporary teeth are twenty in number, ten in the upper and ten in the lower jaw, and arranged as follows :—



The first stages in the development of the teeth, according to Arnold and Goodsir, consist of certain changes in the mucous membrane covering the borders of the maxillæ. This occurs about the sixth week of embryonic life, and appears like a depression or groove of horse-shoe form along the edge of the jaw in the mucous membrane of the gum, and is called the primitive dental groove.

From this arises a series of *ten papillæ* in regular succession, which are the germs and rudimentary pulps of the milk teeth. After this papillary stage is complete, the margins of the dental groove become thickened and prominent, and the bottom becomes converted into a series of follicles, each containing one of the papillæ. This is known as the follicular stage.

The follicles soon become deeper, and gradually shape themselves similar to the crowns of the future teeth. With future development the groove becomes obliterated, the follicles becoming converted into closed sacs. This saccular stage is completed about the fifteenth week. The papillæ, now the dental pulps, acquire an exact likeness to the crowns of the future teeth, and then the formation of the hard substance begins. This commences by a cap of dentine forming on the pulp of the milk tooth, which generally increases until the crown is complete, and soon after, part of the tooth appears through the gum.

The period at which the temporary teeth make their appearance above the gum varies, but the usual time is about six or seven months after birth, although infants are sometimes born with one or two teeth fully cut. Children frequently suffer much pain during this period of teething, through the slow growth of the teeth, which cause the gums to become swollen and inflamed. This is often attended with feverish symptoms, and may even induce convulsions. Immediate relief may be given in such cases by making a small incision in the gum with a lancet above the tooth. Each milk tooth is developed from its germ, and in the process of development separates a portion of itself to be the germ of its successor in the permanent eruption still living though not growing. As

the new tooth comes the crown of the temporary tooth dies, and is eventually pushed out to give place to its permanent successor. Thus, almost directly the temporary set are fully developed the process commences for their removal. The formation of the permanent teeth is exactly the same as that of the temporary set. The pulp is derived from the temporary teeth, the connection being intimate, as both are formed in the one socket, but when separation ensues the permanent teeth become fixed in distinct bony cells or partitions.

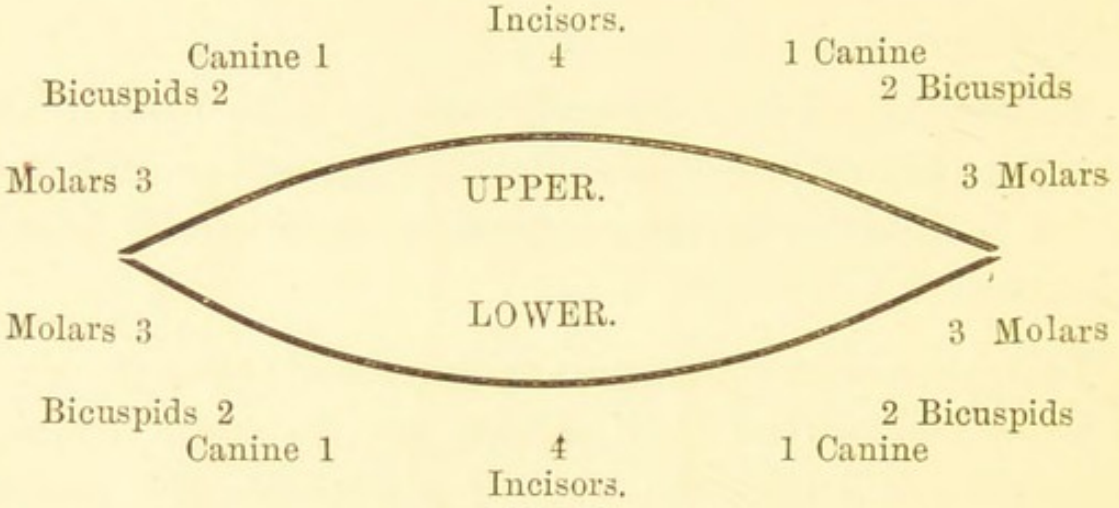
Thus separated from the socket of the milk tooth by this partition, against which as against the root of the milk tooth above it pressure is caused, these parts gradually become absorbed.

This destruction commences at the root of the tooth, which is bit by bit absorbed, until nothing but the crown remains, which falls or is taken out, and the permanent tooth takes its place. The subsequent development of the permanent teeth takes place in the same manner as the former set, but now the number is increased and the order different. The order in which the permanent teeth make their appearance in the lower jaw is as follows, the corresponding teeth of the upper jaw being developed a little later :

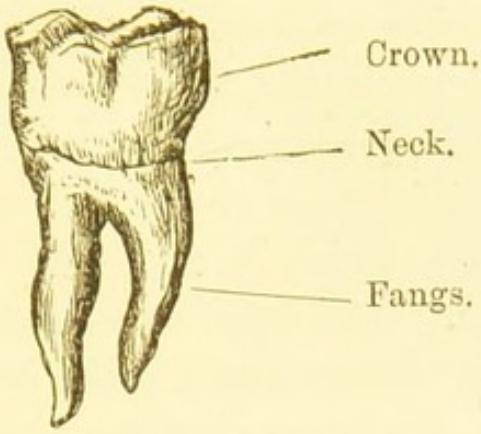
Molars—first at the age of six years.
Incisors—central, at the age of seven years.
„ lateral, at the age of eight years.
Bicuspids—anterior, at the age of nine years.
„ posterior, at the age of ten years.
Canines, at the age of eleven to twelve years.
Molars—second, at the age of twelve to thirteen years.
„ third or wisdom, at the age of seventeen to twenty-one.

During the growth of the teeth the jaw increases in depth and length, changing somewhat in form, and so provides for the extra teeth.

The full complement of the permanent teeth is thirty-two, sixteen in the upper jaw and the same number in the lower, though frequently a less number may be developed. They are arranged as shown in the diagram :



Each tooth consists of three portions, viz., *the crown*, or the part which projects above the gum ; *the fang*, or root which occupies the alveolus or socket ; and *the neck*, or constricted part that comes between the two, The roots of the teeth are implanted in the alveoli of the jaws, the lining of which is called the periosteum or periodontal membrane, being blended with the tissue of the gums which surrounds the necks of the teeth. The form of each tooth is adapted for a special purpose. Thus we have the incisors, or front teeth, with chisel-shaped crowns for cutting and dividing soft food. They have a long single fang slightly compressed at the sides. The canines, or cuspidati, have conical and thick crowns, convex in front and hollowed behind; their fangs are also single, conical, and com-



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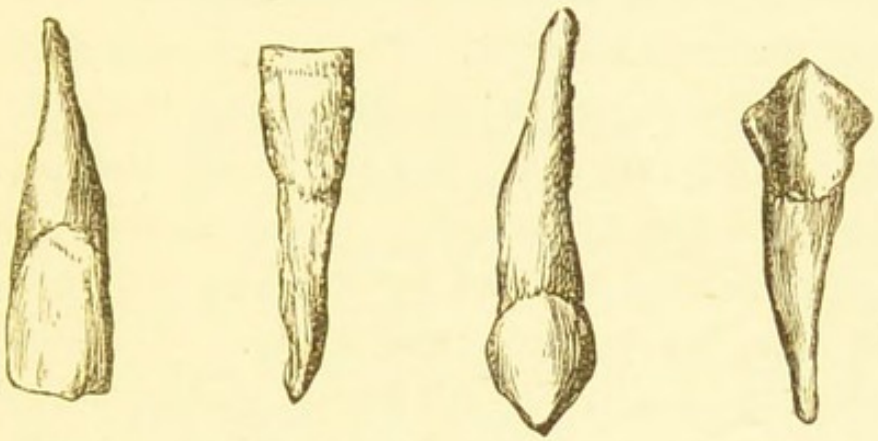

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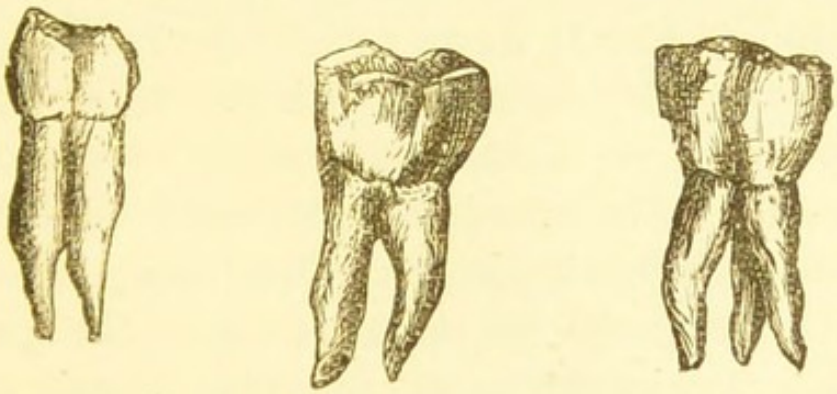


IV. V. V.

Fig. I. Molar tooth showing crown, neck and fangs.
Fig. II. Upper and lower incisors. Fig. III. Upper canine.
Fig. IV. Bicuspids, front and lateral views. Fig. V. Molars.

pressed at the sides, and are the longest of any of the teeth. The upper canines are commonly called the eye teeth, and are larger than those in the lower jaw. The form of these teeth make them adapted for such work as disintegrating hard food. The bicuspids have a compressed crown, broader than the teeth described, which is surmounted by two pointed tubercles or cusps. The fang shows a tendency to become doubled, the apex being usually cleft, but the form varies. The molars have the largest crowns of all, and graduate in size. The last molar teeth are called the *dens sapientiæ*, or wisdom teeth, owing to their late appearance. The fangs of the molar teeth are multiple. The two anterior molars of the upper jaw have three, the corresponding teeth of the lower jaw having but two each, and are broad and compressed. The bicuspids and molar teeth, owing to their breadth of crown, are specially adapted for crushing and grinding the food in the process of mastication. Coming to the structure of the tooth, we shall find on making a section that it is composed of a hard substance, and hollow in the centre. The shape of the cavity is similar to that of the tooth, occupying the interior of the crown and extending down each fang at the point of which it leaves a small aperture. This hollow portion is called the pulp cavity, and is filled by a soft, sensitive substance called the dental pulp, which consists of areolar filaments, &c., and is well supplied with vessels and nerves which are derived from the internal maxillary artery and the fifth pair, and enter through the small aperture at the apex of each fang. It is through this nerve connection the pain sometimes felt in one tooth is communicated to another. Through the minute orifice in the tooth fang there also passes a vein and artery, by which the vital fluid is received into and returned from the tooth, the blood passing in two currents, first

through the artery into the tooth and then returned by the vein.

The solid portion of the tooth is composed of three substances, viz., the ivory or dentine, the enamel, and the cement or Crusta Petrosa. A fourth variety of tissue is formed within the dentine as age advances.

The dentine forms the bulk of the tooth, and gives to it its general form. In structure it is similar to compact bone, and under the microscope appears to consist of a large number of very fine tubes embedded closely together in a compact substance.

The enamel is the hard, white covering which protects the exposed portion of the tooth, and is the hardest of all the dental tissues. It is thickest on the grinding surface of the teeth, and ceases at the neck. It is also the hardest substance in the human frame, and capable of producing sparks when struck with steel. In composition it is made up of minute, hard, and dense fibres of earthy matter packed closely together, of which 96.5 per cent. are earthy constituents. The enamel is soluble in dilute acids.

The Crusta Petrosa, or cement, is a layer of thin bone that covers that part of the dentine which is not protected by the enamel. It extends over the whole fang, fixing it in the socket, and as age advances becomes thicker, especially near the apex of the fang, and, as a rule, eventually blocks up the aperture leading to the pulp cavity. Its chemical composition resembles bone, and contains 30 per cent. of animal matter. It is the seat of the bony growths, or exostosis, sometimes found in the teeth. Osteo-dentine, or secondary dentine, appears to be pro-

duced by a slow conversion of the pulp, and is a hard substance which becomes deposited on the surface of the dentine after the age of twenty, gradually making the cavity of the tooth smaller in size.

THE CARE OF THE TEETH.

A large amount of our comfort and health depends on the teeth ; and especially on the amount of care that is bestowed on the mouth during the period of youth. They should be thoroughly cleaned twice daily by means of a brush of medium bristle, an antiseptic tooth-powder and warm water. Brushes with hard bristles are undoubtedly injurious to the enamel of the teeth if used for any length of time. A well-blended tooth powder is preferable to paste or liquid dentifrice, for obvious reasons. Care must be taken to remove any particles of food that get lodged between the teeth after eating, and for this purpose the quill is preferable to a metal toothpick ; a strand of floss silk being also very useful for this purpose.

Mastication.—As the primary and chief use of the teeth are for the mastication of food, it follows that if they are imperfect, loose, or diseased that important process cannot be performed as it should be, with the result that dyspepsia is often induced with its attendant evils. In the process of mastication the food is blended with a bland alkaline liquid, secreted by the parotid submaxillary and sublingual glands, and conveyed by their ducts into the mouth. Its use is to keep the tongue and mouth moist, and thus assist mastication, the first process of digestion.

IRREGULARITIES OF THE TEETH AND THEIR TREATMENT.

Irregularities that may occur in the growth and position of the permanent teeth, and the best treatment to employ in such cases, are matters of important consideration.

To begin with, the most frequent cause of this is at the time when the milk teeth are being shed. Sometimes, if not removed, they occasion a sufficient obstruction to prevent the permanent tooth appearing in its proper place, and causing it to grow out of its course. This is a common occurrence, and renders a frequent examination of the mouth during that period a necessity, when most irregularities may be easily prevented by the removal of the obstructions. Sometimes the teeth on appearing through the gums are in an objectionable position, such as being turned inwards; if not very irregular, mechanical treatment is unnecessary, and they will gradually assume their proper position. A very slight amount of force, if applied constantly, is sufficient to alter the position of a tooth. The treatment usually adopted in cases where the teeth are growing in an inward direction is by the wearing of a vulcanite plate, fitted to the palate and extended over the molar teeth. The plate is fitted to the necks of the teeth to be operated on, between which and the plate, small pegs of compressed wood are placed in cavities cut in the vulcanite for receiving them. When the plate is being worn, and as soon as the wood commences to absorb moisture it will expand, and exerting a gradual pressure on the tooth in front of it, force it outwards. From time to time the

wedges must be removed and replaced with new ones, until the tooth has acquired the proper position. In case of a tooth growing out of position and partly behind another, a ligature or elastic band should be adapted to it, exerting pressure in the opposite direction, and worn constantly for some time. It will be well to bear in mind that a piece of india-rubber compressed between two teeth will force them apart in the course of a couple of hours, the teeth becoming tender to the touch and slightly loose, although on removal of the rubber the teeth will gradually resume their former position. For permanent results nine or ten months is necessary in most cases to rectify such an irregularity as the inward growth of the teeth. When two incisors are growing too far apart this may be remedied by wearing the ligature or elastic band. Another irregularity is when the lateral incisors are affected by the growth of the canines through their growing in such a position as to cover the root of the former. It is necessary in such cases to give the canine room to pass backwards, and the temporary canine in this instance should be extracted to allow the incisor to regain its proper place. Otherwise temporary teeth should not be extracted without some good reason for so doing.

Another method employed to regulate the teeth consists in attaching to the tooth to be moved a belt of gold, secured by a thread and nut. Some prefer the use of piano wire springs as being more easy of control. The jack screw is another instrument which may be used when greater force is needed, such as the expansion of the whole arch or the bending outwards of a single tooth. It may be used either with or without a plate. Dr. Coffin recommends the use of expansion plates for the correction of irregularities.

The plate is made of very thin vulcanite, and is cleft, with a wire spring connecting, by means of which the plates may be easily shaped to suit the necessity of the case.

Torsion, or twisting of the central incisor, is sometimes met with, when the tooth is growing up edge outwards. This may be treated by the plate and springs, or the tooth may be rotated by means of a ring of platinum foil made to fit round its neck to which a piece of wire is soldered, bent to the outline of the palate, so as to form a lever, and traction made on the end of it by means of an elastic ring tied to one of the back teeth. It may also be treated in some instances by forcibly twisting the tooth with the forceps, and is often done successfully when the patient is young. The instrument used should be a pair of straight forceps. The canine teeth are very liable to grow irregularly, either standing in or outside the regular line. In such cases, as the canine is an important tooth, it is sometimes necessary to sacrifice one of the neighbouring teeth, either the first molar or one of the bicuspids. The first molar is nearly always the first tooth to become diseased, and would therefore be least missed. In regulating, no fixed rules can be laid down, and a great deal must depend upon personal judgment on the best method of dealing with the case. Irregularity of the bicuspids often necessitates the wearing of the jack screws or an expansion plate, for which either metal or vulcanite may be employed.

FRACTURE AND OTHER INJURIES.

A fracture may occasionally happen to a tooth through a sharp blow or fall. It may be trifling, such as the edge of the

tooth being chipped, which a few touches of the file will rectify, or it may be split from crown to root, in which case special effort should be made to save the tooth. The incisors, owing to their prominent position, are most liable to accident. Should the fracture extend through the pulp cavity it is seldom possible to save the tooth, and extraction is the best treatment. If the upper part or crown of the tooth be broken off above the gum, a new crown may often be put on by pivoting. The tooth is thus rendered serviceable, and may last for a dozen years. Pivoting, as a rule, can only be carried out successfully on teeth with a single root. A fracture may occasionally be successfully treated by making a collar of thin gold to embrace the root, just below the edge of the gum; this is adjusted, the new portion fitted to the root, then backed and soldered.

PIVOTING.

The operation known as pivoting, by means of which new crowns may be fixed on the roots of old teeth, cannot be successfully carried out unless the latter are free from disease. It is best performed on the incisors or canines. The root is cut down to a good flat surface with the aid of the dental engine, and the apex having been closed by foil, the pulp canal is drilled to the size of pin wire. An impression of the surface of the tooth is then taken with compo or plaster, and a tooth having been adjusted to it, the side of the pin is scraped, a shred or two of floss silk wound round it dipped in a solution of copal ; this is placed in the drilled hole and pressed home. Another

method employed is by using a flat tooth with a pin soldered to it, and a small metal plate fixed to the back. This may be well fixed by taking a piece of platinum foil and making a hole in the centre, the pin being slightly attached to it with solder. The surface of the root having been prepared and thoroughly dried, it should be coated several times with copal solution before the pin is pressed into the root and fixed. The foil may be burnished into contact with the tooth as a finish. In roots of a large size the hole may be drilled of a larger size, and a thin metal tube inserted, into which the pin can be secured. In such cases a small cavity should be formed near the surface of the root, and filled with gold or amalgam, which will protect the surface before inserting the pivot tooth. Another method is by fixing a cap of thin gold, carefully made to fit over the top of the root, and clipping it in at the neck of the tooth. It may be fixed by filling the hollow crown with hot gutta percha and pressing it firmly on.

CARIES.

Many and varied are the theories that have been advanced from time to time as to the primary cause of caries, or decay of the teeth. Usually it first attacks the enamel and dentine, and then causes the destruction of the crown of the tooth.

It is held by some to be due to the result of chemical change in the dental tissues arising from constitutional causes alone, and not a disease. Decay may also be induced by accidental causes, such as a fracture to a tooth. Caries makes itself first visible in the enamel, either in the form of a small dark spot or an opaqueness which gradually becomes a brown

colour. Bell states that he believes this to be due to an inflammatory action set up in the dental tissue, which, occurring in a dense, hard substance, ends in the death of the tooth. It has also been suggested that caries may be caused by the mouth secretions becoming acid owing to some disordered condition of the system, which attacks the enamel of the teeth. Certain micro-organisms are also present in carious enamel, but whether their presence is productive of decay or not, it has not at present been proved. Early predisposition to caries is thought by some to be hereditary, and it has often been noted that decay frequently begins in the teeth of women during pregnancy. Acids of any kind, vegetable or mineral, immediately attack the enamel of the teeth, it is therefore more than probable that the generation of such in the mouth, through the decomposition and fermentation of small particles of food, and the presence of destructive organisms, is the most probable theory of the origin of the caries. As decay advances the dentine becomes soft and crumbles away, leaving bare the pulp cavity. It spreads, as a rule, in the shape of a cone, which gradually enlarges at the base. Tomes states he believes it rarely happens that the presence of caries in its earlier stages is altogether unattended by some uneasiness in the affected tooth. This form of toothache must be distinguished from that due to inflammation of the pulp, the result of exposure ; there is an absence of throbbing, and contact with hot and cold fluids does not produce unpleasant effects. In support of the theory that caries is due entirely to external causes, it is possible for human teeth which have been fixed and worn in artificial dentures to become decayed, the structure undergoing exactly the same process of destruction as occurs in the ordinary natural teeth. The fermentation products from sugar and milk, also malic and citric acids

from fruits, act in a deleterious manner on the dental tissues.

Cryptogamous growths have also been detected in carious dentine, notably leptothrix, which was noted by Ficinus; also the Mycelium of *Oidium albicans*, and the *Protococcus dentalis* of Schrott, may often be detected in microscopical examination. The presence of these organisms is also supposed to be productive of decay. The teeth of women are more liable to decay than those of men. The time that decay is likely to commence varies largely, but, as a rule, if it does not attack the teeth before the age of 24 or 25 the teeth may remain sound until the age of 50 years. A protracted and serious illness may induce the teeth to decay, and also the action of certain medicines, such as iron and mercury, is injurious to the teeth. Preparations of iron or acids should always be taken through a tube, or the mouth well rinsed with water afterwards.

FILLING DECAYED TEETH.

The process of decay in the tooth may be treated by filing or filling. In cases where it has only proceeded to a small extent the diseased tissue may be got rid of by filing. Files of various patterns and sizes are made, also of varying degrees of roughness. The shape used must depend on the form of the tooth. After the filing the part must be polished with fine pumice power, and finally with chalk. Enamel cutters and chisels are also used for excising the diseased portions of the tooth, and if used carefully the results are very

satisfactory. Corundum disks used in the dental engine are also very useful in the removal of diseased bone and polishing the teeth ; also disks of sand paper and emery, and a mixture of corundum and vulcanite are very useful. Another method of arresting caries, suggested by Tomes, is the free application of powdered nitrate of silver, in such cases where the necks of the teeth are softening along the edge of the gum. From the effects of the nitrate of silver the softened tissue becomes black, wears away, leaving a polished brown surface which is not again attacked by decay.

The chief method of arresting caries is by filling, in which operation the diseased part of the tooth is removed, the deficiency supplied, and it is again made serviceable and useful for mastication.

A great deal of the success in filling depends on the care bestowed in preparing the tooth for the plug. All diseased tissue must be excised and carefully scraped out until a suitable cavity is made. Overhanging edges and sharp corners should be cut away. If the walls of the tooth will stand it, one or two grooves run around will add to the permanency of the plug. The enamel is removed by special chisels designed for scraping, while the dentine is excised by excavators of various forms. Softened dentine is better removed by cutting than scraping, and it also gives less pain to the patient. The enamel may also be excavated by the rose-head burr, used by hand or with the engine, the latter removing it quickly and effectively.

Should the tooth be sensitive, a small portion of arsenic or arsenical paste placed in the cavity, covered with a plug of absorbent wool and retained for a few hours in the tooth will destroy the nerve. Arsenic should not be used if the cavity

is deep, or else death of the pulp may follow. Some degree of pain may be felt in the tooth for several hours afterwards. A small piece of chloride of zinc applied to the tooth will also make it less sensitive. Ethylate of sodium, a solution of tannin in spirits of camphor, and carbolic acid, or a strong tincture of Indian hemp are also useful for the same purpose, and may be employed with more or less success.

Should the tooth be very sensitive, it is often advisable to first plug with a temporary filling of gutta percha mixed with silex in powder, or a solution of gum sandarach.

VARIETIES OF FILLING.

The suitability of a material for filling a tooth largely depends on it being a non-conductor of heat, also a non-irritant. It must further be capable of forming a compact mass without undergoing contraction or expansion, and be able to resist the action of the mouth secretions.

To plug a tooth with the temporary gutta percha and silex filling, small pieces must be gently warmed until quite soft. The cavity having been dried, these pieces should be packed in the tooth with a warmed instrument, the edges being rounded off. When cold the surface may be painted over with the solution of gum sandarach. The chief materials used for permanent fillings are gold, amalgams, and white enamels. Of these gold undoubtedly takes the precedence for durability and permanency. It is prepared for dentists in the form of foil, sponge gold, or cylinders, the former being cohesive, or non-cohesive and soft, the

difference being one of peculiarity of condition only. If a small portion of the cohesive be shaken up for a few moments in a small box it will mass together, but the soft foil when so treated will not cohere at all. The cohesiveness of this foil is destroyed by the least trace of moisture or grease. The foil is prepared for dentists in pellets, but is often used in strips or rolls, the soft foil being generally employed in the form of cylinders. Another form of gold used for this purpose is that known as crystal, or sponge gold, which consists of the metal in the form of minute crystals. In filling with crystal gold the cavity must be perfectly free from moisture and the gold placed in small fragments, each instalment being well packed and consolidated before another piece is added. Great care must be taken to avoid moisture, which it absorbs like a sponge, and instead of welding breaks up into a powder and becomes unworkable. This gold, if kept for a long time, also loses its welding properties through some molecular change, but these may be restored by annealing. An excellent filling is made by using foil to line the cavity, then filling in the remaining space with crystal gold.

Gold foil is prepared in sheets of varying thickness, numbered 4, 5, 6, 7, or 8, the numbers corresponding to the number of grains in each sheet. To free the mouth from saliva during the operation of filling the saliva pump is used, of which several patterns are made. Another method of relieving the mouth of saliva is the rubber dam, which is made by taking a sheet of thin india rubber, which must be tough yet elastic enough to stretch without a tearing, placing it in the mouth and cutting holes to allow the crowns of the teeth to come through. Should the rubber dam require holding in position clamps may be employed. These are

usually fixed by the aid of the clamp forceps, or if the clamps are objected to, the dam may be secured in position by floss silk passed between the teeth. If the tooth that is to be filled lies very close to another, slight separation may be necessary, which may be done by means of the screw separator. Amalgams of varied composition are frequently employed for plugging teeth ; the best of these is palladium, which sets very quickly. An amalgam made by mixing silver filings with mercury, using as little of the latter as possible, also forms a good filling, the excess of mercury being pressed out between folds of blotting paper. There has been a prejudice for some time against using amalgams into which copper enters as an ingredient, owing to a supposed effect of the metal on the system. There is little evidence to prove that when incorporated in the amalgam it has any deleterious effect, and I have used the following filling successfully for a number of years and found it answer well. It is made by immersing a slip of zinc into a solution of sulphate of copper, washing the precipitate of the metal by agitation with water and draining, then add a drop of sulphuric acid, knead up with a small quantity of mercury to the consistency of a stiff dough, using as little mercury as possible. Roll the amalgam, press into thin slabs, cutting into small squares, and it soon becomes a dull, white, hard alloy. To use it, place a small portion on the end of a spatula and hold it in the flame of a spirit lamp. It readily becomes plastic, and on the appearance of a few small globules of mercury work it into a paste with the fingers, pressing out the superfluous mercury with blotting paper and it is ready for plugging the tooth.

Another amalgam is formed by melting five parts of silver with four parts of tin to form an ingot, the filings of which are

mixed with mercury in the usual manner. All amalgam fillings have the disadvantage of turning black after a short time, and are apt to contract after setting. Osteoplastic is a white filling, which may be used for front teeth, it having the advantage of being the same colour as the tooth, but materials of this class are not very permanent. It is made by mixing 1 part of powdered glass with 3 parts of pure oxide of zinc. When used, this is mixed to the consistency of a paste with the following solution

Zinc chlorid.	...	...	...	...	...	℥ ii.
Aquæ	...	...	...	...	...	℥ iss
P. boracis	...	...	...	...	...	℥ ss.

Dissolve the borax in the water first, then add the chloride of zinc.

METHODS AND INSTRUMENTS USED IN FILLING.

The forms of instruments used in plugging teeth are numerous, some operators getting better results from one kind than another. Their special capabilities can only be tested by practical experience, and we can only mention here the most suitable points to use for certain purposes. When plugging with soft foil, wedge shaped points are useful. The gold is used in the form of pellets or ropes of various sizes, the metal being placed in the cavity in small pieces at a time, and well packed before each piece is put in. When filled it is pressed with a flat-tipped plugger, and the whole made firm and compact. Another method of filling with gold foil is by rolling small strips into the form of cylinders. The

cylinders should be a little longer than the cavity of the tooth, in which they should be placed in an upright position, side by side, by means of the plugging forceps. As the cavity gets full they must be compressed closely together by a wedge-shaped instrument, and filling in all the vacant space with small strips of foil, the whole should be packed tight by the foot-shaped plugger, or malleted. After it has been tested with a fine point, cut down, and finish by burnishing. An excellent plug may also be made by cutting small strips of foil and arranging them in the cavity of the tooth in successive layers, in the form of a star. In filling with the cohesive gold, it must be packed in the cavity, a small piece at a time, care being taken that after each piece is once compressed it is not again moved. It is often an advantage to prepare the cavity with a foundation or lining of strips of foil to form a support to the walls of the tooth. The greatest amount of solidity may be finally given to the plug by the use of the mallet, and in the case of cohesive fillings it is most necessary. There are several forms of this useful instrument, such as Kirby's pneumatic, which is largely used; Power's or Bonwill's also, which are used with the engine, and the electric mallet.

Cavities which extend down to the conical margin of tooth, or when the crown is undermined, are more difficult to deal with, and the operator must use his own discretion and act to the best of his ability. As a general rule, it is best in such cases to get as much access to the cavity as possible, and in some instances the help of a matrix must be called in. This consists in a strip of clock-spring passed between the tooth, and wedged up against the one which is being operated on by thin slips of wood, dipped in solution of sandarach to

prevent slipping, driven in between it and the next tooth. This will give invaluable help and support during the operation, after which it may be removed. In dealing with cavities in the front teeth, the cavity may be cut well down, suitable for receiving the plug, if the diseased part cannot be treated by excision. In a small cavity the foil may be inserted in the stellate manner as before described, the ends being finally folded in and compressed. In using the osteoplastic filling, it should be mixed to the consistency of a thick paste and packed in small portions, using pressure with small pieces of blotting paper after each piece has been packed. When using palladium amalgam it should be mixed in a mortar with an excess of mercury, the overplus being pressed out between folds of blotting paper just before using. The cavity being ready and cleaned out, the amalgam in the meantime should be kept worked between the fingers and inserted in it quickly, the edges trimmed round and the surface finished off, as the plug will set hard in a few minutes.

We cannot do more than mention a few of the many methods employed at the present time in filling teeth. It is essentially an operation which must be learned from practical instruction, and any description, however elaborate, can only give a superficial knowledge.

SCALING.

The operation known as scaling is that of removing thick accumulations of tartar which have been allowed to collect on the teeth through neglect, and which if allowed to go on will cause the teeth to become loose and painful. It must be per-

formed with great care, by scraping the teeth, and so removing the accumulated tartar by scaling instruments, the utmost caution being observed not to injure the enamel or to render the teeth looser.

After the operation the patient should be instructed to wash out the mouth frequently with the following lotion :—

Take of

Tinct. Krameriæ	... ...	ʒ ii.
Alum ust.	... ...	ʒ i.
Glycerin	... ...	ʒ vi.
Aquæ	... ... ad	℥ viii.

Misce.

ODONTALGIA OR TOOTHACHE.

The pain commonly called toothache may arise from several causes, and is really more a symptom that usually accompanies a diseased condition of some portion of a tooth than a distinct complaint. It is most frequently caused by the exposure of the sensitive nerves of the tooth pulp through decay, or inflammation of the alveolar periosteum, also by acute inflammation of the tooth pulps, exostosis, &c. Unlike neuralgia, the pain can usually be fixed on one tooth. It varies in intensity, and may be accompanied by paroxysms of great severity. The pain produced by irritation of the pulp, which is often of a prolonged and severe nature, and accompanied by sudden darts of pain, is best relieved by the application of oil of cloves, creosote, or carbolic acid. One drop of the latter on a plug of wool, carefully placed inside the cavity, will generally give speedy relief. Counter-irritants, in the form

of applications to the gum, are also generally useful in this kind of toothache, and tincture of pellitory or capsicum rubbed on the side of the gum will often give relief. Pain of a throbbing nature, when the tooth feels as if it was lengthened and loose, is caused by acute inflammation of the pulp, due to exposure. In such cases the pain seems to increase when the patient is lying down, and is affected by temperature. Relief is felt by holding cold water in the mouth. The pulp is usually much inflamed and there is a collection of pus. The pain is eased by sedative applications, such as tincture of opium and oil of cloves on cotton wool placed in the cavity. The wisdom teeth are often the cause of much pain just before their eruption, especially when there is not sufficient room for them to take their place, and by the pressure they exert on the roots of the surrounding teeth. Such pain is difficult to relieve, and the best applications are sedatives to the gum and incisions made with the lancet round the tooth. In most cases of chronic inflammation of the pulp the best is to destroy the nerve with a minute quantity of arsenious acid as early as possible.

After the acute states of inflammation of the dental pulp it is almost certain to die, and with its death there is an end of the immediate pain. In applying arsenic to destroy a nerve, about the sixteenth of a grain is quite sufficient, care being taken to plug it temporarily in order to prevent it running over the gum. It should be left thus for a couple of days, and if still sensitive after that time the application may be renewed. In all cases extraction should only be resorted to as a last extremity, and the tooth should be saved if possible.

NEURALGIA.

Facial neuralgia is usually caused by some morbid condition or influence of the teeth, and often accompanied by pain of a violent nature, which is difficult to relieve.

The attacks may be periodic or irregular, or the pain continuous, and generally confined to the fifth nerve and its branches. It may arise from many causes, a common one being inflammation of the tooth pulp. The pain varies, sometimes being a dull aching, at others sharp paroxysms moving about the mouth and face, and is rarely located in one spot for any length of time. If the cause is due to inflammation of the pulp and exposed nerve, it should be destroyed by arsenic, but if it arises from inflammation of the alveolar periosteum, or an abscess, the tooth should be extracted. A careful examination of the mouth of the patient should be made, and all decayed stumps or teeth likely to be the exciting cause extracted. In cases where there has been prolonged pain it is a mistake to extract a large number of teeth, as the patient is often weak and unable to bear the shock. The treatment of neuralgia, when it arises from overwork or debility, comes more within the domain of the medical practitioner. For periodic neuralgia, or that which comes on in violent paroxysms, large doses of quinine, 10 to 12 grains every four hours will usually give relief. Exalgine in one or two grain doses is also useful in such cases. Tincture of gelsemium is recommended, especially for the darting pain, 10 drops being taken in water every three or four hours. Tonics and nourishing food are also valuable aid in many

cases. The following mixture has been found to give relief in obstinate cases in a few doses :

℞	Quin. sulph.		45 grs.
	Acid, hydrobrom		ʒ iii.
	Pot. bromid.		ʒ ii.
	Tinc. gelsemin		ʒ i.
	Aq. chlorof.	ad.	℥ iv.

Misce. Fiat mist.

Take a teaspoonful in water every three or four hours.

INFLAMMATION OF THE ALVEOLAR PERIOSTEUM.

Inflammation of the alveolar periosteum, or lining of the tooth socket, may be due to local or constitutional causes. It commences with toothache, usually of a severe character, or a general feeling of uneasiness, and a desire to grind the teeth together, which seems to give temporary relief, but it soon passes away and the pain returns worse than before. The teeth feel lengthened, loose, and tender on pressure, and mastication becomes difficult. At this stage the gums around the teeth also become much inflamed. Relief is often obtained by painting them with strong tincture of iodine, and if there is any suppuration the use of a mouthwash composed as follows will be found of great service :

R	Boric acid		ʒ i.
	Glycer. pur.		ʒ vi.
	Aq. ad.		℥ vi.

Fiat lotio.

Mix with equal parts of warm water and rinse out the mouth frequently.

Inflammation of the periosteum may be caused by taking mercury or antimony for any length of time. Some persons are particularly sensitive to the action of these drugs, and a very small dose is sufficient to cause salivation. On discontinuing the drug the inflammation will be found to subside. Should the cause of the inflammation be due to a debilitated state of the system, the general health should first be improved by the administration of tonics, such as iron and quinine, together with a nourishing diet. If it be of rheumatic origin, salicylate of soda, 10 grains thrice daily, will be found useful, and the decoction of poppyheads used as a mouth-wash. The gums may be painted with glycerine and borax, and the following mouthwash will also be found of use:

℞	Alum. ust.	...	...	...	...	...	ʒ i.
	Glycer. Pur.	...	...	...	...	...	ʒ vi.
	Infus. rosæ acid...	...	...	...	ad		ʒ viii.

Misce. Ft. lotio. To be used three times a day.

ALVEOLAR ABSCESS.

Acute inflammation of the periosteum often gives rise to the formation of an abscess which is both painful and troublesome. The symptoms are similar to the former case, but accompanied by a dull, heavy pain. The gums become very red and inflamed, the tooth being surrounded by a red ring. The pain is usually followed by considerable swelling of the face and gums. At this stage almost immediate relief will be obtained if the protuberance on the gum be punctured with a lancet, to allow the pus to escape. The hot decoction of poppyheads should be frequently used as a mouth

wash, and as a fomentation to the swelling. If the abscess is not treated thus, the periosteum may become loosened from the tooth, and the pus escape up the side of the socket by the edge of the gum. When the patient's system has run down, the abscess often causes serious trouble, and in cases where the pus has not found proper means of escape it has been known to cause pyæmia, and even terminating with fatal results. Cases of chronic alveolar abscess may also eventually give rise to necrosis of the jaw.

In some cases it will be found necessary to extract the tooth. When an abscess occurs at the base of a molar tooth, it is sometimes so deep seated that, as it develops, it may have a tendency to break outside the face, which every endeavour should be made to prevent. In such cases, the tooth must be extracted before the swelling rises, if possible.

When obstinate chronic inflammation of the periosteum occurs, extraction is almost the only cure.

After the abscess has broken, and the swelling subsided, some attention should be given to the tooth. It may be scraped out, and a piece of wool saturated with an antiseptic, such as eucalyptus oil, or thymol inserted, for a time, and the tooth afterwards, if fit, be properly filled and preserved. After lancing an abscess, the mouth should be rinsed out with a glass of water containing a teaspoonful of Condy's fluid, or the boric acid lotion before mentioned.

DENTAL EXOSTOSIS.

Exostosis is caused by the thickening of the cementum which covers the root of the tooth, and thus forming a bony

growth. It may occur in sound or carious teeth. The symptoms of exostosis are shown by the gums becoming dark in colour and thickening. The teeth also become tender, painful, and loose. The local symptoms may be relieved by astringent mouthwashes, but the only remedy lies in the extraction of the tooth, the pain occasionally persisting for a time, even after its removal.

TOOTH EXTRACTION.

To be able to extract a tooth skilfully requires a considerable amount of practice. The chief aim should be to perform the operation rapidly and successfully, that is, without breaking the tooth.

The operation is performed by means of forceps, a special kind being used for each form of tooth in order that they may grip it firmly and to prevent slipping. The old-fashioned key instruments have now almost entirely gone out of use, and have been succeeded by the forceps of English or American manufacture. The difference in the pattern of instrument is purely a matter of taste and custom, the American having long and much curved handles, while the English are almost straight and much shorter. The latter are generally used in this country. These instruments are constructed to fit just below the neck of the tooth. In proceeding to extract a tooth the operator must necessarily be acquainted with its exact form, and a careful examination of the position first made. Should the tooth be deeply embedded in the gum it may be freed round the neck by means of the gum lancet. A suitable instru-

ment must next be chosen, and the patient's head being fixed well back in position, the tooth should be gripped just below the neck, the points of the forceps being pushed well down towards the root. If it is a lower molar a sharp turn of the wrist towards the inner part of the mouth, and then a turn in the opposite direction will extract it without difficulty. The student should bear in mind that the removal of a tooth is not so much a matter of strength as of a skilful movement or twist of the wrist in the proper direction, the turn of which must be judged from the knowledge of the position and form of the root of the tooth.

Failure is often caused by the operator taking too light a grip of the tooth, and yet in closing the forceps he must be careful to exert the pressure gradually or else he may break the crown altogether. In extracting an incisor, one turn of the wrist to the right, will generally remove it without difficulty; the canine being also easily extracted by a similar movement. On grasping an upper bicuspid pressure should first be exerted outwards, then inwards, and it will be readily extracted. Special instruments are constructed for extracting stumps, the blades being long, sharp, and narrow, so they may reach well down into the gum. The pressure exerted on a stump must depend upon its formation. In removing those with double or triple fangs the blades should be passed between them if possible. Some dentists prefer the elevator to forceps for extracting roots. This is a straight instrument with a spear shaped head, and used as a lever. In using it must be pushed down below the root, which yields to a lever like motion. The extraction of a tooth is not always unattended with danger to the patient. The operation should not be performed if the gums are much inflamed, and

any inflammation or swelling should first be reduced by means of fomentations. On the removal of a tooth there is always a certain amount of hæmorrhage through the rupture of a small artery and vein, but it usually ceases in a short time. Occasionally the bleeding is persistent, and difficult to stop, and if not arrested becomes a serious danger.

To stop the hæmorrhage one of the best applications is a pad of wool saturated with tincture of iron or a matico leaf, applied to the gum will be found useful. A plug of wool, covered with powdered tannin, also acts well. To become a skilful tooth extractor actual experience and plenty of practice is absolutely necessary.

TUMOURS.

Tumours sometimes form on the gum and other parts of the mouth causing much trouble and discomfort. There are several varieties of these growths, those most commonly met with being known as the polypus, which form on the gum, vascular tumours and epulis. The polypus is generally caused by some kind of local irritation, such as the ragged edge of a tooth, or the jagged tips of an old stump rubbing against the gum. The growth often fills up the cavity of a decayed tooth. Excising or cauterising alone will only arrest the growth temporarily, the most effective remedy being the extraction of the tooth, and so removing the cause of irritation, the polypus coming away with it.

Vascular tumours form on the side of the gum, and first appear like a small pimple which gradually enlarges, increasing sometimes to the size of a hazel nut. It is best removed

by excision, care being taken before doing so to tie a ligature firmly round the base to check the hæmorrhage. Escharotics are also used to remove these growths. Epulis grows from the edge of the gum, sometimes between the teeth, then spreading out over the gum, often interferes with mastication and gives rise to other inconveniences. Excision is the best cure, the part afterwards being cauterised to prevent future growth.

CHRONIC INFLAMMATION OF THE GUMS.

This condition of the gums may be set up from local irritation or some constitutional disorder, and the treatment must largely depend on the cause. The gums become swollen, soft, tender in appearance, and very painful. Decayed teeth sometimes give rise to inflammation, or the wearing of an artificial plate in the mouth will sometimes do it. In this condition the gums bleed on very little provocation, and swell up round the teeth. The cause must first be discovered, and if constitutional, it should be treated accordingly by the medical practitioner. Dyspepsia sometimes gives rise to chronic inflammation of the gums. If it arises through local irritation the cause should be removed, and the gums painted with glycerine and tannin or other astringent application to allay the inflammation. The use of the following mouth wash will be found beneficial :

℞ Tinct. Kramer ... ... ℥ i
Eau de Cologne ... ... ℥ i

Misce.

Add two teaspoonfuls to a tumbler three parts full of warm water, and use as a mouth wash.

Acute inflammation is another form of this painful disease, which sometimes affects the whole of the mouth. The patient becomes salivated, the edge of the gums swelling and turning whitish in colour, and the mouth can only be opened with difficulty. This condition is best treated with aperients and chlorate of potash. The boric acid lotion (1 in 40) will be found very useful for washing out the mouth.

THRUSH.

Thrush is a complaint peculiar to childhood, and often attacks infants as early as a fortnight after birth. It appears as slightly elevated patches of a reddish colour on the tongue and sides of the mouth. At times these are coated with a whitish exudation. This pale membrane is partly composed of a fungus called *Oidium Albicans*. Thrush is contagious. It usually yields to the application of glycerine, or honey and borax, together with a cooling medicine given inwardly, such as fluid magnesia and lime water mixed with the milk.

STOMATITIS.

This disease occurs in several forms, viz., simple, ulcerative, follicular, and gangrenous stomatitis or Cancrum oris. The simple variety is very similar to thrush, being commonly met with among children and adults, and should be treated in the same manner.

The ulcerative form usually appears on the edge of the gums generally in the lower jaw, and in the front of the mouth. They become thickened and congested, assuming a deep red

colour, and the disease sometimes extends over the whole of the mouth in the form of numerous small ulcers. Ulcerative stomatitis is often very troublesome and may continue for several months. It is frequently caused in the first place, by local irritation, or the fracture of a tooth, &c., and occurs oftener in children than adults. The best treatment is by the internal administration of chlorate of potash and glycerine in the following manner :

℞	Potass. chlor.		ʒ i.
	Glycerin. pur.		ʒ vi.
	Aq....	ad	℥ iii.

Misce. fiat. mist.

Two teaspoonfuls every four hours.

The following lotion for washing out the mouth will be found of great service :

℞	Alum ust....		ʒ ss.
	Glycerin. pur.		℥ i.
	Acid carbol. „		♏ 30.
	Aquæ	ad	ℨ vi.

Misce. fiat. lotio.

Follicular stomatitis, as a rule, first appears in small red spots, which gradually form into ulcers. They are generally found between the lips and the gums in great numbers, and cause much annoyance. The best treatment is cauterising with nitrate of silver and washing the mouth out frequently with an antiseptic lotion, such as the following :

℞	Acid carbolic pur.		♏ 40.
	Glycerin. pur.		ʒ iv.
	Aq. rosæ	ad	℥ viii.

Misce. Fiat lotio.

Gangrenous stomatitis or cancrum oris, now rarely met with, is a most fatal disease, and one which must be treated

by the medical practitioner. The first symptom is a swelling of the face, which rapidly becomes hard and has a dark red centre. The mouth is ulcerated inside, and there is copious salivation. The disease progresses rapidly with the destruction of the cheek, and soon ends with death. The only treatment which seems to arrest the disease in any way is prompt cauterisation with strong hydrochloric or nitric acid, but if this is not done at the beginning it is practically useless.

ANÆSTHETICS.

It should be the aim of the dental practitioner to perform all operations with as little pain as possible to the patient, and with this object the use of anæsthetics of one kind or another has now become an every-day occurrence in the practice of most dentists. The one most commonly used for the extraction of teeth is the inhalation of nitrous oxide gas, which may be regarded as a fairly safe anæsthetic. It may either be manufactured as required, or purchased in iron bottles in the compressed form, a much more convenient way. In administering the gas, the patient should be placed in a fairly upright position, the head being but slightly bent backwards. Any tight clothing round the neck, such as a collar or scarf, should be unloosed before the administration is commenced, and it is well to keep the fingers on the pulse of the patient for a minute or two while proceeding.

Complete insensibility is usually produced in from two to three minutes, when the operation should be rapidly performed. The tongue, which often rises and gets in the way of the operator, may be kept down by using a depresser. If

the patient does not recover almost at once, ammonia salts should be applied to the nostrils, and cold water sprinkled over the face and neck. Whenever an anæsthetic is administered, it is always well that some friend of the patient, or a medical practitioner, should be present. Chloroform is rarely used in dental practice, except for a prolonged operation. When it is considered necessary, it should always be administered by a medical man. The same precautions should be observed in using ether. There is always a certain amount of danger in administering these anæsthetics, and on that account the dental practitioner should never administer them on his own responsibility.

The application of local anæsthetics for the extraction of teeth is rarely quite satisfactory. Of these cocaine is perhaps the best and most used, although there is a considerable difference of opinion as to its utility. A ten per cent. solution of the drug may be injected into the gum in two or three places, immediately around the tooth, or it may be used by pricking the gum with a lancet, and applying the solution over the part with a plug of cotton. In using cocaine in this way no unpleasant after affect will be felt. Ether is occasionally used, by spraying on the gum around the tooth, which produces an intense coldness and numbness of the part, but extraction should not be attempted until the gum assumes a white appearance. The application of chloride of ethyl has been recommended by several American dentists as a local anæsthetic. The chloride for this purpose is sold in small glass capsules. The point being broken, it should be applied to the gum, close to the tooth to be extracted, when the heat of the fingers will cause a few drops to be injected, which, it is said, deadens the shock.

The application of electricity has also been suggested for the painless extraction of teeth, applied in the following manner:—

The patient, on being placed in the operating chair, is told to grasp two handles fixed to the arms of the chair, which are connected to one pole of a battery. The forceps to be used are also connected by an insulated wire to the other pole, so that the moment they grip the tooth a slight shock is induced, which is supposed to make the extraction of the tooth painless.

PART II.

MECHANICAL DENTISTRY.

PREPARATION OF THE MOUTH FOR ARTIFICIAL DENTURES.

In preparing the mouth for the reception of an artificial plate, it is first necessary to remove all useless and diseased remains of teeth and accumulations of tartar from the mouth. This is essential for several reasons, among others, the fact that the plate would be liable to cause the gums to be constantly inflamed and irritated is generally sufficient to overcome the scruples of the patient to undergoing a little temporary discomfort. A sound tooth should not be extracted unless it seriously interferes with the case, or for some other sufficient reason. With regard to firm fangs, should the patient object to have them extracted, they may be nipped off with the excising forceps, if possible, or filed down to the level of the gums. All deposits of tartar which collect at the necks of the teeth must be removed, and any decayed teeth which it is thought advisable to allow to remain in the mouth should be carefully filled. In cases where the mouth has to be prepared for an entire set of artificial teeth, the remains or the whole of the teeth should be extracted, in order that nothing may interfere with the adhesion of the plate to the gum.

After preparing the mouth as described, it is necessary to allow a little time to elapse before inserting the artificial dentures. This necessary period will, of course, depend on the number of teeth that have been removed and the condition of the gums. In most cases two or three weeks should be allowed for the gums to harden and become firm, and in no case should the artificial teeth be allowed to be worn while the gums are at all inflamed or tender.

TAKING THE IMPRESSION OF THE MOUTH.

The first operation of importance in proceeding to make an artificial denture is to take an accurate impression of the patient's mouth. The greatest care should be observed in carrying this out, as the success in the fitting of a dental plate largely depends on a perfect impression of the mouth being obtained in the first instance. The materials employed for this purpose are bees' wax, or one of the numerous compositions specially made for the purpose—gutta-percha, or plaster of Paris. Of these bees' wax or "compo" are generally used, being the easiest to manage and giving the best results.

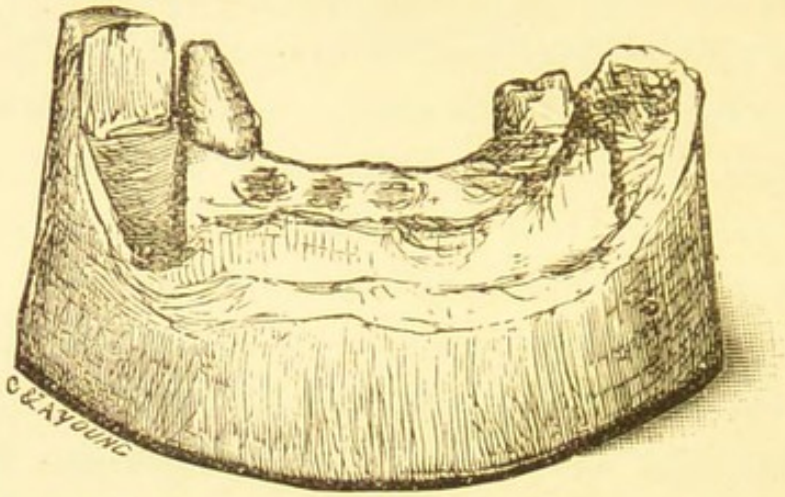
The wax or "compo" is prepared by placing it in a bowl, pouring on hot water, and allowing it to stand therein. When it has become quite soft and plastic it should be taken from the water and worked by the hand to a proper consistence. To take the impression a sufficient quantity of the plastic material is next taken, and placed in the form of a thick

roll on an impression tray, which is a conveniently formed holder made in various shapes to support the wax when placed in the mouth. Impression trays are usually made of pewter or Britannia metal, sometimes electro-plated, various forms being employed according to the size and kind of plate it is intended to make. The patient must be told to open the mouth as wide as possible, and sufficient wax or "compo" having been arranged in the tray, it should be quickly introduced into the mouth, care being taken to observe that it comes just in the centre of the teeth when closed. Supposing the impression desired be for a partial upper denture, the tray must be held firmly by the operator by means of the fingers placed beneath it, and gradually and firmly pressed inwards against the upper part of the mouth. A finger should then be inserted to press the wax that has been forced inwards, against the gum, to obtain as complete an impression as possible. After allowing the wax to remain in contact with the gums for about two minutes, the pressure may be gradually relaxed, and the tray carefully removed from the mouth, taking every precaution against dragging it out of shape. Place on one side and allow it to set hard. It is always a safe plan to take a duplicate impression in case of accidents afterwards. To obtain an impression of the lower jaw a different form of tray must be used, and it is inserted in the mouth the reverse of the method employed for the upper. In cases in which it is not easy to get a good impression in wax or "compo," and when the fingers cannot be inserted to press it home, plaster of Paris may be employed for the purpose. The plaster used should be specially prepared in very fine powder and be kept perfectly dry. As it sets very rapidly it must be mixed with sufficient water to form a thick paste, spread round the tray, and introduced into the mouth as expeditiously

as possible. The tray must not be removed from the mouth until the plaster sets. In mixing, the plaster should be added to the water a little at a time, until a paste is produced of the proper consistency. The patient's head must not be placed very far back, and he should be told to avoid swallowing during the process. It is customary with some to slightly oil the mouth previous to taking an impression in plaster, to prevent sticking. Gutta-percha is now seldom used for taking an impression of the mouth. It may be prepared by soaking in hot water, and on obtaining the impression should at once be filled with plaster, as it contracts very rapidly.

THE PLASTER MODEL.

The next process is to make a plaster model or counterpart, from the wax or compo impression. This is done by first cutting away any superfluous pieces of the composition, then mixing sufficient plaster of Paris with water to the consistency of a thick cream, and then pouring it into the impression. A base must next be made for the cast by making a circle of stiff paper, thin sheet lead, or any similar pliable material will answer the purpose, placing it on a porcelain slab, and filling it with plaster to the height of two or three inches. The impression cast may then be joined to it, and, when set, the whole should be placed in a bath of hot water in order to render the detachment of the wax or "compo" easy. It is generally necessary to strengthen some of the plaster teeth to prevent them being broken off. This may be done by using small pieces of pin wire, and inserting them in the depression made in the wax by the teeth. After the plaster model has



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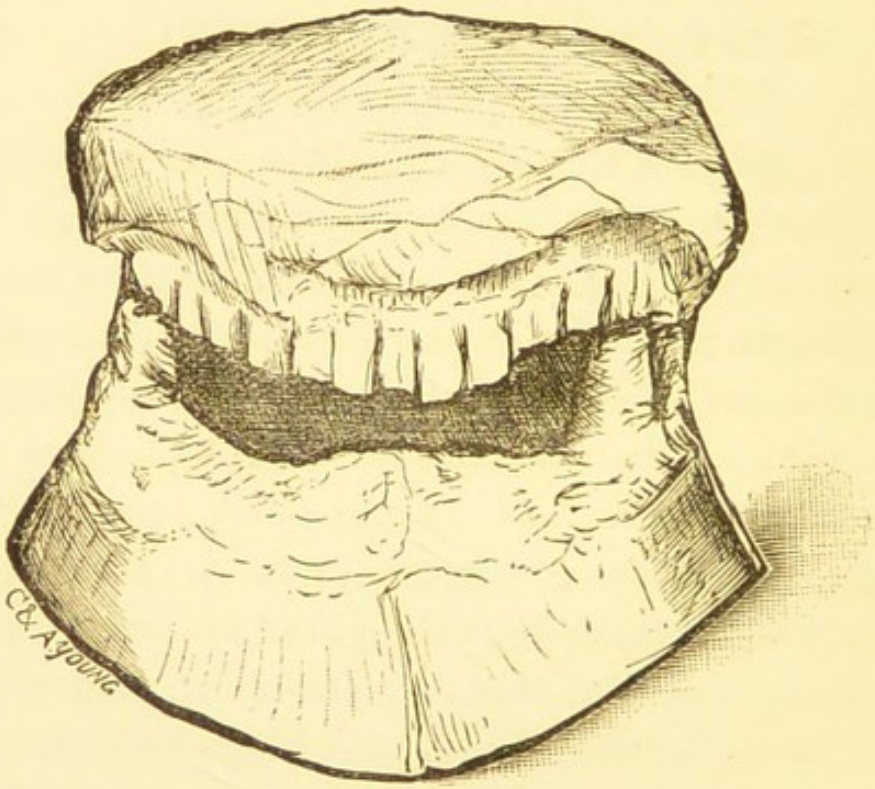


II.

Fig. I.—Plaster model.

Fig. II.—Antagonising model. (See page 54.)

been separated from the impression, it should be neatly trimmed round the base and shaped with a knife.

If an air-chamber is to be made in the base, it may be prepared on the model, by cutting the shape of the chamber from the wax or compo impression, which will be raised in a corresponding manner when the model is cast. It may also be made by cutting out the form of the chamber in a piece of sheet lead the thickness required, placing it in the arch, and using pressure with the fingers until it assumes the form of the palate. This may then be fixed to the model by a piece of wire or soft wax.

In making a model from an impression that has been taken in plaster of Paris it should be first painted over with a varnish made as follows:

Take of

Gum sandarach	2½	ozs.
Alcohol absol.	20	,,

Dissolve.

After using the varnish the whole should be painted over with oil, and the model then cast with the plaster in the same manner as in dealing with a wax impression.

It is a good plan to give the plaster model when finished a thin coating of varnish or boiled oil to protect it from wear ing, and to give it a smoother surface.

THE METALLIC DIE AND COUNTER DIE.

The next process is the making of the metallic die and counter die, the former being an exact model of the mouth in

metal, and the latter a counterpart of the impression. The metallic die is necessary in order to resist the force required in stamping the plate, and of course the fit of the plate depends on it being made as perfect as possible. It is also necessary it should be composed of some metal that fuses at a low temperature, does not contract much on cooling, and will withstand the force of the hammer and resist compression. The most suitable metal, and the one that answers these requirements best, is zinc. The usual method employed for making the die is by moulding, and is carried out in the following manner. A quantity of casting sand and an iron ring or moulding flask are required for this process:—

The fine sand is used for receiving the impression of the mould, and should be prepared for the purpose by adding sufficient water to render it damp and adherent, so it will take the form of the model. The moulding flask or iron ring having been placed on a board, is then carefully packed with the sand to receive the model. An ordinary medium-sized flower pot, partly filled with the sand, will answer the purpose admirably. The model having been dusted over with French chalk, should be steadily but gently pressed into the sand, face downwards, and then carefully withdrawn, leaving an exact mould of the plaster cast. The zinc having been melted in a ladle, must next be slowly poured into the sand mould, and allowed to cool. It then may be removed, and when trimmed with a file, forms the metallic die. In the process known as dipping, the counter die is cast first. The metal having been melted is poured into a small iron pan about three inches in depth, and the unvarnished model having been well dried, is immersed, face downwards, in the metal just before it sets. When the metal

is cool and all the plaster removed, the counter die having been coated with a thin mixture of whiting and water, is encircled by an iron ring, and into this the metal to form the die is poured. To make the counter die by the moulding process the iron ring or moulding flask is placed on a board, and again filled to the height of 3 or 4 inches with the moist sand, into which the metallic die is gently pressed face upwards. The sand is then well packed round about it, leaving only the palatal face exposed, which must be dusted over with French chalk, lycopodium, or a mixture of whiting and water, to prevent adhesion. Lead is generally employed for making the counter die, and a sufficient quantity having been melted in a ladle, it should be poured over the die, and when cool the counter may be separated and trimmed round. Care should be taken that the melted lead is not at too high a temperature when poured over the die, or partial fusion may be caused, with the result that both die and counter die will be spoiled.

GENERAL PROCESS OF MAKING ARTIFICIAL DENTURES.

Having proceeded so far, and completed an accurate model, metallic die, and counter die, the next process is that of constructing the plate or base. For this purpose either gold, platinum, dental alloy, or vulcanite are generally used, their respective merits as dental bases we will note later. If the base decided on is to be a metallic one the size of the plate may be sketched on the plaster model, and then cut out in a piece of thin sheet lead for a pattern, from which to make the permanent plate. The plate for an upper

denture should always be sufficiently large to cover nearly all the hard palate, and in some cases brought over the edge of the gum. The permanent plate should now be cut out according to the pattern in sheet lead and bent into shape on the die with a pair of pliers. It must then be well annealed by bringing it to a red heat under the flame of the blow-pipe and placed on the die and swaged. It is sometimes necessary to cut out a V-shaped piece in the plate before swaging, so the plate may be easily worked, and to prevent cracking. The plate, now fairly well shaped, should be placed between the die and counter die, and the former struck several times with a heavy hammer, until it assumes the exact form of the die. After again annealing it should be subjected to a further careful and final swaging. If the plate is only a partial one any bands or clasps that may be required should now be soldered on. The teeth having been chosen we must next proceed to cut backs for them from a plate of metal similar to the base. In selecting the teeth special attention should be paid to the colour and size, according to the age and complexion of the patient. Large teeth should be avoided if possible, especially for those persons whose lips are short and thin. The backs having been perforated with pin nippers, and the teeth attached to them by their rivets, they should be fixed round the edge of the plate, in the positions they are intended to occupy, by means of wax. The plate is next embedded in a mixture of plaster and sand, the portion round the edge only, which it is intended to solder, being left uncovered. The wax having been removed by heat, solder is applied, and by means of the blow pipe the metal is fused and the teeth fixed to the plate.

Another method of fixing the teeth to the plate, but one now

very rarely used, is by means of a pin inserted in a hole drilled up the centre of the tooth. Pins of a suitable size are first soldered to the plate in the proper positions, and the teeth having been drilled to fit them, they are fixed by first touching the top of the pin with a little melted sulphur, and then at once pressing them into their positions to meet the plate as close as possible. In case of a single tooth pin being broken off a finished plate, it is necessary to remove all the teeth from the plate before repairing it.

THE ATTACHMENT OF SPRINGS.

Most entire dental plates are now supported in the mouth by means of atmospheric pressure, and springs are seldom used, yet the dentist may occasionally be required to fix a new spring to an old set. Springs are made of gold or the same metal as the plate. They are attached to the base on each side, between the posterior bicuspid above, in the following manner :

A narrow strip of metal having been soldered to the border of the plate, extending up the base of the teeth and near the end, a small circular cup of gold is fixed, connected with the standard by a small wire. To each end of the spring is fixed a loop of wire, the closed ends soldered together, so they may enter the hollow in the wire.

In finishing, the plate should be cleaned by means of a scratch brush and polished with prepared chalk on the lathe, and the case may be considered complete.

OBTAINING THE ANTAGONISING MODEL.

The plate having been constructed, before proceeding to arrange and fix the teeth it may be requisite to take a model in plaster of the remainder of the natural teeth in the upper and lower part of the mouth. This is termed the antagonising model, and is obtained as follows :

Attach to the lingual border of the plate a roll of wax or compo by softening it over a spirit lamp. The wax, if used, should be harder than ordinary bee's wax, and the following form is given by Richardson :

Take of

Bee's wax	1 lb.
Gum mastich	2 ozs.
Prepared chalk	1 oz.

The wax must be first melted, the mastich having been previously powdered, added gradually, then the chalk, and the whole well mixed till cold.

The wax having been arranged, and all superfluous portions being cut away, place the plate on the model, when it should be again trimmed, allowing a wider margin than the outer circle of the teeth. The plate may now be inserted in the mouth of the patient, who must be told to bring the jaws naturally together until the teeth meet. The plate and wax should then be carefully withdrawn, and placed on the plaster model. We should now have an exact impression in the latter of the opposing teeth. Place the model with the plate and wax upwards on a porcelain slab, the heel of the model being extended to make the articulating surface for the

antagonising model. The plaster may be kept from running by placing a strip of lead on each side of the model, between which pour a mixture of plaster of Paris with water to the depth of about an inch. Allow this to set and become hard, then trim smooth the edges of the plaster, and at the same time cut two grooves, or holes, in the new portion, in order that the two parts may fit. The articulating surface should then be painted over with boiled oil to prevent adhesion, the wax with the impression of the teeth being treated in the same way. The space over the palatal vault having been covered with a piece of softened wax, we must next proceed to slowly pour a mixture of plaster and water upon the surface of the wax, filling up the teeth imprints carefully, and extending back to the heel of the model, until the plaster is about an inch deep. When this has become hard and set, the two parts of the model may be separated, trimmed round, and the entire pieces re-dipped in boiled oil or varnish. Thus we shall have a complete and accurate model of the mouth, and on the plate being inserted in its proper position, it may be seen if it has been properly formed and treated by the close manner in which it fits.

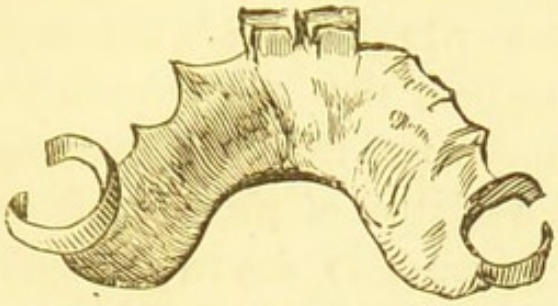
CLASPS.

The methods usually employed for retaining partial dentures in the mouth is by means of bands of metal called clasps, which are attached to the artificial plate, and made to encircle one or more of the natural teeth. The choice of position, and their adjustment, requires both careful judgment, and skill, as much injury is often caused to the remaining

natural teeth by the injudicious fixing of a clasp. The structure of a tooth often renders it unsuitable as a support for a clasp, or through being badly fitted, the tooth chosen may become worn and mutilated, and decay induced. In making the choice of teeth to act as supports to a partial denture, it is well to remember that a clasp should never be attached to a loose or to a decayed tooth, unless the latter can be soundly plugged, and is likely to be free from pain. A clasp should never be applied to an incisor, or bicuspid, as being in or near the front of the mouth, it would be exposed to view. If absolutely necessary to utilise a bicuspid for the purpose, the clasps should be made as thin and small as possible. When sound, the anterior or posterior molars form the most suitable support for clasps, owing to their position and form, and it is therefore often found necessary to extend the dental plate in order to utilise them for this purpose. It is seldom advisable to use the wisdom teeth for the purpose of clasps, both on account of their form and their position in the jaw. It is occasionally necessary to file a tooth for the reception of a clasp, but such cases are rare and should be avoided if possible, as when the enamel is once removed from the tooth, decay is soon likely to set in.

THE FORM OF CLASPS.

The commonest form of clasp is that of the plain band, which is made to partially encircle the tooth. In proceeding to make one, a pattern should first be cut out in sheet lead and fitted round the plaster tooth, and from this the band may be cut from a piece of plate, as wide as the tooth will



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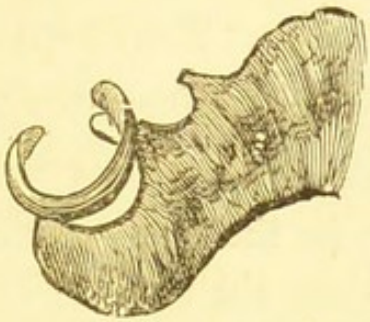

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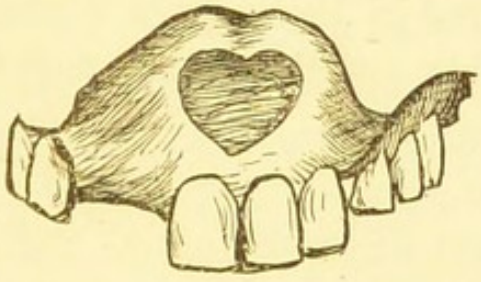


III.

Fig. I.—Plain band clasp.

Fig. II.—Standard clasp.

Fig. III.—Partial upper denture, showing air chamber.

permit. The metal used should be twice the thickness of the base. This band should then be bent by means of a pair of grooved pliers exactly to the form of the tooth intended to be clasped. Having been thus very carefully and accurately fitted it should be removed from the plaster model, the centre being filled with a mixture of plaster and sand, and a small piece of binding wire also drawn through the centre to support it. The part intended to be soldered must then be painted with borax made into a thin paste with water. The solder being cut in very small pieces, and placed over the joint, it should be fused in the flame of the blow-pipe and the clasp attached to the base. The clasps must not be soldered on until the plate has been properly swaged.

Some dentists make their clasps as narrow as possible, using half-round wire for the purpose, claiming that they are thus less liable to injure the tooth. The standard clasp is another form much used by American dentists, in which the clasp is soldered to standards fixed to the plate, leaving a space between it and the tooth. The partial clasps, which, instead of circling the tooth, support the plate by resting against it, are used in those cases where the plate adheres firmly to the palate and the firmer support of the band is unnecessary.

THE SWAGING OF PLATES.

The pattern of the plate should first be cut out in sheet-lead, then carefully and accurately fitted to the plaster model. This having been done, it must be placed on the plate of metal and the exact outline traced thereon; the permanent

base may be then cut out by means of the plate shears. The plate being now ready it should be placed on the die and adapted as a preliminary, with a wooden mallet. This being done, and having been annealed by bringing it to a red heat in the flame of the blow-pipe or the furnace, it may be placed between the die and counter, which must be brought together by well placed blows with a heavy hammer. The plate should be examined now and again to see that it is being correctly formed. It should also be repeatedly annealed in order to prevent cracking, and to enable it to take the impression of the die more readily. The plate should be fitted to the plaster model now and again during the process, so that any defect may be noticed and rectified, either by filing or padding up with a piece of metal.

METHOD OF SUPPORTING THE PLATE BY ATMOSPHERIC PRESSURE.

This method of attaching artificial dentures is very generally used, and when the form of the palatal arch favours it, is usually adopted. The plate should be made large and to well cover the palate. A central air chamber must be constructed in the plate, and in such cases should first be formed in the plaster model. From this a pattern is cut out in sheet lead, which is placed on a metal plate, and its form traced thereon. This being cut out, and after being worked with the pliers, is placed between the die and counter, then swaged and annealed in the same manner as a plate. It should then be forced into its place by a smooth faced stamp, and shaped to the angle of the groove. After it has been

accurately formed, it should be well annealed and again swaged. It is then cut exactly to the form of the chamber, and a piece of the dental plate being cut out with a sharp instrument, the cut chamber should be laid on the plate. It must next be painted round with a paste composed of borax and water, and small pieces of solder having been placed along the line of union, it may be placed in the pan and soldered under the flame of the blow pipe.

ARRANGING AND ANTAGONISING THE TEETH.

In choosing the artificial teeth, care should be taken that they match the natural ones that remain, in shade and size. The form in which they should be placed may be judged from the plaster model. Alteration in form may be made by grinding upon the emery wheel in the lathe. In antagonising the teeth, the natural form should be closely observed, and they should be arranged in a similar manner to those which they are intended to replace. The artificial teeth should not be allowed to come in contact with the opposing teeth before the meeting of the natural ones, when the mouth is shut, and when in contact, the whole should meet simultaneously.

All is now ready for fixing the teeth, which are temporarily fixed to the plate by means of wax. The plate must be placed in a bed composed of a mixture of sand and plaster, and surrounded by the iron ring as before. The whole being placed on a board, all parts of the plate and

teeth should be enclosed in plaster, except the lingual side of the base and the backs of the teeth. Supports or backs must be cut out of a piece of plate for each tooth, with the plate forceps. Each back must then be pierced with two holes by means of the plate punch or nippers for the reception of the platinum pins or rivets. The sides of the holes facing the plate should be enlarged with a spear head drill, so that when the rivets are inserted a head may be formed by splitting, spreading the wire. The edge of the plate where the union is to be, must now be scraped and coated with the borax and water paste, then small pieces of solder placed along the joints over the ends of the rivets. The whole piece should then be gradually heated before soldering by spreading a flame over it, then by means of the blow-pipe, each back may be soldered to the plate.

FINISHING.

After cooling, all the plaster must be removed, and if the plate is discoloured it should be boiled for a short time in a weak acid solution, and then transferred to a solution of soda for a few minutes. Irregularites may be removed with files and scrapers, till the surface of the plate is quite smooth. A bright polish may then be given by applying the revolving brush on the lathe using prepared chalk or rouge, and finally burnishing with a piece of soft chamois leather placed over the rounded end of a cork.

THE VULCANITE BASE.

Vulcanite is, perhaps, the base most generally used for artificial dentures at the present time, and has the advantages of being light, durable and cheap. It is formed by incorporating rubber with a certain proportion of sulphur and other ingredients, the result when subjected to heat for a certain time being a hard material, which is not affected at ordinary temperatures, or by the mouth secretions, and which is a fair conductor of heat. It is prepared for dental purposes in the form of sheets of the required thickness, and convenient size.

PROCESS OF WORKING A VULCANITE BASE.

An impression of the mouth is taken in "compo" or wax in the usual way (but for entire dentures it is best to use plaster of Paris for this purpose), the greatest care being exercised to ensure accuracy. A plaster model is then taken from the impression, upon which is moulded a temporary plate of wax, the size of the required base, but a little thicker, and worked exactly to the model. If an air chamber is to be made, it should be cut out from the impression before taking the plaster model, or it may be made in a similar manner to a metal plate. If the wax used for the temporary plate be softened by dry heat, care should be taken to varnish the model before spreading it over. The teeth must be mounted on the wax, and if clasps or bands are required, they should next be fitted to

the teeth, and fixed in their places. A strip of wax should also be brought over the front of the gum to give the teeth support. The temporary wax plate may now be placed in the mouth, trimmed to the proper proportion, and the bite of the under teeth being taken, it is again placed on the model. An antagonising model must then be obtained, exactly in the same manner as when constructing a metal plate. In fixing the teeth to the wax for an entire denture, small portions must be cut out for each tooth to fit in. They should be well pressed down, and placed close together.

The next process is to form the matrix into which the base is to be packed. For this purpose a vulcanising flask is used, which divides into sections. Into the bottom one is first poured a cream of plaster of Paris and water, until it is about two-thirds full, and into this the wax base and model, with the teeth fixed, is immersed, the cup being then filled up with the plaster cream. The second section of the flask is now placed on and fixed, and is also filled up with plaster mixed to a creamy consistence. The remaining sections are then replaced and filled, and screwed down with a clamp. The flask must now be placed on a stove, with just sufficient heat to soften, but not melt the wax, and the plaster will soon harden. Next remove the flask, and having unscrewed the clamp, the sections may be separated. The teeth with the wax and temporary plate will be found fastened to the last formed section of the matrix, the crowns of the teeth being attached to the plaster and their plate ends towards the matrix. On boiling water being poured over the wax it will soon melt, and may be removed. The next process is that of packing in the rubber

to form the permanent plate. This may be done by heating the section of the flask containing the teeth sufficient to make the gum material soft, or the latter may be warmed over the flame of the spirit lamp, and then packed in small strips and pressed into the mould. Small narrow pieces must be carefully placed in behind the platinum pins of the teeth, until the groove behind the teeth is partly packed. In partial dentures, any clasps necessary must be fixed at this stage. The plate to cover the palate is then cut out of one piece, sufficient being allowed to come over the front of the gum, and placed in the mould. It is often necessary to make this a double thickness. The whole now being carefully placed and packed in the mould, and several grooves having been cut in the plaster to carry off the overflow of rubber in baking, the sections of the flask may be replaced, screwed up and placed in the vulcanizer.

There are various forms of vulcanizing apparatus, the object of the process being to act on the rubber by means of a proper regulated heat, and so causing it to become hard. The vulcanizer consists of a metal boiler and steam chamber in which the flask is placed, the latter being surmounted by a thermometer to register the proper temperature, and a safety valve to guard against explosion. Gas is usually employed for the purpose of heating. The time and temperature required to complete the process of vulcanizing varies according to the make of the material used.

Those in general use require a temperature of from 310° F. to 315° F., and to be exposed to it for from one and a half to two hours, time.

When finished the flask is again separated, and all the plaster removed from the rubber. Any roughness of the

plate may be removed by means of rasps or files, and superfluous edges or excrescences scraped off. The plate may be finally polished on the lathe by means of the brush wheel, and prepared chalk.

REPAIRING A FRACTURED VULCANITE DENTURE.

The vulcanite base, although fairly durable, has the disadvantage of being easily broken. Broken plates of this kind are frequently brought to the dentist to be repaired, and may be remedied as follows :

An irregular shaped groove or dovetail having been made in the fractured plate, it should be brought together and evenly filled in with wax. Proceed now exactly as in making a complete denture with a vulcanite base, placing the piece in the flask, embedding in plaster and heating. Then separating the flask, remove the wax with hot water, and pack small strips of rubber into the cavity formed by the fracture, or over the surface of the fissure, screw up in the flask as before, and place in the vulcanizer. The operation will require the same time, and temperature, as in making an entire denture. When finished any roughness may be scraped, or rasped off, and the plate finally polished with prepared chalk, as described before.

As a rule the new vulcanite will be somewhat lighter in colour than the rest of the plate. It may be darkened by applying a small quantity of dilute nitric acid on a plug of

wool over the part, then washing it well in water, and afterwards immersing it in an alkaline solution for a few minutes.

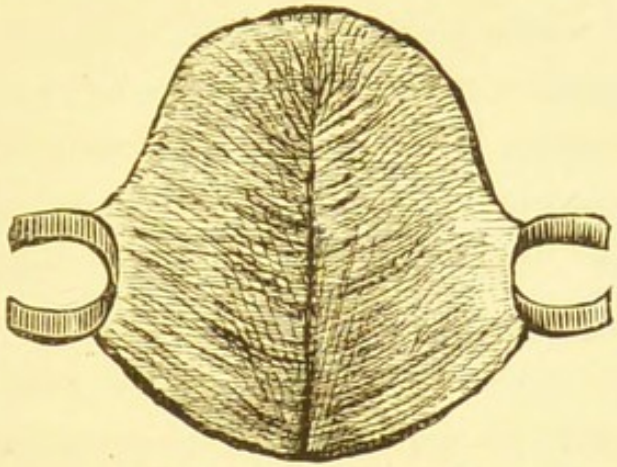
COMPOSITE DENTURES.

It is a common practice at times to employ both metal and vulcanite in making partial and entire dentures. In such cases the metal is used to cover the palatal arch, the teeth being supported by a ridge of vulcanite. In the process of constructing a composition base of this kind the metal plate is swaged in the usual manner, the teeth being arranged and attached to the edge in wax, this is now inserted in the first section of the vulcanizer filled with plaster as described before, then proceed as with a vulcanite plate. When the wax has been removed with hot water, pack the groove at the back of the teeth with strips of the rubber, extending it partly over the plate, then clamp up the flask and vulcanize in the usual way.

DEFECTS OF THE PALATE.

Defects of the palate may either be the result of diseased action in the palatal organs, and simple perforations of varied size, or they may be due to original malformations in the form of clefts in the palatal vault. Such a fissure extending to the upper lip, which is also cleft, forms what is known as hare lip. In most cases of palatal malformation it

interferes with articulation, and also the mastication of food. The dentist may be called upon to try and remedy such defects by mechanical means. In cases where the velum is cleft, an artificial palate termed an obturator is usually



Obturator for defective palate, showing method of fixing with clasps.

recommended. It should not be used until the patient has reached the age of 16 years to be successful, and the arrangement requires the greatest accuracy and skill in construction. If necessary, in making such a plate, teeth should be attached to the front to supply any deficiency. The plate may be composed of gold, vulcanite or soft rubber, and if there be any molar or lateral teeth suitable, it can be adjusted to them by clasps. In most cases beeswax is the best material for taking the impression of the mouth, which is obtained in the usual manner; then proceed as in making an artificial denture on either metal or vulcanite, as the case may be. In more complicated cases where the fissure extends through the maxillary bones to the alveolar sockets more careful and scientific treatment is required. The construction of an obturator to supply such a case requires much experience and special skill.

SOLDERING.

The process of soldering is frequently employed in various operations of mechanical dentistry, such as the joining of a plate, or attaching clasps, and the backs of teeth. For this purpose a blow-pipe, with or without a foot-bellows, a dental lamp or gas-burner, and a circular pan with a handle, partially filled with small lumps of pumice stone or charcoal and plaster, called the soldering pan, is necessary. The flux used is usually borax made into a paste with water, and is applied to the parts intended to be soldered with a camel-hair brush. The edges of the metal to be united should always be first scraped clean with a file. The piece having been placed in the soldering pan, supported and fixed in a suitable position by means of the pumice stone, is then painted with the flux, and the flame, by means of the blow pipe, is brought to bear on the part to be soldered until the edges of the metal become united. Soldering is an operation that requires considerable practice and skill to perform neatly and well.

When soldering teeth to a plate, care should be taken to apply the heat gradually, or they may crack and split.

GOLD DENTAL METALLURGY.

The various metals used in the making of dental plates deserve careful attention, the most important being gold. Its value in mechanical dentistry as a base, in the form of

dental plate, and also for plugging teeth, is far beyond any other metal. It has been known and employed from the earliest period of the world's history, and was used by the Jews some 3,000 years ago. Various ornaments fashioned in the precious metal having also been found in early Etruscan tombs of very great antiquity.

Gold occurs in the metallic state in the form of nuggets, in the crystalline primitive rocks, both in quartz and sand. It is found largely in Africa mixed in the form of small grains or spangles with the sand in alluvial situations on the banks of rivers. Pure gold is of a rich yellow or orange colour and capable of a high polish. It has a specific gravity of 19.26, and with the exception of platinum is the heaviest of the metals. On account of its malleability it is rarely used pure for any purpose, but usually alloyed with some other metal, which increases its tenacity and also renders it more easy to fuse. It fuses at a temperature of 2,016° F., and contracts largely on cooling. No metal is more widely diffused in nature than gold, it being found in almost all parts of the world, but most abundantly in Australia, California and Africa.

Gold does not readily combine with oxygen, and is not affected by exposure. It is insoluble in all simple acids, but easily soluble in the mixture of strong nitric and hydrochloric acids, commonly called aqua regia.

DENTAL ALLOYS.

Gold readily combines with most metals, the admixture of which renders it harder and more suitable for use in dentistry, Tin, antimony, bismuth, lead and arsenic, when mixed with

gold, even in small quantities, render it unsuitable for dental work. Gold, when alloyed with zinc in equal proportions, forms a hard white brittle alloy, but when mixed with platinum, it is rendered harder and more elastic, and is still malleable to a high degree.

Silver also forms a good alloy for gold, its presence improving the latter metal for working purposes, and making it more easily fusible. The alloy formed by gold and copper is of a rich red colour, and forms an excellent metal for dental plates, it is increased in hardness, yet easily worked and malleable. The quality of gold is expressed in carats, 24 being used as the standard of pure gold. The gold used in the arts varies in quality from 6 to 22 carats, that generally used for dental purposes being 15 carats. The following may be taken as examples of the composition of gold alloyed plates used for artificial dentures.

Eighteen Carats Fine.

Pure gold	18 dwts.
Fine copper	4 „
Fine silver	2 „

Fifteen Carats Fine.

Pure gold	15 dwts.
Fine copper	5 „
Fine silver	4 „

Twenty-two Carats Fine.

Pure gold	22 dwts.
Fine copper	1 dwt.
Fine silver	18 grs.
Platinum	6 „

SILVER.

Silver has been known and used from a very early period. When pure it is almost white in colour. It has a specific gravity of from 10.47 to 10.6, and fuses at a bright red heat, at a temperature of 1,837° F. In ductility it is only inferior to gold. It is unaffected by moisture, but soon tarnishes when exposed to sulphurous fumes. It dissolves readily in strong nitric acid. Silver combines with most metals, gold, copper and platinum forming the best alloys. Lead, zinc, and tin cause it to become brittle. It is one of the best conductors of heat and electricity, and does not oxidise at ordinary temperatures. For dental purposes it is best alloyed with sufficient platinum to give it firmness, the usual proportion being 5 grains to each pennyweight of silver. It is now rarely used for dental plates unless alloyed. It becomes tarnished and black after being subjected for any length of time to the mouth secretions.

PLATINUM.

Platinum has the greatest density of any known metal, its specific gravity being 21.25. It melts only at a considerable heat, and is not even tarnished by a white heat. It is harder than silver, and is of a greyish white colour. It is not affected by the atmosphere, and is only soluble in nitro-hydrochloric acid. When alloyed with silver it may be dissolved in strong nitric acid. It may also be alloyed with various metals, but for dental purposes the mixture with gold

or silver only is employed. Gold is used as a solder for platinum.

ZINC.

Zinc is chiefly used in dentistry for the casting of dies, for the purpose of swaging metallic plates. That met with in commerce is generally impure and brittle, but by annealing at a temperature of from 220° to 300° F. it is rendered malleable. It is a bluish white in colour, with a specific gravity of from 6.9 to 7.2, and melts at a temperature of 773° F. It is very necessary to anneal a zinc die, which will prevent any danger from cracking when swaging a metal plate.

LEAD.

For dental purposes lead is only employed for making the counter die. It is a very soft and ductile metal, fusing at a temperature of 612° F., and has a specific gravity of 11.352. That found in commerce is usually impure.

SOLDERS.

Solders are alloys used for the purpose of uniting the same or different metals to each other. They should fuse at a

lower temperature than the metal they are required to join, and should also have an affinity for it. The fusion of the metals is aided by a flux, powdered borax being generally used in dental operations. Gold solder may be used for joining platina. The following formulæ are given by Richardson :

Gold Solder.

Fine gold	3 dwts.
Fine silver	15 grs.
Copper	10 „
Brass	5 „

Fuse together.

No. II.

Pure gold	6 dwts.
Pure copper	2 „
Pure silver	1 dwt.

Fuse together.

Silver Solder,

Fine silver	66 parts.
Fine copper	30 „
Fine zinc...	10 „

Fuse together.

No. II.

Fine silver	6 parts
Fine copper	2 „
Fine brass	1 part

Fuse together.

A Soft Solder.

Lead	2 parts.
Tin	1 part

Fuse together.

THE FUSING POINT OF METAL.

Gold	2,016° F.
Silver	1,837° F.
Tin	422° to 440° F.
Lead	612° F.
Copper	1,996° F.
Iron, cast...	2,786° F.
Antimony	810° F.
Zinc	773° F.
Bismuth	497° F.
Cadmium	442° F.
Arsenic volatilises at	366° F.

FINIS.

APPENDIX.

FORMULÆ—FILLING MATERIALS.

Copper Amalgam.

Immerse small slips of metallic zinc in a strong solution of sulphate of copper. Collect the precipitate from the zinc, place in a mortar, and add a few drops of sulphuric acid. Add a little metallic mercury and work into a stiff paste. Roll into thin sheets and place on a slab to dry. When required for use, put sufficient on the end of a knife and hold it over the flame of a spirit lamp until it becomes soft. Now place between a fold of blotting-paper to press out all superfluous mercury, and then insert in the tooth cavity which has been prepared.

White Fillings.

Burn phosphorus under a bell jar, collect the precipitate that falls and preserve in a well-stoppered bottle. To prepare the filling, mix equal parts of the white precipitate and carbonate of lime on a dry slab, work into a thick paste, and it is ready for use.

No. II.

Take of

Oxide of zinc, in fine powder	200 parts.
Silica, in fine powder	8 ,,
Borax, in fine powder	4 ,,
Glass, in fine powder	5 ,,

Mix, and pass through a fine sieve. Preserve in a stoppered

bottle. When required for use, mix a small quantity of the powder into a thick paste with a concentrated solution of chloride of zinc and it is then ready for filling the tooth. The operation should be performed very rapidly, as the composition sets into a hard cement in a few minutes.

LOCAL ANÆSTHETICS.

No. I.

GELATINISED CHLOROFORM.

Mix equal parts of chloroform and the albumen of an egg, place in a stoppered bottle and shake. In three hours it will be ready for use.

No. II.

Take of

Pure ether	ʒ i. ss.
Menthol	ʒ i.
Extract of Indian hemp	gr. xx.
Oil of peppermint	♏ xx

Mix well. Apply to the gum around the tooth.

No. III.

Take of

Powdered camphor	ʒ vi.
Ether	ʒ ii.

Dissolve. Apply to the surrounding gum with a plug of cotton wool.

APPLICATIONS FOR TOOTHACHE.

No. I.

The following forms a most efficacious application:

℞	Ol. caryoph	℥ ss.
	Acid carbol. pur.	℥ iii.
	Glycerin. ... ... ad	℥ vi.
	Liq. cocci...	℥ ss.

Misce. Apply one drop on a small piece of wool to the tooth cavity.

No. II.

℞	Tinct. opii.	℥ i.
	Camphor	℥ ii.
	Chloroform	℥ vi.

Solve. Apply on wool to the cavity of the tooth.

No. III.

℞	Menthol	grs. xx.
	Tinct. opii.	℥ i.
	Camphor	℥ i.

Solve. Apply on wool to the cavity of the tooth.

Toothache Pellets.

℞	Cocaine hydrochlor.	grs. viii.
	Pulv. opii...	grs. xxxii.
	Menthol	grs. viii.
	Pulv. althæ	grs. v.

Mix and divide into ½-grain pellets and keep in a stoppered bottle. One to be inserted in the tooth cavity when in pain.

Astringent Wash for Spongey Gums.

℞	Tinct. Krameriæ		ʒ i.
	Glycerin. pur.		ʒ ss.
	Aq. rosæ	ad	ʒ viii.

Misce. Rinse the mouth thrice daily.

DENTIFRICES.

Saponaceous Toothpowder.

℞	Pulv. sapo alb.		ʒ iii.
	Creta precip.		ʒ iii.
	Pulv. oss. sep.		ʒ i.
	Pulv. rad. iridis.		ʒ i.
	Otto rosæ		gtt. iii.

Mix and sift.

Astringent Dentifrice.

℞	Pulv. potass. chlor.		ʒ ii
	Acid tannic.		grs. xv.
	Pulv. iridis		ʒ i.
	Creta precip.		ʒ ii.
	Otto rosæ.		gtt. vi.

Mix and sift.

A Rose Dentifrice.

℞	Pulv. oss. sep.		ʒ i.
	Pulv. iridis		ʒ ii.
	Creta precip.		ʒ iv.
	Soda bicarb.		ʒ vi.
	Carmine		grs. xv.
	Otto rosæ		♏ vi.

Mix and sift.

A Pinol Dentifrice.

℞	Camphor	ʒ i.
	Pulv. iridis	℥ i ss.
	Creta precip.	℥ iii.
	Pinol essence	ʒ i.

Mix and sift.

Carbolic Dentifrice.

℞	Phenol. pur.	ʒ ii.
	Pulv. iridis rad.	℥ ii.
	Creta precip.	℥ vi.
	Armen. bole	℥ i ss

Mix and sift.

Foaming Carbolic Tooth Wash.

℞	Quillaia bark in powder	℥ iv.
	Glycerine	℥ iii.
	S. V. rect.	℥ v.

Macerate for three days, then add.

Acid carbolic, pur.	℥ i.
Oil wintergreen	♏ xx.
„ cinnamon	♏ v.
Cochineal...	gr. v.
Water	℥ xxx.

Digest for three days, shaking frequently, and filter.

Astringent Essence.

℞	Tinct. myrrh	ʒ v.
	„ krameriæ	ʒ v.
	„ cedar wood	ʒ xv.
	Oil of peppermint	gtt. 15.
	Otto rosæ	gtt. 10.

Mix. A few drops to be added to half a tumbler of water.

Dentifrice Water.

℞	Pulv. boracis	ʒ ii. ss.
	Glycerin.	℥ iv.
	Acid salicylic	grs. x.
	Otto rose	♏ 5.
	Ol. neroli	♏ 5.
	Ol. patchouli	♏ 5.
	Tinct. cocci	ʒ i. ss
	Aq.... ... ... ad	xx.

Mix and filter.

Astringent Essence for Making Mouthwash.

℞	Tinct. krameriæ	℥ i.
	Tinct. myrrh	℥ i.
	Eau de Cologne	℥ i.

Misce. Use a teaspoonful to a tumbler of warm water.

HOW TO BECOME A REGISTERED DENTIST.

From The British & Colonial Druggist.

THE amount of study necessary for the student of to-day who would become a registered dental practitioner is very different to what it was before the passing of the Act of 1878. The curriculum now demanded by the various licensing bodies is almost as stringent as that required to obtain a medical qualification. To begin with, he must pass a Preliminary examination in arts, similar to that for medical students. The examining bodies whose examinations fulfil the necessary conditions are the Senior, and Junior, Local Oxford, or Cambridge, or the Preliminary examinations of the Universities of Durham, London, Victoria, Edinburgh, Aberdeen, Glasgow, St. Andrews, Dublin, the Apothecaries' Society and others.

On passing this, he may be registered as a dental student at the office of the General Medical Council, 299, Oxford Street, London. He should now commence his professional studies by becoming apprenticed to a registered dental surgeon. The usual term of apprenticeship or course of dental mechanics is for three years; but the third year is allowed to run contemporaneously with the hospital course. Hence the majority of students devote their first two years to mechanics, and combine the third year with the subsequent two years of hospital study; but it is much better to devote the whole period of three years to mechanical work, if the time can be afforded. An extra year or two in the workshop will never be regretted afterwards, as much of the skill necessarily depends on the practical experience gained during apprenticeship. On the completion of this term, or of the first two years of it, the student should enter the hospital, register as a *medical* student, and employ the next two years in dissecting, and attendance on the

general and special lectures and practice of the hospital. Before admission to examination for the diploma in dental surgery, the candidate must produce evidence of having been engaged during four years in the acquirement of professional knowledge, subsequently to the date of registration, but of the three years required for instruction in mechanical dentistry, any period may be taken prior to registration as a dental student. If a dental student registers as a medical student on entering the hospital, all the lectures and practice attended by him are accepted as part of the general medical curriculum, and he is not required again to attend them should he afterwards determine to enter for a medical or surgical qualification. The student having now completed his four years of professional study, and attained the age of 21 years, he may enter for the examination for a diploma in dental surgery. This qualification is granted by four licensing bodies in the United Kingdom, viz , the Royal College of Surgeons, England, the Faculty of Physicians and Surgeons of Glasgow, and the Royal College of Surgeons, of Edinburgh, and the Royal College of Surgeons of Ireland.

The majority of English dental students enter for the examination as licentiates in dental surgery of the Royal College of Surgeons of England, for which the following instruction is demanded. Candidates must have attended at least one course of lectures in anatomy, 12 months dissection, and one course each of physiology, practical physiology, medicine, surgery, chemistry, practical chemistry, and materia medica. It is also necessary to produce certificates of having attended two winters' hospital surgical practice, and surgical clinical lectures. Two courses each of dental anatomy, surgery, and mechanics, and one course of metallurgy. The certificate of registration as a dental student by the General Medical Council, 299, Oxford Street, London, W., must be produced, and evidence of having been engaged during four years in the acquirement of professiona

knowledge subsequent to the date of such registration. Of this period three years may be spent with a dentist, or two years with a surgeon. Two years' dental hospital practice. There is but one examination, the fee for which is ten guineas.

The examination is partly written, partly practical, and partly oral. The written portion comprises: general anatomy and physiology, general pathology and surgery, dental anatomy and physiology, and dental pathology and surgery. At the practical examination, candidates may be examined in the treatment of dental caries, to prepare and fill cavities with gold or plastic fillings, or material, or to do any other operation in dental surgery. Also on the mechanical and surgical treatment of the various irregularities of children's teeth, and on mechanical dentistry. The oral portion is conducted by the use of preparations, casts, and drawings, &c. Should the candidates fail to satisfy the examiners, he is referred back for a period of not less than six months. The examinations are held in May and November each year.

For the Licence in dental surgery of the Royal College of Surgeons of Edinburgh, all candidates must pass a Preliminary examination in general knowledge, and be registered first as dental students. Certificates must be produced of having been engaged for four years in professional studies, and of having received three years' instruction in mechanical dentistry from a registered dental practitioner. The curriculum demanded consists of anatomy (one winter course), practical anatomy and demonstrations, nine months, or practical anatomy, nine months, and anatomy of head and neck, one course of 20 lectures; physiology, one course of not less than 50 lectures; chemistry, one winter course; surgery and medicine, one winter course; materia medica, one course of three months; surgery, one course of six months; medicine, one course of six months; and attendance on the practice of surgery and clinical lectures on surgery at a recognised hospital, six months. I

addition to these courses, which candidates will require to have attended in a recognised dental hospital, or with teachers recognised by the college, the following special courses of lectures :—Dental anatomy and physiology, human and comparative dental surgery and pathology, dental mechanics one course each, and two years' attendance at a dental hospital, or the dental department of a general hospital recognised by the College.

There are two examinations. For the first the candidate must have attended the courses in anatomy, chemistry and physiology, which form the subjects for examination, the fee for which is £4 4s. For the second examination the candidate must have attended the remaining courses of the curriculum previously stated, and be over 21 years of age.

The subjects are surgery, medicine, therapeutics and the special subjects of dental anatomy, and physiology, dental surgery and pathology, and dental mechanics. The fee for this examination is £6 6s. Unsuccessful candidates are repaid £2 2s. on the first, and £3 3s. in the second examinations. Full regulations can be obtained on application to the clerk to Royal College of Surgeons, 1, George Square, Edinburgh. For the dental diploma of the faculty of physicians and surgeons of Glasgow, the regulations as to certificates, curriculum, fees, and number of examinations are similar to those of Edinburgh.

For the licence in dentistry, granted by the Royal College of Surgeons of Ireland, the student must pass three examinations in order to obtain his diploma—viz., the Preliminary, Primary, and Final. These examinations commence on the second Monday in the months of February, May, and November.

(1.) The Preliminary.—Every candidate for the dental licence of the college must produce evidence of having passed a Preliminary examination in general education recognised by the General Medical Council, and be registered as a dental student.

(2.) PRIMARY DENTAL EXAMINATION.—The candidate must produce evidence of having attended a course of lectures on practical anatomy—demonstrations and dissections; lectures on theoretical chemistry, physiology (winter course), practical chemistry (winter course), histology (summer course), and of having attended a medico-chirurgical hospital. The fee for this examination is £10 10s.

(3.) FINAL EXAMINATION. — The candidate must produce certificates of having attended subsequently to registration the following courses of lectures. Special: Dental surgery, and pathology, dental mechanics, dental anatomy, dental metallurgy. General: Surgery. Also of having attended for two years the practice of a recognised dental hospital. Of having subsequent to passing the primary dental, or its equivalent, attended for a period of nine months as extern, or six months as intern pupil, the practice of a recognised medico-chirurgical hospital. Further, he must show proof of having been engaged for at least 45 months in acquiring a knowledge of dentistry. The fees are as follows: — For the Primary examination £10 10s.; re-examination, if rejected, £5 5s. Final: Candidates holding L.R.C.S.I., £10 10s., or dental students of this college, but for all other candidates £26 5s. For re-examination on failure £10 10s. A rejected candidate will not be admitted to re-examination until after a period of three months. This body still hold an examination for their licence in dentistry for those who were actually in practice before July, 1878, *sine curriculo*, and whose names are on the dental register. The application for this examination must be made on a form obtainable at the college, setting forth a certificate signed by two fellows, members or licentiates of a college of surgeons, or by two licentiates in dental surgery in the Royal College of Surgeons in Ireland, or two members of the British Dental Association, or of the Odontological Society, to the effect that applicant is of good moral character, was engaged in the practice of dentistry before July,

1878, and has not during the past two years attracted business as a dentist by advertising or other unbecoming practices. The examination and fees for candidates, *sine curriculo*, are the same as for the final dental examinations of other candidates given above.

Of these bodies the Royal College of Surgeons, England, is usually chosen by the student As a guide, it may be mentioned the whole cost of the curriculum, which includes the fee for two years' surgical practice and two years' dental hospital practice, ranges from £70 to £80.

LEGAL REGULATIONS RELATING TO DENTISTRY.

Reprinted from the Chemist's Legal Handbook.

The law regulating the practice of dentists in the United Kingdom of Great Britain and Ireland is now contained in the Dentists Act, 1878, as amended by the Medical Act, 1886, s. 26. Inasmuch as many chemists who were practising as dentists before the passing of the Dentists Act, 1877, are under the impression that they may still continue to do so in all respects, without being registered as required by that Act, or that they are entitled to be registered thereunder, it may be useful to state shortly the principal provisions of the Act as it affects them in these respects.

Prohibition of Unregistered Persons using Title of Dentist.—Section 3 provides that from the 1st of August, 1879, no person unless registered under the Act shall be entitled to take or use the name or title of "dentist" (either alone or in conjunction with any other word or words), or "dental practitioner," or any *name, title, addition, or description.** *implying* that he is registered under the Act, or a person specially qualified to practise dentistry.

Penalty.—On summary conviction, a fine not exceeding £20.

N.B.—This section does not affect qualified medical practitioners.†

Provisions relating to the above Offences.—A person is not to be deemed guilty of any such offence—(*a*) If he shows that he is not

* "Title, addition, or description." By s. 26 of the Medical Act, 1886, these words, where used in the Dentists Act, 1878, include any "title, addition to a name, designation, or description, whether expressed in words, or by letters, or partly in one way and partly in the other." It will be observed that s. 3 does not in terms prohibit the practice of dentistry by unregistered persons, but only the unlawful assumption of title. The Act nowhere prohibits the practice of dentistry, but prevents an unregistered person from recovering in any court of law any fees for professional services.

† Dentists Act, 1878, s. 3.

ordinarily resident in the United Kingdom, and also that he holds a qualification to practise dentistry in a British possession or a foreign country, and that he has not represented himself to be registered under the Act; or (*b*) If he shows that he has been registered, and is still entitled to be registered, but that having ceased practice his name has on that account only been erased from the register.*

Penalty for a person taking or using the designation of any qualification or certificate in relation to dentistry or dental surgery which he does not possess, a fine not exceeding £20.†

Prosecution by Private Person.—A prosecution for any offence may be instituted either by a private person‡ or by the General Council of Medical Education, by a branch council, or by a medical authority, if such council or authority think fit.§

Registered Persons may Practise Anywhere.—A person registered under the Dentists Act is entitled to practise dentistry or dental surgery in any part of Her Majesty's dominions, subject, however, to any local law in force in that part.‖

Unregistered Persons cannot Recover Fees.—From the 31st August, 1879, no person, unless he is registered under the Dentists Act, or is a legally qualified medical practitioner, can recover in any court of law any fee or charge for the performance of any dental operation or for any dental attendance or advice.**

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* Dentists Act, 1878, s. 4.

† Ibid.

‡ Medical Act, 1886, s. 26. Under the Dentists Act, 1878, s. 40, a prosecution could only be instituted by a private person with the consent of the general council or of a branch council. But this part of s. 4 has been repealed by the twenty-sixth section of the Medical Act, 1886.

§ Dentists Act, 1878, s. 4.

‖ Dentists Act, 1878, s. 5. Medical Act, 1886, s. 26.

** Ibid, s. 5.

Qualifications necessary for Registration.—Any person is entitled to be registered under the Dentists Act, who is either

(*a.*) A licentiate in dental surgery or dentistry of any of the medical authorities (*i e.* the bodies and universities which choose the members of the general council, s. 2.); or

(*b.*) is entitled to be registered as a colonial or foreign dentist; or

(*c.*) is at the passing of the Dentists Act *bonâ fide* engaged in the practice of dentistry or dental surgery, either separately or in conjunction with the practice of medicine, surgery, or pharmacy.

Provided that as regards (*c*) such person must produce or transmit to the General Registrar before 1st August, 1879, information of his name and address, and a declaration signed by him in the form given in the schedule to the Act, or to the like effect, and the Registrar may, if he thinks fit, require the truth of such declaration to be affirmed by a statutory declaration under the Statutory Declarations Act. 1835.*

Registration of Persons in the Dentists' Register.—When a person entitled to be registered under the Dentists Act produces or sends to the General Registrar the document conferring or evidencing his licence or qualification, with a statement of his name and address, and the other particulars, if any, required for registration, and pays the registration fee, he shall be registered in the Dentists' Register.†

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* Dentists Act, 1878, ss. 6, 7. It seems hardly necessary to give the form of this declaration, as if it was not made and transmitted to the Registrar before the 1st August, 1879, it cannot now be done. It is important that all chemists who rely on the fact of their having been in *bonâ fide* practice at the time of the passing of the Dentists Act should note this provision carefully. Their case may be met by s. 37; as to which see post p. 91.

† Dentists Act, 1878, s. 7.

Persons not Disqualified for Registration.—A person resident in the United Kingdom is not disqualified for Registration under the Dentists Act because he is not a British subject, nor is a British subject practising out of the United Kingdom.*

Registration of Foreign and Colonial Dentists. — Foreign and Colonial dentists, if holding recognised certificates, may be registered as foreign and colonial dentists respectively in the Dentists' Register.†

Council may erase from Register Name of Practitioners Convicted of Crime, or Guilty of Disgraceful Conduct.—The General Council are empowered by s. 13 to erase from the register the name of any person convicted at any time or anywhere of a crime which, if committed in England, would be punishable as a felony or misdemeanour, or who has been guilty of any infamous or disgraceful conduct in a professional respect, an inquiry being first made into the case of persons accused. But a person is not to be liable to have his name erased from the register on account of his adopting or not adopting some particular theory of dentistry; nor on account of a conviction for any political offence abroad, or for any trivial offence. Any name erased from the register shall also be erased from the list of licentiates in dental surgery or dentistry of the medical authority of which such person is a licentiate.‡

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* Ibid.

† Ibid. ss. 8, 9.

‡ Dentists Act, s. 13. S. 15 provides for the appointment of a permanent committee to ascertain the facts of any case. Where a person has been registered under the Act as a licentiate of a medical authority, the fact that his diploma has since been revoked by such medical authority does not render him liable to be erased from the Dentists' Register. In the case of *Ex-parte Partridge* (Law Reports 19, Queen's Bench Div., 467), the applicant, who was a licentiate in dental surgery of the Royal College of Surgeons in Ireland, had his diploma revoked by that body for breach of an undertaking given by him not to advertise in connection with his profession. On that ground alone, and without communicating with him, the General Council of Medical Education removed his name from the Dentists'

Exemption of Registered Persons from serving on Juries.—All persons registered under the Act are exempt, if they so desire, from serving on juries of every description, and from serving corporate, parochial, ward, hundred, and township offices, and from serving in the militia; and the name of any registered person shall not be retained in the list of persons liable to serve in the militia, or in any such office as aforesaid.*

Penalty for obtaining Registration by false representation.—Any person wilfully procuring or attempting to procure himself to be registered under the Dentists Act by making or causing to be made any false representation or declaration, either verbally or in writing, and any person assisting him therein, is liable to imprisonment for a term not exceeding 12 months.†

Provision for certain Students.—Section 37 contains the following provisions in favour of students who were so before the passing of the Dentists Act.

(i.) Any person who has been articled as a pupil and paid a premium to a dental practitioner entitled to be registered under the Dentists Act, 1878, in consideration of receiving from him a complete dental education shall, *if his articles expire before* 1st *January*, 1880, be entitled to be registered under the Act as if he had been in *bonâ fide* practice before the Act.‡

Register. On an application for a mandamus to restore his name to the register, it was held by the Court that the Council had acted erroneously, and that the name must be restored to the register. The Council afterwards removed his name from the register on the ground of disgraceful conduct in advertising in breach of his undertaking. An application for a mandamus to compel the Council to restore his name to the register was refused.

* Dentists Act, 1878, s. 30.

† Ibid, s. 35.

‡ This provision, although it is principally intended for the benefit of those whose apprenticeship had nearly expired at the time of the passing of the Act, will enable persons who were then in practice to register at any time, provided they were articled pupils having

(ii.) In the case of dental students or apprentices whose professional education or apprenticeship commenced at any time before the passing of the Dentists Act, the General Council are empowered, if they think fit, *by special order*, to dispense with any of the usual conditions of registration, *i.e.*, certificates, examinations, &c., required by the Act or by any bye-law or regulation made in pursuance of this Act.*

Recovery of Penalties.—The penalties imposed by the Act are recoverable

In England and Wales.—Summarily, before magistrates, according to the provisions of the Summary Jurisdiction Acts.

In Scotland.—Before the sheriff or sheriff substitute, under the Summary Procedure Acts.

In Ireland.—

(*a*) In the Dublin Police District.—According to the Acts regulating the powers and duties of the magistrates or police of such district.

(*b*) In other parts of Ireland.—Before magistrates, under the Petty Sessions (Ireland) Acts.†

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paid a premium. Suppose, for instance, that a man was apprenticed in the way suggested, and his articles expired, say, in 1876, and that he was in practice on his own account at the passing of the Dentists Act, but omitted to send in the declaration mentioned in s. 7 by the 1st August, 1879, he might get the benefit of this provision.

* It will be seen that there is an important difference between the two parts of s. 37; the persons mentioned in the first part are *entitled* to be registered under the conditions there set forth; while as regards those mentioned in the second part, they can only avoid the usual conditions of registration by *special favour* of the General Council, who have an absolute discretion to grant or refuse any petition for the dispensation there mentioned. No doubt, in a proper case shown, the petition would be granted. Many chemists, though not qualified for registration in the ordinary way, would, on proving to the satisfaction of the Council their skill and knowledge in dentistry, be allowed the benefit of this provision.

† Dentists Act, 1878, s. 40.

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