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Dominion Dental Journal

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Original Communications

A BRIEF REVIEW OF THE ETIOLOGY OF IRREGULARITIES.*

BY J. F. COLYER, M.R.C.S., L.R.C.P., L.D.S.

The causes which produce irregularities in position of the teeth may be divided into two groups, viz., general and local.

General Causes.—One of the first facts which must strike any investigator into the etiology of irregularities[1] is the comparative freedom of ancient and even uncivilized modern races from such deformities. This has been well demonstrated by many observers; for instance, Messrs. Cartwright and Coleman failed to find any irregularity in the large collection of skulls in the crypt of Hythe church[2] and Dr. Nicols, quoted by Talbot, in an examination of thousands of Chinese and also of Indians on the Pacific Coast and in the Rocky Mountains, did not find a single example of irregularity of the jaws. Talbot himself, in 1881, examined 300 Chinese and found no irregularity in the shape of the teeth and jaws. On the other hand, Dr. J. M. Whitney[3] has found among the Hawaiians, a race in which for at least 1,400 years there has been practically no admixture, irregularities as numerous as in civilized races of the present day. The balance of facts seems, however, to point to a distinct connection between irregularities and modern civilization. Certain irregularities of the teeth and jaws are undoubtedly transmitted, and, indeed, may be looked upon as family peculiarities. A slight overlapping of the centrals, not the result of crowding, may be present, and in one case, out of a family of seven, the father

*A lecture delivered to dental students at Charing Cross Hospital in January, 1899.

and four of the children had the right central incisor slightly overlapping the left. Prominent upper teeth, accompanied by contraction of the arch, or large mandibles, will be often found to be transmitted through many generations.

Talbot is of opinion that in race crossing an explanation of some irregularities can be found.

Each nation has its peculiar characteristics and customs, which manifest themselves in "the head and skeleton, the general contour and mould of the body, the manners," etc., and the older the race the more fixed these characteristics. One race may possess large jaws and equally large teeth, another small jaws and proportionately small teeth. If, now, a person of the one race marry one of the other, it is quite possible, even probable, that irregularity in some shape will be present in the offspring. In support of this view Talbot instances the fact that in new races, such as the American where inter-racial marriage is frequent, irregularities are prevalent, while in races such as the Chinese and African, irregularities are seldom met with. On the other hand, the presence of irregularities among the Hawaiians must not be lost sight of. Mr. J. R. Headridge[4] considers that this hypothesis of Talbot's is untenable and instances that in dogs, where crossbreeds between parents of very different sizes are frequent, irregularities are very rare. In practice one certainly meets with cases where one parent has large teeth and jaws, and the other small teeth and jaws, the offspring inheriting the large teeth of one parent and the small jaws of the other. That inter-marriage of races plays a part in the production of some irregularities seems extremely probable. The question, however, demands a more through investigation.

That diminution in the size of the jaws has taken place in the inhabitants of England, is shown by the statistics of Talbot.[5] According to this observer the early Britons possessed maxillæ, varying in their lateral diameters[6] from 2.12 to 2.62 inches. In modern Englishmen the maxillæ vary from 1.88 to 2.44, the minimum diameter has thus decreased more than the maximum. A comparison of the maxillæ of ancient Romans and modern inhabitants of southern Italy gives a similar result. With the present generation those drawn from the lower social scale have wider maxillæ than those from the higher.

Modern civilization probably produces these effects in the maxillæ partly through the arterial system. The brain and osseous structures of the face derive their main blood supply from the same source, viz., the common carotid. The strain of modern education, the character of amusements, indeed, the whole environment of the individual, entails a greater call upon the brain than the more primitive mode of living in days gone by and thus necessitates a larger supply of nutritive material to that structure.

This increased supply is probably provided at the expense of the osseous structures, including the teeth, with the result that these structures degenerate. Modern food and cooking, by calling forth less effort in mastication, may also indirectly deprive the jaws of a certain amount of nutrition.

That some form of selective breeding may have had an influence in the production of the narrow arch of the higher classes of the present day is possible. Mr. Tomes,[7] in referring to this point says, "If the type of face now-a-days considered to be beautiful be investigated it will be found that the oval tapering face with a small mouth, etc., does not afford much room for ample dental arches. On the other hand, the type of face which we consider bestial has a powerful jaw development. Perhaps generation after generation seeking refinement in their wives may have unconsciously selected those whose type of face hardly allows the possibility of a regular arrangement of the full number of teeth. At any rate there is something tangible in the hypothesis and grounds for arguing pro and con."

That cross breeding, sexual selection and modern civilization are factors in the production of irregularities is probable; but the fact must not be lost sight of that the variation produced has been more marked in the jaws than in the teeth. The size and shape of the permanent teeth are to a great extent determined during the first two years of life, and they are arranged in their crypts in a crowded condition. In the natural course a rapid growth of the jaws takes place during the period of eruption so as to accommodate the teeth in a normal arch, any condition such as an exanthematous fever or any other severe illness may lead to an arrest of the development of the body including the maxilla and mandible, and in this way a crowded condition of the teeth may be brought about. Irregularities of the teeth are said by Talbot to be more frequent in people congenitally deaf, dumb or blind.

The above remarks on the etiology of irregularities of the teeth are necessarily brief owing to the limited scope of the present paper. Anyone, however, who is interested in the question will find abundant information on the subject in Talbot's work on "The Etiology of Osseous Deformities of the Head, Face, Jaws and Teeth."

Local Causes.—Too early removal of the second temporary molar is a fruitful cause of crowding. Removal of this tooth at an early age allows the first permanent molar to move forward and so encroach upon the space which would be occupied normally by the second bicuspid. In a case under notice the temporary molars were retained on the right side for the normal period and no irregularity resulted; on the opposite side the second temporary molar had to be extracted prematurely, with the result that the

first permanent molar moved forward and caused the second bicuspid to be displaced inward.

Too early removal of the temporary canine may lead to irregularity by allowing the first bicuspid and lateral incisor to approximate and cause the permanent canine to erupt irregularly. Under certain conditions removal of the temporary canines to relieve a crowded condition of the incisors is advisable. Under certain conditions the early extraction of the first permanent molars may produce irregularity. In cases where the temporary molars are very carious the first permanent molars are practically the sole means by which mastication is carried on, and their early removal under such circumstances would transfer the whole force of the bite to the incisors, with the probable result that the upper ones would be driven forward, an irregularity at times difficult to remedy.

In pulpless or necrosed portions of temporary teeth absorption is carried on slowly and often arrested. The temporary tooth then acts as an obstruction to the erupting permanent tooth, and deflects its normal direction. The presence of persistent deciduous teeth with the corresponding permanent ones in irregular positions does not necessarily indicate cause and effect. Many persistent deciduous teeth, when extracted, are found to have quite normal pulps, and to have undergone but little absorption. In the majority of these cases the abnormality of the permanent teeth is due to their being developed in an abnormal position, which affects their direction when erupting; in such cases the abnormality of the permanent teeth is the cause and not the effect.

The frenum of the lip at times passes between the central incisors and is attached to the muco-periosteum covering the palate. Under such conditions, every movement of the lip causes the frenum to press on the teeth and thus separates them. This cause of divergent centrals was first pointed out by Mr. H. Moon.

Alveolar abscess in connection with the temporary teeth sometimes leads to irregularity in position of permanent teeth, because the pressure of the abscess may displace the permanent tooth follicle.

Supernumerary teeth often cause irregularities. A divergence of the upper central incisors is at times due to the presence of a peg-shaped supernumerary tooth. Displacement of the incisors internal or external to the arch, or a general crowding of the teeth, may be traced to the presence of supernumerary teeth. Thumb, lip, tongue and toe sucking produce irregularities.

Mouth breathing is held by many to be an active factor in the production of maxillary deformities, and the frequent association of chronic nasal obstruction with the high vaulted palate would seem to indicate the possibility of there being a connection

between the two. In an interesting paper to the *West London Medical Journal*, July, 1896, the author, Mr. Mayo Collier, points out that if one nostril be blocked up the rush of air passing under the naso-pharynx, and to some extent through the open half of the nasal cavity, lessens the tension in the closed portion of that cavity. This can be shown, according to him, by the following simple experiment: Take a bent piece of glass with mercury in the bend and connect one arm with a fairly thick elastic tube, and insert this latter into the blocked nostril and it will be noticed that during every inspiration the mercury will fall in one limb and rise in the other to the extent of an inch or more; and this, according to the author, is equal to a pressure of about half a pound on every square inch. In other words, if we look upon each nasal cavity as a box, it means, in cases of nasal obstruction, that during each inspiration there is a force equal to half a pound on every square inch of the bones forming the fossa, and it is possible to conceive that such a force would produce the contracted and high arched palate often seen in these cases. This view is corroborated by an experiment made by Ziem and quoted by Mr. Mayo Collier. Ziem artificially blocked for a long time the nostril of a young animal, and he noticed as a result that "there was a deviation of the intermaxillary bone and the sagittal suture towards the shut-up side, also lesser length of the nasal bone, frontal bone and the horizontal plate of the palate bone, less steep elevation of the alveolar process, smaller distances between the anterior surface of the bony auditory capsule and the alveolar processes, and also between the zygomatic arch and the supra-orbital borders; in other words, the whole side of the face was squeezed in from all points by the unequilibrated atmospheric pressure due to the rarefication of the air from within the obstructed nasal fossa, with the result that the whole side of the head was prevented from expanding and growing."

These experiments certainly open up new thoughts and shed fresh light upon some of the forms of contracted arch at times met with; cicatrices, hypertrophy of the gums, and tumors of the jaws also act as local causes of irregularities.

REFERENCES.

1. The word "irregularity" is used throughout as meaning irregularity in position.

2. The age of these skulls is not accurately known, but in all probability they belong to a period about 600 A.D.

3. Transactions of the World's Columbian Dental Congress, Vol. I., page 102.

4. *British Journal of Dental Science*, Vol. XXXVII., page 145.

5. The Etiology of Osseous Deformities of the Head, Face, Jaws and Teeth. Third edition. Page 67.

6. The measurements were taken from the buccal surface of one first permanent molar to the buccal surface of the corresponding tooth on the other side.

7. A System of Dental Surgery. Fourth edition. Page 112.

NOTES FROM GEORGIA.

By B. H. Catching, Atlanta, Ga.

Did you ever wait for a patient to meet his engagement, Mr. Editor? I am doing that now, and, while waiting, will execute a determination that I have long had—to write you a word of greeting. If there is a people that we love better than our own, it is the Canadian people. You possess many virtues and few faults; that is, if you have any faults, you keep them well hid away. Your best foot is always foremost, therefore I must think that you have no bad foot. (The patients have come and gone, happier, I think.) Yes, there is one thing that we can charge you with. You have never been to a meeting in our South-land. Come, and we will divide our "greens" with you. We want to express our appreciation in a personal manner. We are too poor to go so far away from home. You are rich and can afford it. Dentistry in your country is a bonanza, while in our country it is a "pan-out." I perceive that you have a few quacks. They are ubiquitous. The first "dental parlor" made its appearance here about three years ago; others followed in quick succession. I do not believe they are mints. Their signs, however, are glittering spectacles of vulgar dentistry.

This is Saturday; I close my office for the afternoon and go fishing. Oh, that I could tackle the finny tribe in some of your waters. I read much of the sport; and it must be sport, indeed. I find that a weekly afternoon outing is very restful. I gather new life for the coming week. The half-holiday cannot be made universal, nor even local, for there are too many who "cannot lose an hour." It will be the custom of this writer to close office every Saturday afternoon this summer, and hie to the woods or to some stream where I may coax some aquarian beauty to taste my bait. I do not know how to appreciate one who is not Waltonian in taste. For fear that this may become fishy to you and your readers, I will drop that subject and take up the one of "weather." I prefer to put that word in quotation points, as it will show that I did not originate it. It is always a subject ready at hand, and when one has run out of something to say, which I have almost done, as I am purposely avoiding the subject of dentistry, which may not be very acceptable to a dental editor. I am master at this end of the line, while you are master at the other end, and, can do as you please.

Your thermal lines moved very near us this last winter, and we do not care to try the experiment again. How you manage to sur-

vive such cold we are at a loss to know. I know that it is a cant phrase with many who are here from your frigid region, during our winters, to say that "We don't suffer as much from cold in the north as we do down here." Why they don't freeze, with the thermometer away below zero, as you have it, is a wonder to me. It seems that you would have neither ears nor nose if you went out of doors. Well, we have had enough zero weather to last us through the twentieth century—by that time, I will have passed hence and will not, I hope, be wishing for a colder clime.

Our fruits and flowers have been destroyed. Think of Georgia without her peaches, if you can! Think of our yards without the beautiful roses! We console ourselves with the prospect of water melons in abundance. Did you ever eat a fresh, genuine Georgia water melon, Mr. Editor? If not, you have something to live for; but to get that living you will have to come to the melon to get it in all of its freshness and sweetness.

I am glad to see that you are progressing with the DOMINION DENTAL JOURNAL. You certainly deserve the most liberal support of the profession in your section. You have stuck to it through thick and thin. I can appreciate some of the obstacles that you have had to contend with. Let this admirer, from "away down south in Dixie," pat you on the back and say, "Bravo, my boy!" You cannot imagine how I am enjoying my rest, after sixteen years of constant editorial work. I no longer hear the cry of "more copy" when there is no copy to give, and the tired editor must hustle around and find something to satiate the printer's capacious maw. Under such stress the reader is not always pleased, and if he be a contentious fellow you will hear from him by next mail in a cantankerous scrawl. How refreshing it is, on the other hand, to get a letter from an appreciative subscriber —one who seems to know and appreciate the dental editor's trials and perplexities. Such letters are more precious than gold. They do not pay bills, but they go to make the life of an editor happy. He can actually go home happy, if he has not a cent in his pocket. He feels so good and looks so good, that he can ask and get credit from his grocer to tie over the hard times.

Reader, if you appreciate the efforts of the editor of the DOMINION, tell him so, and tell him quick. If you don't take the JOURNAL, cease cheating yourself and your patrons, and send the money for a year's subscription in advance. If you are not a better dentist and a better man at the end of the year I will guarantee the refunding of your money.

Let me tell you, Mr. Editor, how good the publishers of the *British Journal of Dental Science* made me feel a few days since. I am still feeling good over it. They said something like this: "As a token of our appreciation of what you have done for den-

tistry by your publications, we will place your name on our complimentary list and send you our journal regularly."

Does not this sound something like that which says: "A prophet is not without honor save in his own country"? I surely appreciate this honor, coming as it does, and from our cousins abroad.

I have been two weeks writing this. No, two weeks trying to write it. If I can scrape money enough together, I will meet you at Niagara, where we will pow-wow together. I fear the god of fortune has forsaken the dentists in this country. Only the professors, editors and dealers have money. If I am not at Niagara I shall make an effort to be represented by a paper on "Gomphosis." I have been doing a little thinking on this line for some years, and believe that I can surely utter a truth on the subject. I tell you, in advance, that one merit the paper will have will be its brevity.

Proceedings of Dental Societies

ROYAL COLLEGE OF DENTAL SURGEONS OF ONTARIO.

On May 13th, the secretary of the R.C.D.S. of Ontario advised you that the directors were arranging for a Practitioners' Course at the College, in July.

The committee in charge of the course now have pleasure in announcing that they have completed the arrangements, and have secured a corps of expert instructors.

Dr. George Evans, of New York, author of the well-known text-book on "Crown and Bridge-work," and probably the leading expert in this department of dentistry, will give the instruction in Crown and Bridge-work. The committee feel that nothing requires to be added to this announcement to secure the presence of every practitioner who desires instruction in this important department of dentistry.

Orthodontia will be in charge of Dr. A. E. Webster, a student of Dr. Calvin S. Case, of Chicago, the widely-known specialist in this increasingly important department.

Porcelain Work will be demonstrated by Drs. J. F. Ross and A. H. Husband. Electro-Therapeutics, by Dr. F. D. Price. Steel Working and Tempering, by Dr. W. A. Brownlee. New Therapeutic Agents and Refining Gold Scraps, by Dr. Harold Clark. Lectures on Jurisprudence, by Dr. J. B. Willmott. Lectures on Care of the Eyes, by Dr. J. M. MacCallum, oculist. Mr. E. T.

Campbell will demonstrate Crown and Bridge-work and all kinds of Metal Work.

Dr. Evans will commence his subject at 9 a.m., July 4th, and continue each day till completed.

Dr. Webster will commence Orthodontia at 2 p.m., on July 8th, and continue daily during the following week.

Lectures and demonstrations will be announced from day to day.

During the first week the course will be in general charge of Dr. W. E. Willmott, and during the remainder of the time in charge of Dr. A. E. Webster.

You will understand that this course in entirely free to every licentiate in Ontario who is not in arrears of his annual fee; that is to say, everyone who qualified to vote last December, or who may pay the arrears of which he was notified by the treasurer in October, 1898.

All lectures and demonstrations will be open to all qualified as above, but the laboratories will only be open to those who are working; no mere onlookers will be admitted.

Suitable certificates will be issued by the Board to those who complete the practical work assigned in Crown and Bridge-work, Orthodontia and Porcelain.

It will be well for dentists to bring with them such laboratory tools as they may have, which will be useful in the work to be done. Other necessary instruments may be purchased here. Lockers will be available for all who desire to use them.

Dr. W. E. Willmott will be in the Board Room of the College at 8.30 a.m., July 4th, to register those intending to attend the course.

A. M. CLARK,
F. J. ADAMS,
HAROLD CLARK,
J. B. WILLMOTT,
Committee.

Toronto, June 13th, 1899.

NATIONAL DENTAL ASSOCIATION.

The next annual meeting of the National Dental Association will be held at Niagara Falls, N.Y., commencing on Tuesday, August 1st, 1899.

GEO. H. CUSHING, *Rec. Sec.*

Railroad arrangements for meeting of the National Dental Association are not yet completed. A rate of one and a third

fare, on the certificate plan, has been granted by some of the Associations. Have not had replies from all of them, but expect to know within a week, and that all will grant this concession. Wednesday, August 2nd, has been arranged as the day in which the Special Agent of the Railroad Associations will be at the meeting to qualify certificates, All attending should be sure to get certificate from ticket agent when purchasing ticket going, showing that full fare has been paid, otherwise they will not be entitled to the reduction upon return ticket. Tickets for reduced rate will be good going July 24th to 27th inclusive and returning not later than August 9th. Reports from secretaries of sections have not been received sufficiently definite to enable us to issue at this time a complete literary programme.

J. N. CROUSE, *Chairman Ex. Com.*

Selections

THE RELATIONS OF DENTAL DISEASES TO GENERAL DISEASES.*

BY WILLIAM HUNTER, M.D., F.R.C.P.

It is now some ten years since, in the course of a somewhat detailed study of the pathology of the severest forms of anemia, my attention was drawn to the mouth as a possible source of the infection which, according to my observations, undoubtedly underlies these forms of anemia.

At the International Congress of Hygiene held a year or two later, one of the papers in the Section of Bacteriology, presided over by Lord Lister, which interested me most, was one by Professor Miller, of Berlin, entitled "The Mouth as a Source of Infection."

Since that time the subject has maintained its hold on my interest on two grounds: firstly, in relation to the pathogeny of anemia; secondly, in relation to infection generally, of which dental caries is, in my opinion, the most common example to be found in the human body.

When, therefore, your secretary approached me with a request to contribute a paper to your Society, he found the ground was prepared. I consented willingly, and for two reasons; the first being that I was anxious to submit the few observations I had

* Read before Odontological Society of Great Britain.

been able to make to the criticism of this Society ; the second, that I was anxious to learn how far the wide experience of dental surgeons bore out the conclusions derived from the much more restricted experience of the physician as to the importance of dental diseases in relation to general diseases.

While still thinking of the subject I was fortunate enough to have a case which, so far as I was concerned, brought to a head my interest in the subject, and satisfied me of the importance of this relationship in infective gastritis ; and the observations in this case may serve as my chief contribution to the subject of our discussion.

The subject is one of very great practical importance, greater perhaps to the physician than to the dental surgeon, and is, I venture to think, not yet so fully recognized as it ought to be. To no one are we more indebted in this relation than to Professor Miller, of Berlin, whose prolonged researches on the bacteriology of the mouth and teeth have thrown a flood of light on the importance of the mouth as a possible source of infection in many diseases. There is no lack of material to illustrate this fact. To adduce the facts in detail would be only to repeat and amplify what has been already so well done by others.

I propose, therefore, to confine my remarks within certain defined limits, to pass over briefly those diseases whose relation to dental diseases is obvious and well recognized, and to direct attention to those—in my opinion, no less important—where this relation is not so clear, yet probably hardly less close.

Relation of Dental Disease to Indigestion.—That health is to a very great extent conditioned by the state of the teeth—their presence or absence, their freedom from pain—would probably be admitted by all. But if inquiry were made as to the nature of this connection, I suspect it would be found that in the minds of most the relation is chiefly what one might term a mechanical one.

Carious teeth mean imperfect mastication, and this in time, by throwing unnecessary work upon the stomach, leads to all the many ills and worries attendant on impaired digestion.

It is not this subject that requires to be dwelt on. It requires no further elucidation. This mechanical relation, however, by no means exhausts the relationship of dental disease to gastric disease, as I shall presently show.

Relation to Reflex Nervous Disturbances.—Another group of affections whose relation to dental disease is obvious, and which may be noticed in passing, are the various disturbances of a reflex nature so common in dental disease, *e.g.*, headache, neuralgia, spasms of facial muscles, spasms and paralysis of ocular muscles, ptosis, strabismus, disorders of accommodation, or still more generalized effects, such as convulsions or paralysis.

Relation to Infective Diseases.—This is the branch of the subject I consider to be the most obscure, and the one whose importance is not sufficiently recognized, and it is the one that I desire especially to dwell upon.

The subject of most obscurity is the relationship between dental diseases and the whole class of cases of infective nature, such as osteomyelitis and acute necrosis occurring apart from injury, idiopathic meningitis, empyema in children, ulcerative endocarditis; or, more obscure cases presenting the general characters of a blood-poisoning.

The special interest and importance of this class of cases in relation to dental diseases arise from the fact that dental caries, and suppurations connected therewith, present us with the most complete examples of mixed infection that we find in the body. The organisms concerned are very many and various, some harmless, others very virulent. Moreover, while many of the organisms are harmless, others constantly present include the most virulent pyogenic organisms, *e.g.*, the staphylococci and the streptococci.

Bacteriology of Dental Caries.—On this point—the infective nature of dental caries—I need not dwell. The evidence so abundantly furnished by the laborious bacteriological observations of Miller (1884-1894), on no fewer than 250 cases of diseased teeth; Galippe and Vignal (1889), Jung (1893), and, most recently of all, by Professor Arkovy, of Budapest (1898), is to my mind overwhelmingly conclusive on this point.

The observations of the last mentioned seem to me to be of such particular importance that I venture to summarize them very briefly. They extend from 1878.

He has studied in detail the organisms found in the following conditions:

(1) Chronic alveolar abscess, with and without parulis.

(2) Gangrene of pulp, both acute and chronic.

(3) Old stoppings removed after varying periods of time.

(4) Chronic alveolar abscess with circumscribed alveolar necrosis, after previous root stopping.

His method was as follows:

After complete evacuation of the pus from the abscess cavity, or removal of the gangrenous pulp from the pulp cavity and out of the root as far as the apical foramen, all parts were thoroughly disinfected, first with one per cent. corrosive sublimate and then with pure carbolic acid, and then thoroughly packed with a jelly-like mixture of camphor, pure carbolic and oil of eucalyptus, and the whole closed in with a covering of asbestos and gutta-percha. In this condition the tooth was left some three to six months before the definitive filling was proceeded with.

Many cases under this treatment healed entirely, and he

regarded them as sterile. A small minority still presented some degree of parulis or chronic periostitis remaining; and the cause of this he endeavored to ascertain by careful cultivation, the pathogenic properties of the various cultures being determined by experiments on animals.

The number of cases examined in this way was forty-three; and the chief result of his observations is to show that the organism most constantly present in diseased pulps and in dental caries is a bacillus to which he gives the name of bacillus gangrene pulpa, Its relative frequency, as compared with other organisms, is 95.3 per cent. of all cases.

Next most frequent is the staphylococcus pyogenes aureus, in 34.8 per cent. of cases; then the streptococcus pyogenes, in 23.2 per cent. of cases; then staphylococcus pyogenes albus, 18.6 per cent.; S. pyogenes citreus, 4.6 per cent.; bacillus pyocyaneus, 9.3 per cent., and some nine other organisms, mostly harmless, in varying frequency.

Morphologically, the characteristic feature of B. gangrene pulpa is that it is pleomorphic, forming bacilli, when grown on gelatine, cocci when grown on agar-agar.

As regards pathogenic action, pure cultures of this organism were found to possess the power, single-handed, of producing gangrene of the pulp; never suppuration unless other organisms were present.

A further important observation made was, this organism could effect a softening of the tooth, even in an alkaline medium, a fact which, if confirmed, would dispose of the view widely prevalent regarding dental caries, viz., that the first decalcification is the result of the action of an acid.

The organisms found in carious dentine after sterilization were: B. gangrene pulpa in every one; S. pyogenes aureus; streptococcus pyogenes; B. pulpa, the only constant.

The pyogenic organisms were always absent in teeth properly dealt with antiseptically.

Relation to Local Infective Diseases.—This group includes not only the various complications of diseased teeth met with in the bones of the jaw, the gums, neighboring maxillary sinuses, *e.g.*, alveolar abscess, suppuration in the sockets (pyorrhea alveolaris), periostitis, osteitis, osteomyelitis, necrosis of bone, suppuration in maxillary sinuses, but also inflammations and suppuration in neighboring parts by direct extension, such as inflammation, and at times suppuration of lymph glands of neck, cellulitis of neck, post-pharyngeal abscess, thrombosis of veins, miningitis.

This group of cases may, perhaps, with one exception, be excluded from our field of survey. Their relation to dental disease is obvious, and does not require any special elucidation.

Cases of this kind are not uncommon. A number are on record (one such came but recently under my notice) where after extraction of a tooth with a foul instrument a condition of gangrenous stomatitis, osteomyelitis and necrosis has been set up, and death has ensued from pyemia.

Diseased Glands in Neck.—One of the conditions above referred to deserves a more detailed notice, viz., the relation of dental caries to chronic glandular enlargements in the neck. To what extent may such enlargements be due, in the first instance, to conditions of decay in the teeth—to irritation set up by inflammatory conditions around the teeth in children ; the chronically enlarged glands, subsequently forming favorable seats of infection for tubercle bacilli, with all the troubles attendant on tuberculous glands of neck.

Odenthal* examined 987 children and found decayed teeth in 429. In 558 no decay.

Of the 558 without decayed teeth: glandular swellings in 275=49 per cent. Of the 429 with decayed teeth: glandular swellings in 424=99 per cent.

He was able to determine a constant relation betwixt the extent of the glandular swellings and the extent of the decay.

Wherever the pulp was gangrenous or highly inflamed the glandular swelling was invariably more pronounced and extended.

The presence of a number of decayed teeth was always accompanied by very marked glandular swellings.

The most recent contribution to the subject is that of Hugo Starck, "Tuberculous Cervical Glands in Relation to Carious Teeth" (*Munch. med. Woch.*, xliii., 1896).

He examined 113 children with grandular swellings of neck. In 41 per cent. he found carious teeth, and in almost all of these the situation of the glands corresponded to the affected teeth.

In three children with tuberculous glands of neck he also found carious teeth: but he could not discover any tubercle bacilli in these.

In a girl, aged 14, otherwise healthy, he found a molar tooth containing tuberculous granulation tissue, and tuberculous glands on this side, and this alone.

This case suggests the possibility of a casual connection betwixt carious teeth and tuberculous glandular enlargements, but at the same time suggests that a local tuberculous lesion of the tooth is necessary, and this is very rare.

So far as the mouth is concerned, by far the most important seat of infection for tubercle is the tonsil.

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* Odenthal, 1887 ("Caries of Teeth as Centres of Infection and Cause of Chronic Glandular Swellings of Neck.")

Not only are giant cells to be found in the tonsils in a considerable proportion of cases—7 per cent. according to Cornil (*La Semaine medicale*, 1895, p. 223, 70 observations); but experiments have shown that tonsillar tissue, when injected into animals, is capable of giving rise to tuberculosis in a considerable percentage of cases—according to Dieulafoy, 13 per cent. (*La Semaine medicale*, 1895, p. 199, sixty-one experiments on guinea-pigs).

Not only for tubercle bacilli, but even more for pyogenic organisms, does the tonsil play an important part as a seat of entrance.

According to Buscke ("The Tonsils as Portals of Entry for Pyogenic Organisms," *Deutsche Zeitschrift fur Chirurgie*, 1894), the tonsils play a greater *rôle* in admitting pus organisms than even the skin or the mucous membranes.

He found staphylococci and streptococci in hypertrophied tonsils which were not seats of acute inflammatory change.

He gives the history of four obscure cases of suppuration, in which the tonsils were the probable seat of infection, one of them a case of uncomplicated simple fracture, which pursued a normal course for three weeks, by which time a large amount of callus was thrown out.

On the twenty-sixth day the patient fell ill with a sore throat, due to streptococci. Three days later similar streptococci could be found in the blood, and on the following day the patient was seized with rigors and rapidly developed a suppurative osteomyelitis and periostitis at the seat of fracture.

Relation to General Infections and Infective Gastritis.—The class of disease whose relation to dental disease is not so clear and possibly hardly less important are (1) those of obviously infective nature, the only question being the channel by which the infection has entered the body—such affections as acute osteomyelitis and necrosis occurring apart from injury; empyema, meningitis, ulcerative endocarditis, some forms of acute nephritis; and (2) the whole series of cases of obscure nature, probably infective, characterized generally by features of blood poisoning, and probably determined by some general infection, the origin of which cannot be made out.

When, as sometimes happens, such cases can be traced to infection from diseased teeth, light is cast upon the whole subject of the *rôle* possibly played by dental diseases in many general conditions. One of these conditions I consider to be subacute and chronic infective gastritis. I cannot better illustrate the class of case I refer to than by describing to you a case recently under my observation.

A Case of Subacute Infective Gastritis secondary to Suppuration around Decayed Teeth.—The case was that of a lady, aged 62, sent

to me by Dr. Ferris, of Uxbridge, where she had been on a visit, with a history of having been ill for nearly a year ; symptoms all referring to stomach, pain, sickness, and obscure abdominal distress, necessitating use of opium ; loss of flesh ; symptoms suggesting cancer of stomach, although no signs of growth could be detected.

She presented a wasted, somewhat cachectic appearance, with pale, sallow complexion.

Next to the gastric pain, intermittent in character, she complained mostly of a constant bitter taste in mouth, a great loathing and distaste for food, an inability to taste her food, and a sense of nausea with occasional sickness, the sickness having no relation to food, coming on usually in the morning.

On examination, I could not find any sign of malignant disease in abdominal or pelvic organs. The only physical signs of disease were to be found in the mouth. Her teeth had all been removed with the exception of four stumps. She wore two plates of false teeth, which were scrupulously clean. The gums, except around the four stumps, were quite healthy. These stumps presented a dark, rotten, dead appearance, and in the case ot three of them, on pressure pus welled out freely from their sockets through small pouting sinuses.

This condition of teeth she had had, she said, for a year or more.

The tongue presented a moist, soft, flabby appearance.

The provisional diagnosis I made, after full consideration, was against it being cancer, and in favor of the gastric condition being due to continual swallowing of pus. The sickness she complained of appeared to be an utter loathing of food with nausea, rather than actual sickness, and these might be well accounted for by the quantity of pus she was constantly sucking into her mouth from the decayed stumps.

I directed her to have the stumps removed at once, preparatory to any further treatment.

She consented to this after some demur—(the stumps, she said, could not possibly be at fault, as they had been in that condition for a year or more—a period closely corresponding, it will be noted, to the duration of her illness)—had them removed the following day, and apparently with the most immediate and satisfactory result. For when she reported herself a week later, she had had only one return of sickness and gastric pain, viz., the day after the extraction ; had lost all bad taste in mouth ; was able to taste her food for the first time for months ; the tongue now quite clean.

This striking improvement, however, did not last. Three days later the gastric pain, with sickness and vomiting, recurred, and continued on and off for the next two weeks. A specimen of the

vomit was obtained at this time, *i.e.*, three weeks after the extraction of the teeth; it was of a somewhat brown color, with rusty, and here and there redder, streaks, and small flakes resembling bits of grape-skin.

On examination I found these flakes to consist of fibrinous exudation, with numerous leucocytes and crowds of streptococcus organisms, along with bacilli and cocci in much smaller number.

As it was now three weeks since the suppuration in the gums had been stopped, I regarded the presence of these organisms as confirming my original suspicion, viz., that the case was one of subacute infective gastritis or subacute infective catarrh.

Up to this time the patient had been struggling to get about, but she was now too ill to do so.

The subsequent course of the case was as follows: I confined her to her bed for eleven days, fed her entirely on peptonized milk and gruel, beginning with one and a half pints daily, applied counter irritation to stomach with sedatives internally; and, specially to combat the streptococcal infection, gave salicylic acid in 3 grain doses, thrice daily after food.

The improvement was immediate and continuous. The sickness and pain were entirely checked from the first day, the tongue lost its raw, angry look, and became normal. The pulse fell from 102 to 80 and 70. Temperature normal (which had been 99°). In ten days' time she was able to go out driving and to return home to the west of England. I kept her on peptonized milk and gruel for another month, at the end of which time she reported herself as still without return of pain. A month later she reported herself still free from any pain, and gaining in weight, although still on milk diet. It is now five months since her illness, and she has no recurrence of any stomach trouble.

Cases of this kind could, I have no doubt, be paralleled by many others in the experience of members of the society. One almost identical is recorded by Miller (p. 298). A lady aged 45, complained for months of severe pains caused by eating, loss of appetite, indigestion, etc.—her troubles so great that she declared life had become insupportable. She showed two envelopes filled with prescriptions both for internal and external use. A glance into her mouth, its fetid odor, and the inflammation and suppuration of gums suggested at once the cause. The cleansing of the mouth and the use of antiseptic and astringent mouth-washes caused such a pronounced improvement in a fortnight that the patient could not often enough express her thanks.

In this case, he adds, the source of the trouble was so apparent he could not understand why it had not been discovered before; and it is with reference to the constant overlooking of such class of cases that he elsewhere brings the charge against many phy-

sicians, that "the custom to disregard dental diseases altogether as a factor in pathology, is as unjust to their patients as it is discreditable to their profession. No physician can afford to be without a thorough knowledge of the pathological processes occurring in the human mouth, and their relation to general diseases."

Infection from the Mouth as a Cause of Infective Gastritis.—While resembling, however, many others of a like kind, the case I have recorded presents some special points of interest—in respect, namely, of the actual proof of infection of the stomach by streptococcal organisms, viz., the presence of pus, fibrin and leucocytes and numerous pus organisms three weeks after removal of source of the infection.

That organisms play a pathogenic *rôle* in stomach troubles by setting up fermentative troubles is fully recognized.

Most writers on the subject would appear to regard this as the only way in which gastric disorders may arise from organismal infection. The case I have recorded would appear to suggest, in certain cases, another and even more intimate connection between gastric disorder and organismal invasion, viz., by an actual infection of the mucosa, and the setting up of, at first catarrh, and subsequently of more permanent inflammatory changes in the mucosa and submucosa.

The liability to such infection will be the greater if the organisms introduced be the recognized pyogenic organisms setting up inflammation and suppuration elsewhere.

Now the number of organisms that enter the stomach with the food and from the mouth is very large, and a very considerable proportion of these are permanently to be found in the stomach contents. Out of twenty-five kinds of bacteria found by Miller in the human mouth, eight were found in the stomach contents.

Moreover, the old view that organisms entering by the stomach were destroyed by the gastric juice has had to be abandoned in the light of the observations of Macfadyen and others.

Only a certain proportion are destroyed. From Miller's experiments the conclusion is warranted that all bacteria swallowed at the beginning of a meal may pass alive into the intestine (in the feces he found twelve of the twenty-five mouth organisms). It is only when the acidity of the gastric juice is considerable—say an hour or two after meals—that it exercises any direct bactericidal action.

"If we, furthermore, take into consideration the various and numerous affections in which the quantity of gastric juice, its percentage of HCl, is abnormally small, it will appear as though the stomach can afford almost no protection whatever against the passage of pathogenic micro-organisms through into the intestinal canal," or indeed, under favorable conditions to their sojourn in the stomach itself.

If, in addition to diminished acidity, we have also increased supply of pathogenic organisms, and, moreover, the conditions be such that these organisms reach the stomach not only with food, but at all times, in the intervals between digestion as well as when food is taken, we have, I consider, pre-eminently favorable conditions for not only a temporary sojourn, but for possibly a permanent infection.

Such are the conditions typically presented in many cases of dental disease, viz., long-standing suppurating conditions around teeth and gums, constant swallowing of pyogenic organisms, impaired digestion with diminished acidity.

That under such circumstances increased fermentations go on we know.

What, however, is not recognized, what certainly I never realized till I made the observations just described, is that there may be not only increase of the fermentative processes, but also what is more dangerous, that organisms with well-defined pathogenic properties may become, so to speak, permanently established in the stomach.

The mucosa of the stomach remains permanently exposed to infection from pyogenic organisms, and may in time become actually infected with them.

The subacute and chronic catarrh so often met with in association with suppurative dental disease may thus be, as in the case I have recorded, of infective origin, not merely the result of irritation set up by fermentation of food products, but the result of definite invasion of the mucosa and submucosa.

Under certain circumstances it is conceivable that the effect might not stop short at catarrh, but, on the contrary, lead to subacute inflammatory changes, resulting, as all such changes in glandular organs do, viz., in atrophy of glandular cells and increase of fibrous tissue.

The condition termed atrophy of the mucous membrane of the stomach, so well studied by Dr. Samuel Fenwick, and the more acute inflammatory change occasionally met with and likened by him to eczema of the stomach, may thus be, and in my opinion probably are, the result of old-standing infections.

Phlegmonous Gastritis.—It is conceivable, further, that in a still rarer group of cases the infection might become an even more acute and generalized one.

Such a condition we have in the disease variously designated phlegmonous gastritis, mycotic gastritis, purulent inflammation of walls of stomach, submucous abscess, gastritis purulenta, suppurative gastritis, gastritis bacillaris, gastritis mycotica.

On this subject I can refer you to an admirably full account given in the Edinburgh Hospital Reports for 1896, by Dr. R. F. C. Leith.

It may be said that such a rare condition as phlegmonous gastritis can have little in common with such a comparatively common condition as that we are discussing, viz., subacute and chronic gastric catarrh.

One might equally well maintain that such severe and generalized conditions as pyemia and ulcerative endocarditis, or such intense local infections as acute osteomyelitis, cannot have the same *underlying cause, viz., pyogenic organisms as the smallest* furuncle, the slightest local erysipelatous attack, or lastly, as the suppurative process going on around a diseased tooth.

But, nevertheless, such is the case. The difference is not one of kind, but one of resistance and dose. If, as the above case would appear to show, some forms of subacute gastric conditions met with in association with suppurations around teeth may be due to infection of the mucosa by the pyogenic organisms swallowed, it may well be that, from time to time, the infection of the stomach wall may take on a specially virulent character. While the ordinary effect of infection underlying dental caries is to set up at most a slight local periostitis or a localized gum-boil, in certain cases the same condition may give rise to the most intense local suppurations or even to general pyemia.

In six out of the fifty-two cases of phlegmonous gastritis collected and tabulated by Dr. Leith, micro-organisms were actually found. "If the methods for detection of bacteria had been as well known as they now are, I have no doubt they would have been found in them all" (Leith).

In the case described by himself and in three of the above six, the streptococcus was the chief organism present.

He draws attention to the parallelism betwixt phlegmonous gastritis and erysipelas, and notes that while we often cannot tell how or why an erysipelas arises, we never speak of it as being an obscure disease, whereas every author who has yet written upon phlegmonous gastritis has done so.

Leith thinks it may be looked upon as a severe form of erysipelas of the stomach.

Curiously enough, however—and this is the interesting point in relation to our subject—in discussing the probable source of the infection in such cases, the various possibilities are considered to be two, viz., the disease may arise from the side of the stomach or from the blood.

As to the conditions which favor the determination of the streptococcus to the stomach, the relative importance of alcoholic excess, dietetic errors, and overloading of stomach, is considered. There is no suggestion that the source of infection might possibly be the mouth.

And yet one of the cases (No. 45), in which the symptoms

came on six days after a tooth extraction and death ensued on the tenth day, might well have had such an origin.

Condition found: In stomach submucous, muscular and subserous coats, infiltrated with pus; mucosa slightly hyperemic; in mouth "the gums swollen, and showed purulent ulcers; alveoli of jaw slightly splintered. Submaxillary glands swollen."

The relation of events in this case I should conceive to be: a diseased tooth with purulent ulcers around as focus of infection; extraction; further inflammation and necrosis; constant flow of pus organisms into stomach for six days (probably also for a long period before the tooth was extracted); acute infection of its walls; suppurative inflammation and death.—*Transactions of Odontological Society of Great Britain.*

BRITTLE PLATINUM PINS IN PORCELAIN TEETH.

BY W BOOTH PEARSALL, F.R.C.S., DUBLIN.

In the year 1884 I made a maxillary gold denture for an old lady who had been under my professional care for some years. She had always treated me with the greatest confidence, and was a very good friend to me. The gold denture was designed to carry pin teeth fitted on the gum from canine to canine, with tube bicuspids and molars to replace the natural teeth, that had been lost from time to time from gouty inflammation of the sockets.

The pin teeth were backed with 18-carat gold plate, and were well fitted. The pins were bent on the backs of gold plate, but not rivetted.

The teeth were attached to the plate with sticking wax, and were duly positioned in the mouth to the satisfaction of the patient.

The gold plate and pin teeth were removed from the mouth, and invested at once in plaster-of-Paris and powdered pumice. The wax attachment was washed away with boiling water, the solder duly placed in position. The investment was heated slowly to redness on Fletcher's gas-heater, and the gold backs duly soldered. The case was polished and finished, and given to the patient.

All went well for a couple of weeks, when a central incisor "dropped off."

My patient came to me at once to have the defect repaired. A new central was prepared in lieu of the one that dropped off, positioned in the mouth, invested, and soldered.

Two days later my kind old friend came in to me with another

disaster. The central I had replaced two days before, together with the left lateral, had "dropped off."

The pin teeth used were of American manufacture. The teeth were dark in color, and not easy to get of the size and shape that was desirable.

When these disasters happened, I was fortunate enough to have on a wax card some extra sets that exactly matched; so that I felt at ease with respect to being able to make the denture as perfect as when I first completed it.

The teeth that had "dropped off" were again duly replaced by fresh teeth from the duplicate sets. The other teeth were, so far as my examination could determine their condition, in perfect order.

In three more days the patient returned again, with three teeth off, including the central and lateral that had been repaired.

I will not describe matters further, more than to say that I backed, fitted, and soldered eighteen teeth before the "dropping off" of these front teeth ceased to trouble my patient and myself.

Such a series of mishaps have never happened to me before, and I think I can claim a good sound knowledge of, as well as considerable experience of, such practical details in mechanical dentistry. I confess I was completely at a loss to account for such a succession of mishaps. I had carefully kept all the defective teeth, and on close examination and comparison I noticed a crystalline fracture of the platinum pins, quite unlike the fibrous surface we see when soft or sound platinum is deliberately broken across.

Inquiry from the depôt where I had purchased the teeth, brought out the fact that the amount of platinum in the market is limited in quantity, and there has been, as you all know, a great increase in the use of platinum on the part of electricians. It was suggested that some adulterated platinum had been used, and the impurity used for adulteration was supposed to be zinc.

I do not for one instant imagine that any tooth manufacturer would deliberately use unreliable platinum for pins. It does happen, however, that this brittle crystalline condition has been known to teeth manufacturers for over thirty years.

Although individual dentists have complained, and, indeed, in several instances within my knowledge, have entered into a somewhat energetic and heated correspondence with the manufacturers, the latter have always steadily stuck to the defect, as one produced by careless soldering, careless fitting, "over-heating," the use of deteriorated solder, and undue strain. The trying experience I had gone through, which I have just described, has always been indelibly impressed on my mind. I had not, strange to say, come in contact with anyone who had gone through a similar experience; nor, indeed, had I ever heard of platinum becoming crystalline in

dentistry, although I was familiar with the destruction of platinum crucibles in the chemical laboratory from contact with a smoky gas flame, or when heated after phosphoric acid had been used in them, without being carefully cleaned.

In 1895, Mr. G. M. P. Murray sent me some pin teeth, and asked my opinion as to the cause of the fracture of the platinum pins. Examination of the teeth showed the crystalline fracture close to the porcelain, such as I had observed in the teeth I have already described to you.

I found in talking over the matter with Mr. Murray, that his experience was the same as my own, for the teeth had "dropped off" as spontaneously and fortuitously, as if Sir Isaac Newton himself was in waiting for another example of the law of gravitation.

Brittle platinum pins have occurred in my practice in four cases:

One was the case of the patient I mentioned at the beginning of the paper, whose goodwill and confidence, I am proud to say, I still retain, after an experience warranted to break a less tempered bond of friendship.

Another was that of a patient with a maxillary gold denture, the pin teeth of which "dropped off," without any reason so far as I could then discover. I duly replaced all the teeth, but, although I had served this patient faithfully for fifteen years, she thought I was careless in my work. She carried her goodwill and herself to another practitioner. We had some correspondence on the matter. Her conviction remained unshaken that I had been careless; indeed, she used the word dishonest, in that I had used teeth of inferior quality for her case. In this view she was supported by the practitioner she went to, and who, I have reason to know, has since changed his opinion with regard to the cause of the mishap so far as I am concerned.

The other cases were single teeth, one in a vulcanite molar, the other in a soldered lateral.

Ever since Mr. Murray placed the defective teeth and pins in my hands, this most vexatious kind of accident and its cause have occupied my thoughts a good deal, and I have made a small collection of teeth which have "dropped off" in this unexpected way. In the specimens I have gathered, I found nearly as many examples of brittle platinum pins amongst vulcanite teeth, as amongst those used for soldering to metal plates. The defect is to be met with in the teeth manufactured by the British and American firms.

I have also a continuous gum canine, the pin of which broke when I was pushing it into a wax card in summer weather.

You can see how crystalline the fracture is. This tooth has never been used; it is in the state in which it came from the manufacturers.

Since I first drew attention to this subject in the British Dental Association *Journal*, I have gathered a good deal of information. I am also gratified that the Irish branch spent some money on engaging skilled observers to work at the matter. Professor A. J. Scott, of the Royal College of Surgeons in Ireland, made micro-photographs of the fractured surfaces, which I beg to show you prints of; and Professor W. N. Hartley, F.R.S., made an exhaustive physical examination of a small number of defective pins, and a similar number of reliable pins. I have been in correspondence with individual dentists who have suffered from this defect, and with manufacturing firms, since I appealed to my brother dentists, to send me examples of the defect.

I approached a large platinum firm, with a view of learning the cause of the crystalline condition of the pins. The result was not encouraging, as they wanted a large fee for the investigation, and also an amount of platinum for the purpose I do not think I could gather in the course of many years.

I was already acquainted with the nature of the delicate work Professor Hartley had carried out in investigating other metals with the spectroscopic instruments he has designed and developed in his laboratory. After due consideration, Mr. Murray agreed with me to place our material in Professor Hartley's hands for physical investigation. We were guided in this course by the fact that Professor Hartley had done so much work with the spectroscope, and is the only scientific chemist in the world who has all the necessary apparatus for photographing the spectra of minute quantities of metals when volatilized by the electric spark, or by the oxyhydrogen jet. Professor Hartley has carried out this investigation, not only with great care and patience, but with sustained enthusiasm. The investigation that he has made for us is new to science, and we must hope that this minute physical examination will direct the attention of the platinum refiners to the fact that the defect can be avoided on their part, and of warning teeth manufacturers that platinum pins are under serious suspicion of unsoundness.

I shall now show you examples of brittle platinum pins I have arranged for your inspection. I have received many letters from various dentists and manufacturers. The correspondence shows that the defect is much more frequent than some of us might expect; that the defect has been known for many years; and that individual correspondence or remonstrance is of no effect with teeth manufacturers—they are unable to explain the cause of the disaster—that the defect cannot be ascertained beforehand by the dentist or his assistant; that we have not been able to make brittle platinum at will in our experiments.

Mr. Murray will give you details of experience of a practical

nature, that have been patiently carried out, and which I will leave him to deal with.

Amongst the causes suggested for the "dropping off" of pin teeth we find the following: Rivetting. Investments contaminated with base metals. Overheating the teeth during soldering. Impure solder. Cadmium solder. Rapid expansion and contraction in investment. Soldering with a smoky flame.

Impurities in platinum: Phosphorus, phosphoric acid. Zinc. Carbon. Iridium. Arsenic. Fluoric acid. Hydrogen.

Rivetting.—I do not regard this operation as a cause of brittle platinum pins. I have rivetted numbers of pin teeth and never saw a crystalline pin. Porcelain teeth have been cracked and broken under the careless use of the hammer, and possibly from heating a strongly rivetted back. In all these contingencies I have never seen a broken pin. Rivetting was needful when short pins were used in porcelain teeth. I prefer to bend pins on the backing and solder them.

Investments Contaminated with Base Metals.—Mr. Murray's experiments will show that investments can be mixed with fillings of zinc and lead, without spoiling platinum pins or the teeth. Investment material contaminated with base metals, we do not recommend for daily use.

Overheating during Soldering.—I have seen a few teeth backs sweated or melted during the course of many years, from careless use of the blowpipe in soldering backs in confined positions, or from deflected flame. I never remember to have seen the pins spoiled. So-called overheating, can, in my opinion, be avoided by slowly bringing the investment to a cherry red heat, and with a few jets of suitable blowpipe flame flowing the solder where it is wanted.

Impure Solder.—I am not aware of any impurities in solder. If it is purchased, it is supplied by firms of established reputation, who have no possible interest in selling a bad article. If it is not purchased, but made by the dentist himself, so far as my knowledge of the matter is concerned, only reliable material is used.

Cadmium Solder.—I have used cadmium solder for some years. Dr. Hunt, of Yeovil, and Mr. Goodman, of Taunton, have used it for many years. Strange to say, I have never had a brittle pin when I have used cadmium solder. Dr. Hunt and Mr. Goodman have rarely met with brittle platinum pins.

Rapid Expansion and Contraction in Investment.—I do not think this has anything to do with the deterioration of platinum, Porcelain teeth may be cracked or broken from rapidity of heating or cooling, but not the platinum pins.

Soldering with a Smoky Flame.—I do not attach any importance to this cause, as few dentists now waste their breath heating up an investment with the blowpipe, "starting all cold," as Mr.

Fletcher says in his catalogues. A *smoky* flame is not hot enough to melt the solder and make it run.

Undue Strain.—It has been recently suggested to me that the pins that have been broken in vulcanite teeth, and in teeth that have not been heated by the dentist, have been subjected to undue strain. Some specimens of brittle pins in vulcanite, which I recently sent to a large firm for inspection in reply to a challenge that I could not produce twelve vulcanite teeth with brittle pins, have been pronounced victims of overstrain by this gentleman and two (unknown) mechanical dentists of considerable experience.

Are we to keep porcelain teeth in glass cases, unused, or place them in our patients' mouths to assist them to masticate? Are porcelain teeth to be articulated with the natural teeth of patients, or with the necessary occluding porcelain teeth in the maxillary or mandible dentures?

Undue strain, I am told, is shown by the way the pins pull out of the porcelain! This particular defect seems to me to point to an insufficient anchorage in the porcelain on the part of the pins. What is the strain porcelain ought to bear in structure, and the strength of pin? The closing power of the mandible has been shown to amount to some hundreds of pounds.

During my experiments with regard to this investigation I have been much impressed with the ease with which I can crush, with a pair of 7-inch pliers, the modern teeth in order to get the platinum pins. In the case of some teeth I sacrificed, which have been in my stock and unused for thirty or forty years, I have had to use a hammer on an anvil to break out the pins.

You see, in every way, one is met with objections and statements which do not clear up anything. They are advanced without any definite experiments to support them, and we know that brittle pins *have* existed for the past thirty years, if not longer.

I will now read Professor Hartley's physical report, and Mr. Murray will follow with an account of a number of experiments he has made with a view of determining whether some of the *causes* I have just mentioned are to be accepted as proved.

Report on Brittle Platinum.*

I received from Mr. W. Booth Pearsall, F.R.C.S., on May 23rd, 1898, a small packet containing ten pin points of brittle platinum wire, which had been in use for dental purposes, with a similar number of points in another packet labelled tough platinum. I was requested to examine the brittle platinum for impurities of a metallic nature supposed to be present. The quantity of defective

* By Wm. Noel Hartley, F.R.S., Professor of Chemistry, Royal College of Science, Dublin.

material placed at my disposal was small, as may be judged from from the fact that the largest fragment of wire was only 1-25th of an inch in length. As eight of these had a total weight of 0.1819 grammes, it may be concluded that the whole of them did not weigh more than 0.2274 grammes. I was informed that they had been examined microscopically and found to possess a crystalline structure. I ascertained this fact independently. The pins broke readily on bending, and though they did not break under the hammer, the flattened wires had ragged edges, which shows an imperfect malleability. It was my desire, if possible, to examine each fragment separately, as they might differ somewhat in composition.

The very small quantity of material available would render any attempt at ordinary methods of analysis by separating the constituent substances entirely futile, even if the whole were employed in a single analysis. It was decided to rely upon spectroscopic methods, but considerable difficulties were encountered in operating on fragments of metal of such very small dimensions. Between thirty and forty photographs of spectra were obtained and carefully examined—many of these were in parts greatly enlarged, some of them to ten diameters.

It was proved beyond doubt that the following metals are most certainly completely absent, namely: zinc, cadmium, copper, silver, mercury, tin, lead, arsenic, antimony, bismuth, tellurium, nickel, cobalt, aluminium, gold, chromium, and also the metals which would scarcely be expected to be found in platinum—namely, indium and thallium.

A very careful examination was made for iron, as this element is difficult to remove entirely from platinum. For this purpose a spectrum of pure iron, and one of the purest platinum which, perhaps, has ever been prepared, were photographed. It was found that the pure platinum electrodes gave spectra identical, line for line, with the spectrum of two fragments of brittle platinum. I conclude, therefore, that any metallic impurity in this platinum must be in such a very minute proportion that it is impossible for it to cause the brittleness.

The comparison of the platinum spectrum with that of iridium showed that the strong lines of the latter element were absent from the platinum spectrum. There remain now certain non-metallic elements, such as phosphorus and carbon; and metalloids, such as tellurium and arsenic, all of which can cause brittleness in platinum; but the two latter have been proved to be absent from these specimens. Phosphorus has been added to native iridio-platinum in the United States for the purpose of rendering it fusible.

It is said that the phosphorus is entirely eliminated from the iridio-platinum alloy by continued heating. There appears to be nothing more than a very minute trace of iridium in the metal, and

the brittleness is not caused by that, because, if it were, melting would not improve its malleability; proof of this occurs later. It is, however, very probable that phosphorus may be present, and, as the effect of phosphorus in minute proportions is to render platinum brittle and crystalline—the properties seen in the pins—taking this view of the matter, is quite what might be expected. Phosphorus would not be detected by the method of spectrum analysis, and it is extremely doubtful if any chemical method of separation would satisfactorily afford proof of its presence when so small a quantity of material is available for analysis.

Carbon also renders platinum brittle. The platinum cones or caps used in the ignition of the mixture of gas and air, or petroleum vapor, which is used in gas and oil engines, become so brittle that they may be broken up between the fingers.

I am of the opinion that some non-metallic impurity, either carbon or phosphorus, is the cause of the brittle and crystalline character of this platinum, either of which substances might be introduced in the working up of old platinum. Both phosphorus and carbon can be eliminated by prolonged fusion of the platinum under the oxy-hydrogen blowpipe flame. Accordingly, I fused the remainder of the fusible pins, and find that the metal is now greatly improved in malleability, which is a strong confirmation of my opinion.

Note on the Method of Investigating the Composition of the Pins of Brittle and Tough Platinum, and their Comparison with Pure Platinum and Iridium.*

For the minute chemical analysis of mineral substances, where the quantities of the substance dealt with are so small as to be beyond the skill of the chemist to separate and weigh them separately, it has been found advantageous to employ spectrum analysis, aided by photography.

Generally speaking, a photographed spectrum is a chemical reaction distributed in time and space. It is, in fact, a series of as many observations as there are lines in the spectrum photographed, *for every line has its meaning. The length and strength of the* lines are an indication of the quantity of material to which the lines belong, and which is present in the flame or spark used to vaporize the substance, and it also indicates the proportion of the substance present in the material examined. In this manner, or, more

* By Wm. Noel Hartley, F.R.S., Professor of Chemistry, Royal College of Science, Dublin.

correctly speaking, by carrying out this principle, ancient coins and jewellery have been quantitatively analysed without submitting them to injury.

The method in this case of the platinum pins, consisted in passing between their points, a rapid succession of powerful electric sparks, condensing the rays on the slit of a spectroscope, and photographing the spectra obtained.

The pieces of metal were only 1-25 of an inch in length, and peculiar difficulties were thereby encountered. It is necessary that the screw pinchers which hold the points be good conductors of electricity, and they are, as a rule, made of steel.

The sparks were found to pass from the steel as well as from the platinum, although their passage was not actually visible; nevertheless, sufficient iron was volatilized with platinum to vitiate the results of many experiments. To obviate this, various devices were resorted to, and that finally and successfully employed was to fuse on to the platinum pins a wire of pure gold.

The electricity passed through the gold wires gave a succession of sparks, in which the material of the platinum pins was vaporized, along with a very small quantity of gold from the wire conductors. The lines of gold are known, and on observing the spectra, they were easily picked out. On comparing the brittle platinum with the spectrum of pure platinum, it was seen that the spectra were, line for line, the same, except at one portion; and for the better to compare the two, the plates were enlarged and prints taken from them just at the region where they seemed to differ.

The results of the examination are shown by the notes made on the prints. Previous to this, the plates were carefully examined for the lines of metal likely to cause a deterioration in platinum, and their absence was proved.

Since then I have examined the spectra for silicon, which element, it was thought, might be present; but I have not found any indications of it.

Both iridium and iron are difficult to separate entirely from platinum, and on this account I looked particularly for their presence in any appreciable quantity, without success. I may add that palladium, rhodium, arsenicum and ruthenium, were also sought for, but were found to be absent.

A good deal of trouble was occasioned by two lines which were remarked in the spectrum of brittle platinum, tough platinum, pure platinum and iron, being close to two silver lines.

The wave lengths of these lines are in the dark spectrum :

	I.	II.
Of iron (Liveing & Dewar).....	2625.2,	2627.9
Of platinum (Exner & Haschek)...	2625.41,	2628.13
Of silver (Hartley & Adeney).....	2625.2,	2627.3

At first it appeared as if there was some impurity common to the different specimens of iron and platinum, the nature of which had not been ascertained; but these lines have now been proved to be really components of respective spectra.

I append a note of the various publications in which the methods of examination here put into practice are described, since they have not yet passed into common use among chemists and metallurgists, though accepted and acknowledged by the best authorities. They date back to 1879:

Hartley and Huntington: "Philosophical Transactions of the Royal Society." Vol. 170, p. 257.

Hartley: "Description of Instruments and Processes Employed in Photographing Ultra-violet Spectra."

"Scientific Proceedings of the Royal Dublin Society." New series. Vol. 3, p. 93. 1881.

Hartley: "Researches on Spectrum Photography in Relation to New Methods of Quantitative Chemical Analysis."

"Philosophical Transactions of the Royal Society." Vol. 175, pp. 49-325. 1884.

Hartley: "Notes on Certain Photography of the Ultra-violet Spectra of Elementary Substances."

"Transactions of the Chemical Society." Vol. 41, p. 84. 1882, and Hartley and Adeney: "Measurements of the Wave Lengths of Rays of High Refrangibility in the Spectra of Twenty-one Elementary Substances." "Philosophical Transactions." Vol. 195, p. 63. 1884.

Hartley: "Photography and the Spectroscope in their Applications to Chemical Analysis."

"Journal of the Society of Arts," Vol. 34, p. 396. 1886.

The medal of the society was awarded for this last paper, which was merely an abstract of those previously published, with demonstrations of the method of working.

"Spectrum Analysis, Practical Applications of." The article in Thorpe's "Dictionary of Applied Chemistry" (p. 536), published by Longmans, is from my pen It contains a very brief account of my methods of working.

Brittle Platinum Pins in Porcelain Teeth.*

As compared with the delicate spectroscopic analyses of Professor Hartley, the experiments carried out by us are, perhaps, crude and somewhat "rough-and-ready," but the "dropping off" of teeth in practice is a "rough-and-ready" affair, and the language used by patients in describing it is sometimes rather "rough-and-

* By George M. P. Murray, F.R.C.S., Dublin.

ready" too. We may, at all events, claim for these experiments the merit of being practical, and of serving to eliminate some of the suggested causes of this mishap.

Before proceeding to a detailed description of these tests, it may be well to impress once more upon all interested in the matter that our object has not been to fix blame upon anyone, but simply to find out the truth, and the object of the investigation would be just as fully and satisfactorily achieved if we could prove to demonstration that these fractures were due to some faulty procedure on the dentist's part, as if we were to find a definite and damning impurity in the pins of the teeth as supplied to us by the manufacturers. To find the true cause and its remedy has been, then, our sole object.

The negative result of Professor Hartley's spectrum analysis cuts two ways. It proves that the brittle pins contained originally no metallic impurity; but it also proves that no such impurity was introduced by the dentist's fault, either by the use of base or unsuitable solder, contaminated investment, or in any other way.

It is probably the experience of most victims of this very annoying and disconcerting accident that it is more often found to happen with plate teeth than with vulcanite; but this, we venture to submit, does not prove that soldering has anything whatever to do with the case, or that brittle pins exist more frequently in teeth so dealt with.

That brittle pins have some cohesion and some tensile resistance is, we think, evident from the fact that they often stand use for some weeks before parting company with their mounting; and it would seem as if they had a better chance of surviving when anchored into a comparatively yielding and elastic material like vulcanite, than when held between two such rigid substances as the porcelain and a metal backing—a condition specially unfavorable for the withstanding, by brittle crystalline metal, of even a slight jar. The fact of the lesion ever occurring in connection with vulcanite proves far more in one direction than the fact of its happening, perhaps less frequently, can possibly be held to prove in the other.

My first experience of "dropped-off" teeth was with four bicuspids which quietly came away from a vulcanite maxillary denture.

Engineers tell us of some conditions under which steel becomes brittle and unreliable, but that is after prolonged strain and constant vibration, whilst the fracture under consideration invariably occurs at the very outset of the pin's promising career, and in no case has it happened to teeth which had been long in use.

I would venture to anticipate a suggestion which has not yet been advanced, but will probably occur to some one to bring forward as a simple cause, namely, that a faulty backing, not properly

home to the porcelain, throws a heavy strain upon the pins at the point of exit from the tooth, whilst in vulcanite teeth it might be held that insufficient support in the rubber threw all the strain upon the same point. These hypotheses, however, are exploded by one of Professor Hartley's experiments, in which he demonstrates that the fragments of the broken pins are themselves brittle and crystalline, and when fused into a button the metal still retained these defects, thus showing that the brittleness was not confined to one point.

Light is thrown on an investigation of this kind by spontaneous and by deliberate experiments. Under the former heading falls our observation of what occurs in the ordinary course of things. Thus we observe that the heat applied to platinum in making the pins does not ordinarily render it brittle, neither does the heat of baking the porcelain. If heat were the cause, all the pins should be brittle. Nor are cases wanting, as we have seen, where the pins break without being subjected to any high temperature in soldering. We also know from observation, or spontaneous experiment, that direct violence usually breaks the porcelain, leaving the pins intact, and that a prolonged strain will draw the pins out of vulcanite, or even stretch them.

These observations prove much, but we have thought it well to supplement them by certain deliberately applied tests under conditions carefully noted and controlled.

NOTES ON SOME EXPERIMENTS WITH PLATINUM PINS.

For experimental purposes fourteen plate teeth were taken, with presumably tough pins, as they had been in use in the mouth for over ten years, viz., nine American teeth (gold backing), and five English teeth (D.A. backing). All had been rivetted.

No. 1. With knife and hammer an attempt was made to split off English tooth from backing. *Result:* Tooth broke away, leaving pins intact in backing.

No. 2. American tooth, similarly treated. *Result:* Identical with No. 1.

No. 3. American tooth—(*a*) similarly treated. *Result:* Same as foregoing (considerable force required to split tooth away). (*b*) From the backing, one of the pins was broken away with pliers. Fracture fibrous.

These three experiments were intended to test toughness of pins in the teeth selected for experiment.

No. 4. American tooth invested in plaster and fresh sand, dried out and heated with blowpipe till backing was fused, then split off with knife and hammer. *Result:* Pins so soft that knife cut deeply into them, one breaking through the uncut portion, with fibrous fracture, the other coming away with backing; the latter, when broken off with pliers, shows fibrous fracture also.

No. 5. A repetition of No. 4. *Result:* Pins remained intact in backing, one being broken with pliers; shows fibrous fracture.

No. 6. English tooth, invested in plaster and sand, *containing filings of lead and zinc.* Heated up and soldered, and split away with knife and hammer. *Result:* Very difficult to split off. Pins remained intact in backing, tooth breaking away. One pin being broken off with pliers; shows fibrous fracture.

No. 7. A repetition of No. 6. *Result:* Identical.

No. 8. American tooth. *Investment containing lead and zinc filings.* Heated to the extent of fusing backing, and then split off as in the other cases. *Result:* Knife nearly cut through pins; fracture of uncut portion being fibrous.

No. 9. English tooth, invested in plaster and fresh sand, *heated up and soldered with smoky flame*, and split off as in other cases. *Result:* Pins cut through by knife.

No. 10. English tooth similarly treated. *Result:* One pin broke (fibrous fracture), the other coming away intact with backing.

No. 11. American tooth. *Investment containing zinc and lead filings, heated up with smoky flame till backing was fused*, split off as before. *Result:* One pin nearly cut through, fracture through remaining portion fibrous. Other pin came away with backing.

No. 12. American tooth, invested in plaster and clean sand. Heated up and soldered with smoky flame, and split away as in other cases. *Result:* Pins remained intact in backing.

No. 13. A repetition of No. 12. *Result:* Pins very soft, nearly cut through.

No. 14. A repetition of No. 12. *Result:* Pins came away with backing; one, on being broken with pliers, shows fibrous fracture.

These experiments would seem to show that *neither over-heating*, "*impurities in investment*," nor "*a smoky flame*," will cause sound platinum pins to become brittle or to break with the peculiar crystalline fracture which characterizes the pins of the teeth which "drop off."

Further Experiments.

Four unused American teeth were taken, the remainder of a set of six. Of the two used, one had "dropped off" after a few days' use; the other has been in use a year.

No. 15. The pins of three of these teeth were broken with pliers, leaving a fibrous fracture.

RELATIONS BETWEEN DENTIST AND PATIENT.

There is one factor in dental practice—as well as in many other affairs of life—which exercises a profound influence on the success, or otherwise, of the practitioner; this factor is a knowledge of human nature. Carlyle, in an oft-quoted passage, has stigmatised

the dwellers in these islands as "mostly fools," and we freely admit that we all have some weak point; perhaps even the cynical philosopher himself had. If we study the weakness of our fellow creatures in order to prey upon them, to deceive them, or to work upon their vanity or their ignorance, we lower our moral nature, and do ourselves infinitely more harm than we do them. But if we take the word of Pope that "the noblest study of mankind is man," if we study human nature with the idea of benefiting by that which is good, and of being helpful to that which is weak, ignorant or misguided, our knowledge of human nature will be a help to ourselves and cannot fail to bring us the respect of those with whom we come in contact, whether patients or not.

And we may here briefly discuss how far it is advisable to make friends of our patients or they of us. We have heard it said, "I do not object to my friend becoming my patient, but I object to my patient becoming my friend." We are inclined to agree with this axiom, though not altogether. There can be no objection to our friend becoming our patient, though it is quite possible to imagine a case in which we had rather it did not occur; but, as regards the other clause, we think there can be very little difference of opinion. It is better for the friendly relations between dentist and client to be confined to the consulting room. The fact of a professional acquaintance existing, should give neither party the right to presume upon it in any way. If either chooses to ignore the other's presence under other circumstances he has a perfect right to do so. The unwritten laws of good taste and right feeling will guide those who possess them; those who do not are not worth worrying about.

It is interesting to watch the change of feeling which has gradually come over the public mind during the years gone by as regards the status granted to various professions. At one time a man, to be a gentleman, was either a fighter or a cleric. Might was right in this life, so the fighter was an important person—and still is. The importance of the cleric lay in his assumed power over the future life—this also lingers to a large extent. In course of time, as right began to assert itself, the lawyer became more important, was admitted to some of the highest positions in the State, and it became recognized that the law, too, was a profession which a gentleman might enter. Medicine, which meekly limped behind her prouder sisters, has raised her head during this century in a remarkable manner, and we have had the satisfaction of seeing, ere its close, a medical man as a Minister of the crown and another a peer of the realm. If we read the description of medical men and medical students as portrayed in the novels of fifty years ago, we are struck by the difference existing to-day. Dr. Smollett, when serving as "surgeon's mate" on board a man-of-war a hundred

years ago, never dreamt of sitting down to the same table as his captain, who was most probably ignorant of his existence on board his vessel. Our specialty has also made great strides of late years, and our position as educated men and useful members of society is freely granted by all right-thinking people. But we are not only all brought in contact with people who do not think rightly, but scarcely seem to think at all. It is when feeling a want of consideration—to say nothing of gratitude—from people of this sort, that our knowledge of human nature helps us, as we know the genus "snob" to be as much a branch of the great human family as it was when Thackeray wrote. Finally, a few words of the great philosopher, Marcus Aurelius, may well be borne in mind: "Be satisfied with your business, and learn to love what you were bred to; and as to the remainder of your life, be entirely resigned, and let the the gods do their pleasure with your body and your soul. And when this is done be neither slave nor tyrant to anybody."—*British Journal of Dental Science.*

AN UNPLEASANT EXPERIENCE WITH COCAINE.*

By J. Charters Birch, L.D.S.I.

A few weeks ago I had a very unpleasant experience with cocaine, particulars of which may prove useful.

I was fitting gold collars for crowns to left mandibular canine and bicuspids, first trying each one to place separately, and using some little pressure to slightly cut the surrounding gum. I applied to the neck of each of the three roots, on a pellet of wool, one minim of 5 per cent. solution of cocaine. I am particular in saying one minim to each, for the small glass container in which I place my solution, which is freshly prepared for each case, holds ten minims, and I roll up and place in the cup, at starting, ten wool pellets or rolls; these absorb all the fluid.

Placing a roll of absorbent wool between the tongue and alveolus to absorb any solution that might run down with the saliva, I waited about two minutes, changing the position of the pellets occasionally. I then removed the wool and tried the collar upon the first bicuspid. Finding the gum still sensitive, I applied a fresh pellet of wool to that root, leaving the others in their place. In about another minute or so I tried the collar upon the posterior root, and finding the gum insensitive, pressed the collar down to place and burnished it close; then, removing the remaining pellets of wool, also the one under the tongue which was now in my way,

* Read at a Meeting of Leeds and District Section of Midland Branch.

I commenced to fit another collar. It had just got down to place without pain, when the patient remarked that her tongue and throat felt queer, as though they had no feeling, and she did not know whether she was swallowing or not; also that her hands were very cold; I felt them and they were death-like. I then noticed that she had turned a most ghastly hue, and had dropped down helplessly in the chair, the pulse was scarcely perceptible, but hard and rapid; her breathing quick and short, and appearing to come from the throat, not from the chest at all. Removing her to the couch we laid her full length, but there she was worse and struggled to sit up as she could not breathe while extended. She breathed rather better when she sat upright propped with pillows.

Opening the case containing nitrate of amyl capsules I found four all broken, someone evidently had been trying them to find out what they contained, I therefore gave the patient a teaspoonful of sal volatile, following that with a cup of hot strong coffee, and later with hot brandy and water.

She appeared to be in a state of collapse, hands, body and feet cold; face blanched and grey, with peculiar bluey green-color; shivering and shaking constantly. We drew the couch up to the fire, wrapped her in blankets, rubbed her hands and limbs, applied hot water, and gradually, though not for several hours, she rallied, and her breathing improved. Then her color became better, and later the pulse, and at the expiration of four hours she was able to go home in a conveyance.

After she left I examined all the appliances, and found six unused pellets, so at the most, she could only have had four minims of five per cent. cocaine solution applied to her gums on wool; that means, perhaps, $\frac{1}{3}$ gr., allowing for what remained in the wool unabsorbed.—*Journal of British Dental Association.*

RE-HEATED AMALGAM AND OXYPHOSPHATE: A NEW COMBINATION FILLING.

By William Guy, F.R.C.S., L.R.C.P., L.D.S., Edinburgh.

Since Mr. Tomes reported the results of his investigation into the behavior and value of amalgam I have taken considerable interest in the properties displayed by re-heated amalgam, and am bound to agree with Mr. Tomes that in using it we obtain a filling which is unrivalled for edge strength and non-shrinkage. But the difficulties attendant on its manipulation are so great that I find its use restricted to crown cavities in the lower cheek-teeth. However, while experimenting with re-heated amalgam, it occured to me to try it in combination with oxyphosphate cement. I need hardly

enumerate the various ways in which amalgam and cement are used in combination, all of which ways have their merits and their drawbacks, which will be quite familiar to those who read this note. Obviously, the only way to utilize the re-heated amalgam in combination with cement was to heat the amalgam button and mix the cement simultaneously, and immediately incorporate the amalgam with the cement mass. This procedure gave a grey mass, which retained the adhesiveness of the cement, set hard in the same time as the cement, and burnished within ten minutes of its introduction to a fine metallic lustre.

The chief obstacle to the use of re-heated amalgam had hitherto been the rapidity with which it passed from the plastic to the solid state; this very rapidity of solidification now became its most valuable property, for in a combination filling the fact that the two constituents set at the same rate and in the same time seems to be of the first importance. I have inserted some 200 of these fillings, so far with complete satisfaction. The color is fast and they wear well.

The proportion of amalgam to cement may be varied according to the fancy of the operator, the masticatory strain the filling is destined to bear, and the size and shape of the cavity. Absolute dryness is an essential condition to success, and I should say it was futile to try this combination without the rubber dam.

Experience, and that alone, will teach the operator what are the best proportions in which to mix, and enable him to seize the propitious moment for the introduction of the stopping. This moment I believe to be just previous to the time when the mass would roll in the fingers without sticking. Just as much care in the introduction, packing, trimming and burnishing of the filling is required as the dentist can lavish on it; but I think the result, provided he has by previous experiment mastered the idiosyncrasies of his material, will repay him for his trouble.

I use Eckfeldt and Dubois' standard amalgam and Weston's cement. A nice range of color is procurable. I heat the amalgam in a copper-amalgam spoon, mixing the cement at the same time. The amalgam should be in little pieces, not bigger than a No. 6 shot, and I fancy the older it is the better.

I have tried all the other combinations of cement and amalgam, and shall continue to use them; but as my confidence in the particular combination I have described increases, I find myself using it more frequently, in, for example, the case of a large distal cavity in an upper bicuspid, where the patience or the purse of the patient is inadequate to the strain of a gold filling. Where the shape of the cavity precludes the use of amalgam, and where a cement filling one feels sure would rapidly wash away, it is in such a case as this that I find the re-heated amalgam and cement invaluable.—*Dental Record, London, Eng.*

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EDITORIAL NOTES.

Owing to the unavoidable delay in the recent issue of the JOURNAL, we have been unable to insert a number of notices of meetings. Some of them, however, would have been too late even had the JOURNAL been on time. The programme of the Eastern Ontario Society, held on the 27th June, reached us on the 26th.

DR. G. V. N. RELYEA, of Oswego, N.Y., one of the pioneers of dentistry in Canada, has retired from active practice in favor of Dr. Raymond C. Turner. In the May (1896) number of our JOURNAL, the Doctor gave us some of his reminiscences.

Occasionally we receive anonymous correspondence—some of it scurrilous; some of it well worth publishing. We have a number of the latter on hand, but we require the names of the authors—not necessarily for publication.

Dr. S. B. Palmer, Syracuse, N.Y., whose contributions to the DOMINION DENTAL JOURNAL our readers have enjoyed, celebrated, on the 1st of May, the fiftieth year of his entrance upon practice.