# The Art of Dentistry — Odontology.

## A Brief Historical Review and an Attempt at Clearing up the two Conceptions.[1]

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During the last few decades the art of dentistry and the present education of dentists has on sundry occasions been the subject for animated discussions.

Amongst dentists there has long prevailed a feeling that the scope for tuition given to the prospective dentist, has been too circumscribed, both in respect of the theoretical disciplines that form the foundation for practicing the art and the purely practical application.

Suggestions have been put forward from various quarters purporting on the one hand to reduce the tuition hitherto given, and on the other to increase it, so that the medical examination plus a brief course in odontology, i. e. what might be termed stomatological educative, would be required for practising the art of dentistry.

Pleasant to relate, the dental corps by the very resolution to augment the period of tuition at our educational institution from three to four years, has been able to point to the fact that neither of the two last-mentioned suggestions has been carried into effect. The former would simply lead to a deterioration of the level which the art of dentistry as a whole has attained, and the latter would, with its suggested brief odontological course, just as surely bring about diminished professional skill when it is a matter of the most essential parts of the practical application.

The circumstance that such diametrically opposed opinions could be raised, must be due to the different conception formed in various quarters about the tasks, aims and objects, and means of the art of dentistry. It may, therefore, be of interest to try and

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ascertain what we conceive at present as the art of dentistry, respectively odontology, or, in other words, try to distinguish these conceptions. A brief historical review may serve as a suitable starting point.

By this is not meant that the definition or distinction should be deduced from the historical development. On the contrary, one must in such a case be circumspect about arguments taken from history. It shows the development of science, and, to take a single example, the relation between the two scientific spheres, physics and chemistry, which through the course of development and evolution and through the various methods they employ, are delimitated from one another, but which as to their being, are one and the same — this has been demonstrated by atomic research during the last few decades.

But a historical review may illustrate and illuminate the subject to be dealt with. It prevents a manifestation being put in an isolated position, without any connexion with the factors that have brought it forth. It is able to supply information as to when something essential or something inessential carried development in a certain direction, and contribute towards the elucidation of the way in which the future should turn out.

## History.

The origin of the art of dentistry can be traced far back in time. Rules for its practice existed at least a couple of thousand years before our era. In the beginning it was a part of the art of healing; to make use of H. Strömgren's expression, it was a legitimate offspring of the medical art and placed on a level with any other branch whatsoever of the same. It is clear, then, that the history of the art of dentistry during this period coincides with the art of medicine.

Amongst the ancients it was as a rule the priests who practiced the art of healing. This may have been due to the mythological conception of natural phenomena and causes of disease of those days, but also, and more especially in the cultured world of the Greeks, to the so-called votive tablets which were a gift or sacrifice to the gods for hearing prayers. On these were inscribed, when it was a case of illness, the name of the person cured and the way in which he had been cured. Hung in the temple they formed gradually a kind of library of which the priest, more so than anybody else, was able to make use as a source of information.

With the appearance of the philosophical schools and the origin of natural sciences the art of healing became more "secular".

In Egypt serious specialization seems to have taken place at an early stage. "The practice of the art of healing is organised and divided amongst the Egyptians in the following way: Each doctor has for its task to cure one disease, and no more. In this way Egypt was crowded with medical practitioners. For some look after the eyes, others after the head, some after the teeth, others after the stomach or the invisible diseases", writes Herodotos, the oldest historian of Greece, after his voyage in Egypt in the Vth century B. C.

If the Egyptian medical art was thus greatly specialised, such was not the case with the younger Greek, where the doctor was chiefly a general practitioner. This is seen from the writings of Hippocrates. These devote a special chapter to the teeth. Furthermore, they are mentioned a little here and there in dealing with other diseases.

On the Apennine Peninsula it was not so much the Romans as the Etruscans, who were the ruling people before them on the peninsula, that inscribed some leaves in the history of the art of dentistry. This people, which had probably immigrated from one of the countries in the Eastern Mediterranean and taken possession of the western strip of land on the peninsula, possessed a very high culture which betrays both Greek and Oriental influence. Nor is it improbable or incredible that through their origin or their wide commercial relations they had come into contact not only with the Babylonian-Assyrian cultured world, but also with the peoples of the Far East, Indians and Chinese, and had acquired from them a dental art which may very well have existed, but of which we have a very scanty knowledge. The Indians were already at an early date known for their surgical methods in replacing in one way or another lost portions of the body, ears, nose, etc. When these surgical methods were of no avail, what could there be more natural than to try in an artificial way to hide a loss which might give rise to the suspicion that the party concerned had been in collision with the severe laws of those days: "A life for a life, an eye for an eye, and a tooth for a tooth", were tenets which the judges according to the oldest known legal code, the Hammurabis, had to administer.

The position which the art of dentistry had come to occupy amongst the Etruscans, does not seem to have been inherited by

the Romans, at least there is no evidence which can lend support to such an assumption. But that the art did not die out altogether, is shown by certain laws as well as statements made by poets and writers.

In the Middle Ages the medical art and the art of dentistry flourished jointly amongst extra-European peoples, e. g. the Arabs. As regards the European peoples, many of the advances and discoveries made were lost. The soil during the period of migration of the nations was not suitable for cultural development, nor even for maintaining that which had been acquired. A brilliant exception was the University at Salerno, where the medical faculty was the foremost one and where tuition and research were carried on with the full consent and good will of the representatives of the Church, who otherwise cannot be said to have favoured the development and progress of science — and in regard to the art of dentistry without distinction to other disciplines.

There was here no question of prosthetical art of dentistry, but the teaching and tuition were confined to anatomical knowledge, to the medical treatment of pain and a description of the art of extraction. But this speciality was not practised by the doctor. When it was a question of surgical interference or prosthetic dental art, the sufferer was referred to some skilful person, in the latter case mostly to the goldsmith, in the former to the bath attendant. The smith, the butcher and even the public executioner were considered as possessing certain qualifications when it was a matter of operative interference, but the one to stand competition best was the bath attendant. This may by due to a certain amount of enterprise since in the exercise of his trade or profession he came into contact with boils and wounds of various kinds, but also to the circumstance that at least in some measure he followed the laws of antiseptics by bathing the field of operation and his hands constantly dabbling in water. From the profession of bath attendant emanated the barbers, and from these the so-called surgeons and barber-surgeons.[1]

[1] It is well-known that the bath attendants until fairly recent times continued to act as some kind of male nurses and also were entitled to perform certain surgical operations. A unique exemple from Sweden may be mentioned. When a bath attendant, Frans Gustaf Höglundh, as late as the year 1857 petitioned the Board of Health to be allowed to pass his examination as a dentist before the proper medical practitioners in Norrköping, the Board of Health on the 20th April, 1857, issued the remarkable declaration that "since Höglundh as a qualified bath attendant in conformity with the Ordinance is at liberty to practise minor surgery and, therefore, likewise treat dental diseases, the Board considered that the petition in question required no interference on their part".

In the XIIIth century some of the surgeons who had attained a higher degree of development, united and formed the College de Saint-Côme, which ultimately became a good educational establishment for both surgeons and, later on, dentists.

The original practitioners of surgery came from the lower, illiterate class of the population; they were thus unable to benefit by the knowledge of their day, which was written and presented in Latin. When the new era dawned and the writers of the ancients came into their own, surgery consequently did not enjoy any renaissance. It was not until later, when the demand that school books were to be written in the language of the country had found willing ears, that surgery began its slow and weary development from the level of a trade or handicraft to a science on a level with other medical disciplines.

The one who in the earliest stages of the new era contributed more than anybody else to the development of surgery, is the Frenchman Ambroise Paré, who, jeered at by reason of his lack of knowledge of Latin, in 1545 published in the French language a work dealing with the treatment of bullet-wounds, which aroused a vast deal of attention.

Paré continued with his work of authorship and also dealt rather thoroughly with matters belonging to odontology. He may also be said to be the originator of the obturators.

Somewhat more than a century after Paré's death, or more precisely in the year 1700, the Collège de Saint-Côme, which in the year 1713 passed into the l'Academie de Chirurgie, was granted the right to examine and pass so-called chirurgiens dentistes, or dental surgeons. With this the art of dentistry begins to develop as an independent branch of the art of healing. It is not without admiration that odontology stops at the memory of P. Fauchard, the man who may be said to have laid the foundation of the structure it now is. In the year 1728 he published his textbook "Le chirurgien-dentiste ou Traité des dents", in which in a masterly manner are dealt with all the branches of odontology known at that time, and which became of particular importance at a period when the art of dentistry as yet to a high degree was stigmatised as quackery. It is of special interest to hear a statement on the question of education at St. Côme by this clear-sighted and clever man, trained according to the light of his day: "Though the examiners are very well up in all the other parts of surgery, I believe, if I venture to express my opinion, that when

as a rule they do not devote themselves to the practise of this (the art of dentistry) it would not be amiss if on these occasions a skilful and experienced dentist were allowed to examine the candidates in the difficulties encountered in the course of a long practice of his art and to instruct them in the method of overcoming the same; in this way we would not have to see the majority of dentists equipped with knowledge below the average". This is a sober but well-administered speech of the man who was given the honourable title of "father of the art of dentistry". His statement shows that the different views expressed in medical and odontological quarters about the art of dentistry, are of old standing.

It may be said that the art of dentistry in France at the time of Fauchard was more than a hundred years ahead of development in the rest of the world. In Sweden as well as in other countries the patient was still restricted to the medical practitioner, who perhaps at the most tried to deaden the pain with some drops or some plaster, or to the bath attendant or barber-surgeon for extraction. There was no third way.

During the XVIIIth century foreign practitioners, mostly Frenchmen, began to immigrate into Sweden. The first legitimate practitioner of the art of dentistry was Franciscus Allar, who received his license in 1707 "to practise the aforesaid art, in so far as Teeth and Corns are concerned". For a long time Sweden did not have more than one practitioner who dealt with "the repair and insertion of teeth", for in 1766 Ehrenreich, who had been summoned to Sweden in 1747 by King Frederic I, mentions in a petition that as »Medicus Dentiste he is the only one in the kingdom", and in 1768, after Ehrenreich had left the country, "the Medical College is not aware that there is anybody in Sweden who has made this branch of the healing art his profession".

But the crowd of immigrants increased gradually.

Many of them had learned their art rather superficially; with one it is only a tiresome appendix to a much more pleasant and profitable profession to touch off fire-works, with the other a means without competition to look about the world, but with the third something resembling a task in life. The claims rose, and in 1815 was promulgated the first Royal Rescript on the art of dentistry and its practitioners, which was in operation until 1861 — the year after the establishment of the Swedish Dental Associa-

tion — when it was superseded by the so-called "Ordinance". According to this the adept was as a private pupil and assistant to a private dentist to acquire the necessary knowledge and skill in the duties appertaining to the art of dentistry", and furthermore to pass through a course of tuition on the structure of the human body in so far as such a knowledge is necessary for the purpose of practising the art". "On this very incomplete Ordinance as a foundation", writes the Committee of the 31st January, 1913, which had to inquire into the question of "If and to what degree the tuition and training of dentists in Sweden should be reformed", the corps of dentists in the course of more than half a century has been trying, again and again — through committees, deputations and innumerable petitions — to build up a system of instruction and examination which, in the same measure as odontology and the consequent claims of the public increasing, would be able to fulfil this double purpose". As the result of these endeavours on the part of the dental profession there was established, as is well known, in 1885 the Policlinic for Dental Diseases, and in 1899 the Dental Institute.

Even if the Policlinic for dental diseases was intended to be an educational institute, it may be maintained that the tuition was not organised in any fairly satisfactory manner until the establishment of the Dental Institute. The circumstance that the art of dentistry was developed so relatively late may be attributed to the fact that the question of teaching was waiting for a solution for quite a long time, and this in its turn that the powers-that-be were not particularly interested in the art of dentistry, since social hygienic views hardly existed as yet, and the dental hygiene was looked upon as a matter of a cosmetic nature. Things were different with surgery. The constant wars during the XVIIth and XVIIIth centuries called for surgeons — or barber-surgeons, as the current term was — and such had to be got by hook or by crock for satisfying the needs of the army and navy. When the Serafim Hospital was opened in 1792 in Stockholm, it became, besides an educational institution for physicians, also one for surgeons. The reason for the establishment of the Caroline Medico-Surgical Institute in this town a little later, or in 1810, was also the urgent need of an institute for turning out skilful barber-surgeons.

The Swedish Dental Association, established in 1860, has by its activity laboured for the scientific development of the art of dentistry and also for its practical application by labouring for

the improvement in the tuition; by aiding and supporting deserving and meretorious work; by lectures and discussions; and by the organisation of post graduate. As from the year 1900 the Association has, together with the other Nordic countries, published the "Nordisk Tandläkartidskrift" (Nordic Dental Journal), which from 1903 became wholly Swedish, and from 1908 received its present name, "Svensk Tandläkar-Tidskrift" (Swedish Dental Journal).

If we ignore France, which at the time of the appearance of the art of dentistry as an independant profession, i. e. at the beginning of the XVIIIth century, may be said to have been fully one hundred years ahead of other countries, we may say that the development and evolution of the art of dentistry in the rest of the world on the whole proceeded as it has been sketched and delineated in regard to Sweden, possibly with a minor modification of the period for the appearance of certain institutions.

The country which, next to France, occupies a leading position, is America, which in June, 1839, witnessed the publication of the first dental journal of all countries, to wit "The American Journal of Dental Science"; "The Society of Dental Surgeons" was formed in August, 1840, and in November of the same year was established the first purely odontological educational institute, "The Baltimore College of Dental Surgeons".

The fact that some of Fauchard's disciples emigrated from France to America brought the new country into early contact with the development in the old, and was influenced by Fauchard's doctrines which, transplanted into the new soil, soon further developed and improved.

The early establishment of a technical journal has undoubtedly also been of vast importance. That the inception of the same already in the ensuing year was followed by both a union of the practitioners of the profession and certainly a private but organised tuitional institution, is more than a mere chance. If it may be said of the American dental art that from the beginning it possessed, and for a long time kept, a mechanical stress, it seems of late years to have been superseded by a more and more increasing biological trend.

The circumstance that Europe was not influenced or affected in the same measure as the distant America, is very likely due to the constant wars and revulsions during the XVIIIth and the first few years of the XIXth century. In the Rhenish Union

formed by Napoleon under the supremacy of France, fresh laws were promulgated inter alia in 1811, with an independent dentists' corps, but after Napoleon's fall the Rhenish provinces were incorporated with the German Confederation, the newly passed laws being severely circumscribed and altered or rescinded, the practitioners of the dental art being relegated to the class of more or less ambulatory practitioners of surgery and dental art, who passed under the denomination of operators and bandagers.

In the year 1846 the first dental journal in German, "Der Zahnarzt", appeared, in 1847 the first society, "Verein der Zahnärzte in Berlin" was formed, and in 1859 the "Zentralverein Deutscher Zahnärzte". In 1855 was opened a private "dental clinic", but it was not until 1884 that Germany got its first State Institute.

In England two societies were formed in 1856 and 1857, which, a few years later, amalgamated into the "Odontological Society of Great Britain". In 1859 was founded the "Metropolitan School of Dental Science".

In 1881 was founded in Geneva the "Ecole dentaire de Genève".

The first international congress met at Paris in 1889, and this has since, with the exception of the war years, been held every fifth year. In 1900 was established the Féderation Dentaire Internationale (F. D. I.) with the object of being an executive organ between the congresses and to convene the same and perform the preparatory work. One of the leading forces in the international co-operation and the one to take the initiative for the F. D. I., was M. Goudon of Paris, who was likewise the founder of the Ecole dentaire of Paris, in 1879, and of the Odontological Society in 1880. By his successful work in various branches he realised the statement attributed to him, *that the tripod which a scientific profession ought to build upon in order to gain a safe foundation is the educational establishment, the professional union or society, and the technical journal; the educational establishment for training the prospective practitioner, the society or union for giving lectures and getting up discussions and for colleagues to meet together, the journal for reaching a wider public for disseminating knowledge and further education and training.*

Through the influence of these educational organs there came at the end of the XIXth and the beginning of the XXth century the period of breaking through and forgeing ahead. From having

reached a relatively high level amongst some of the ancient nations, and from passing through, if we ignore the Fauchard era and some other sporadic manifestations, the long period of a couple of thousand years without any appreciable development — lengthy periods are, on the contrary, characterised by darkness and retrogression — the art of dentistry developed within a few decades so rapidly and the sphere of knowledge of which a dentist was in need, was enlarged and widened in such a way that the art soon began to be divided into special branches.

But this rapid development, which at least the older generation of dentists have had an opportunity to witness, and the more and more strongly manifested knowledge amongst the dental profession that the art must be practised on biological bases and on scientific principles, was grasped, as was quite natural, not quite so rapidly by outsiders. For this reason it has until late years been uphill work to instill into the powers-that-be and the general public an understanding and appreciation of the demands made upon the profession, both in regard to improving education and the organisation of social dentistry. But we must not forget the interest and the support which both the Medical Board and its predecessor, the Board of Health, have always given to the Swedish dental profession by advocating with the Crown and Parliament the demands for better organised education and training.

It is also well worth not to forget the statement made in 1892 by the body of teachers at the Caroline Institute to the Medical Board, in which it is inter alia pointed out that the dental profession during the last few decades had begun to develop from a guild into a well defined and delimitated special branch of surgical science (p. 17 in "Uttalande och Förslag").

The lineage of the art of dentistry is, therefore, pretty old. As an independent branch of profession it is relatively young. It is obvious from the name that it has the designation, honour and rank of "art".

The word "art" occurs in somewhat different senses; it may be looked upon as a verbal substantive of "knowing" and thus denotes in its general significance knowledge or skill within a certain sphere. This occurs in associations as art of governing, oratorical art, healing art etc. Used by itself or in some combinations the

word carries the thought to the creations made for feeling and fancy and partly through feeling and fancy, which we are accustomed to term the "fine arts".

It cannot be denied that the sense of dentists for colour and colour combination plays a very great part in his daily work, and that his ability to judge the proper shape and form and to be able to give shape and form to the separate details and to combine them into a harmonious whole, are qualities in respect of which very severe demands must be made upon the present-day dentist. If, therefore, the aesthetical view point must not be underestimated, it is probably incorrect that there is any art in this sense which has given rise to the term dental art or art of dentistry. The essential in this art lies in a quite different sphere, viz. in the task to prevent dental diseases — a task in which we have, unfortunately, not as yet advanced very far — and in restoring the function in a destroyed tooth or in the denture as a whole.

If the word is conceived in its wider sense, e. g. knowledge, competency, capacity in a certain art or science, the word art of dentistry corresponds at least to some part of the tasks which come within the dentist's sphere of activity. But the word has been unhappily selected since it supplies an erroneous idea of these tasks, both from the view point of some healing in the proper sense of the word, at least not of the cariose defect, is brought about, and that it does not correspond to the minimum measure of knowledge which the dentist must have in order to enable him to practise his profession rationally.[1] Let us take an example which, for that matter, is rather fit. To extract a 6-years-tooth — or for that matter any other tooth, possibly with the exception of some wisdom-teeth — may be quite a simple art. If it is performed in a straightforward manner it does as a rule not cause very much trouble, but the person performing the operation, and to whom the patient trustfully has applied for getting the best possible aid, must know what complications may arise as a result of the operation and not least so those consequences which may befall adjacent teeth and the masticatory apparatus as a whole, and which consequences according to our present conception may be serious enough.

With this example as a starting point, and it can also be multi-

[1] The same really also holds good for the medical art as a term for what is now generally termed medicine. The term medical art hardly occurs otherwise than in such combinations as "deity of medical art, father of medical art", etc.

plied indefinitely, as desired, one may venture to assert that the dentist's profession calls for both skill and knowledge. If we ask ourselves where the difference between the two cultural manifestations — art and science — lies, the answer might essentially be formulated that art is concrete and imparts its purport in the form of an action, no matter whether it manifests itself as a surgical operation, a picture, a symbol, etc., whereas science is abstract in its purport and tries to investigate the conception or — in the natural sciences — how a phenomenon is repeated, i. e. the constitutional and legitimate one.

Now, there is nothing to prevent an art developing into a science, or for its further development to require a scientific basis. The scientific may even become the essential and fundamental. This holds perhaps good not so much for the fine arts, where the picture or effigy symbol is the essential and often wishes to be idealized. Of course, in art criteria in this sense are not lacking, which have wanted to make it into a science, but it is difficult to understand how this should be accomplished, since each artist must have his own conception, and science does not approve of any subjectivity but demands objective validity.

For work which has for its aim and object the very human organism with its complicated manner of reaction, sensitivity and irritability it is a matter to try to get on the track of actual reality and investigate the structure of the various organs, their function and relation to one another, and the manner for the restoration of a disturbed function. An example of the way in which an art has developed into a science, and by doing so stands on safer ground, is the medical art or medicine, as it is nowadays generally termed, and we shall in the ensuing see if the same cannot be said with equal right about the art of dentistry.

If, therefore, after this brief orientation on art in general the attention is directed especially to the art of dentistry, so as to ascertain its scientific nature, the following questions arise: What is meant by science and in what way can a cultural manifestation or phenomenon, which lays claim to science, prove itself to be a science? If the first question is clearly and distinctly defined the second might most simply and practically be answered by pointing to its scientific production. It is also certain that a science gradually gains for itself acknowledgement in this way. But even if the question can be settled in this way a theoretical investigation of the character of the research area is of fundamental importance,

not least so because its task can be more clearly elucidated by doing so.

One might expect to find in the existing literature without any difficulty an exhaustive and satisfactory answer to these questions, but such is hardly the case. This is perhaps due to the fact that it is difficult in a single formula to define exhaustively and incontrovertibly the conception science, or give an answer to the latter question as to how it is able to prove itself.

One writer defines the term science briefly and succinctly as systematically conceivable knowledge. In Eisler's Handwörterbuch der Philosophie, we find the following definition giving evidence of German thoroughness: "Wissenschaft ist systematisiertes Wissen, der Inbegriff zusammengehöriger, auf ein bestimmtes Gegenstandsgebiet sich beziehender oder durch den gleichen Gesichtspunkt der Betrachtung verbundener, zur systematischer Einheit methodisch verknüpfter, zusammenhängender Erkenntnisse". One is perhaps not much wiser after perusing this definition.

From a formal point of view science is equivalent to the methodical carrying on of research work.

To distinguish in descriptive words or terms the conception science, may be easier and give a better result.

I take the liberty to quote A. Nygren: "Filosofisk och kristen etik", where he touches in the introduction upon these questions. His presentation of the subject is abstract — it can, therefore, not be said to refer to the separate case, still less so, as the title indicates, to the question which in this connexion has been dealt with by the answer.

"The first claim that must be made upon every science is that it can state clearly and incontrovertibly what its task is. A loose and arbitrary accumulation of thoughts and observations we do not call science. Scientific thought differs, in fact, from other thought chiefly by the demand for uninterrupted connexion and cohesion, by the strictly conscious and methodical in its progress from thought to thought. A sine qua non for every science is, therefore, from the start, a conception of the purpose, a leading idea which prevents the separate reflexions united in the same from going to pieces. This leading idea is nothing else but the conception of the task of the science in question. If the task is clearly and energetically propounded, one of the most important conditions for successful scientific work is fulfilled. If, on the

other hand, the task is indefinite and shrouded in obscurity, the work depending upon it will of necessity also be a groping in darkness. And this cannot be overcome by collecting still more empirical material. For just as surely as any more extensive material, if the task is already clear, more than anything else is able to elucidate and fortify the scientific insight, just as surely the more plentiful material, if there be no conception of the task for the solution of which this material has been gathered, will merely contribute towards increasing the confusion. The idea which imparts to science connexion and guidance, cannot be brought to light as anything matter of fact from the material; science itself must bring it along. Of course, it may justly be said that the task for a scientific presentation cannot stand forth in all respects until the conclusion of the investigation. In the course of the research it may be found that the original idea does not quite come up to the material that the task mapped out from the start is too far-reaching or too circumscribed, and must undergo all kinds of modifications. But this does not alter the circumstance that every science must consider it as its first duty to map out just its task, at least in a preliminary way.

Such a mapping out of the task is, however, also in another respect of considerable importance. The clearly conceived task not only lends inward firmness to the separate science, but determines its relation also to other branches of science. In this way isolation is cancelled; the separate task is put in its natural place in a greater connexion of the sciences. It cannot escape notice that this arranging into the greater connexion again reacts elucidatingly upon the separate science. For if we see the separate scientific task in its relation to science as a whole, we are entitled to set up the claim, *on the one hand, that every science must have its specific task, strictly delimitated from all others, so that the same is not dealt with and solved within any other science, on the other hand, that the task appertaining to it alone in the total connexion of science proves to be a necessary task, so that there would occur a gap in this connexion if the questions touched upon were not dealt with within this science.* If, therefore, the questions which a certain science considers it its main duty to solve prove to be perfectly arbitrary questions when an attempt is made to subordinate them into the great scientific connexion, so that from without this no reason or cause can be found for setting them up, this goes to show that the science in question, provided it concentrates upon these

questions, is to be looked upon as a pseudo science. Or if it were found that these questions, though legitimate and necessary in the scientific connexion, are already being dealt with satisfactorily by another science, and as the result of their nature should belong to the latter's sphere, this means either that the science has gone astray in respect of its task, or, if no other task can be found for it, that as an unnecessary duplicate it is not at all entitled to existence".

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It must now be our duty to investigate in how far the art of dentistry fulfills the claims set up here, which may be considered as constituting scientific work. The points of view last quoted are not of this day. Already Fichte, Schleiermacher and their philosophical contemporaries set up alternative conditions either that the separate science shall fill a given and necessary place in the system of scinces, or that a part of our experience, is of such importance that the joining together of these separate parts or elements of knowledge into a whole is justified. The last case was very likely at one time the cause for the primary origin of special sciences. Thus there arose mathematics in order to regulate the first business transactions, geometry (= land survey) in order to measure and divide the land, astronomy as a chronological measure for agriculturists, and the art of healing to cure diseases, injuries, and to relieve man of pain.

Pain has certainly been the first and greatest impulse to a germinating dental art of a surgical and preserving nature. Toothache has always and everywhere been looked upon as the worst of all aches and pains. Ambroise Paré characterises it "as the worst next to the death struggle".

In the preceding it has been pointed out how the severe laws of the ancients have been an impulse to the origin of prothetic dental art which, later on, and then perhaps more for esthetic reasons, we see brought almost to perfection by the beauty-loving Etruscans.

The decadence in some branches which characterises the Middle Ages very likely brought about that the care given to the teeth during this period consisted chiefly of "the rude art of breaking out teeth", a condition of affairs which can be traced far into the newer times. When, in the XVIIIth century, uniform dentistry made its appearance, it is significant that this took place in the then leading and cultured France. It made its appearance as a cultural necessity and became an independent profession because

medical practitioners or physicians considered it beneath their dignity to occupy themselves with the art of dentistry, just as little as with surgery.

The demands which in the majority of civilised countries are now made upon the organisation of the question dealing with dental hygiene, show that the goals which the art of dentistry has set up as a task to be solved, are not selected arbitrarily but are necessary in order to satisfy an urgent need which is being generally felt.

If, therefore, the need of dental care and hygiene has now become generally known in such a way that not many words need be wasted on its necessity, development has brought about that the art of dentistry has been made to occupy another and more intimate relation to medicine than that which it held during the last few centuries. That which has chiefly contributed to this is the prevailing conception of the tooth, not as an isolated organ but as a part of an organism intimately connected with the surrounding tissue, which conception has found expression in the generation of the term paradentium and in the dental doctrine of focal infection, respectively allergical conception.

In the term paradentium are summarised the tissues surrounding the tooth: gingiva, periodontium and alveolar bone, as well as the root-cement in the tooth itself. For a long time the tooth was looked upon as a delimitated whole, and from an anatomical point of view it may well be said that it is delimitated from its surroundings, though the structure and nutrition of the vessels in the bone tissues indicate a connexion. From a functional point of view the tissues summarised under the term paradentium form, however, a unit or an organ in which the state of belonging together between the various tissues clearly stands forth and particularly so in a pathological condition. Well-known circumstances are that at least a severer pathological change in the pulp is seen in an alteration of the bone above the apex before the infection has reached the latter. Furthermore, that the irritation in the pulp, which occurs in the case of badly isolated silicate filling may cause changes of the bone surrounding the apex already noticeable under X-ray, without the pulp having to be necrotised, and that an inflammation in the gingiva may produce changes of the bone while the inflammation is still localised to the gingiva; this might partly be explained by the typical supply to the vessels.

With a fully developed condition of disease of the tooth the

state of belonging together between the latter and the surrounding tissues is obvious.

"The German Association for Dental Anatomy and Pathology" set up the following theses in 1924:

1. Recent research has unanimously shown that the nutrition of the tooth and its function are intimately connected with the maxilla.

2. Every serious disease or necrosis in the pulp of the tooth with inflammation of the root-membrane as a consequence passes automatically into the maxilla. This holds good for both acute and chronic conditions.

3. Patients suffering from the aforesaid diseases are not to be denoted as suffering from a dental but from a maxillary disease.

The union between the tooth itself and the surrounding tissue stands out also after the removal of the tooth, when the part of the paradentium termed the alveolar protuberance disappears or is formed back.

A problem more far-reaching and important was unfolded the same moment the conception of focal infection and certain allergical conditions were placed into connection with diseases of the teeth.

While according to the doctrine of focal infection the bacteria or their toxins would be carried about in the body and cause pathological processes, the toxins being assumed as exercising a physiological poisoning action, the mechanism regarding allergy is another. Allergy means another action or, more freely translated, "altered reactivity". This change of a patient's capacity to re-act may take place either in the direction of increased power of resistance or increased sensitiveness. For a long time medical science identified allergy with that allergy which occurred after certain medicines and nutrients. It was not until recent years that an infectious cause has been accepted and bacterial allergy has been brought into the focus of discussion. Rheumatic arthritic complaints have been produced artificially in animals by gradual allergization or rather by hyperergization with certain species of streptococci.

In the literature are mentioned many cases of allergical conditions and manifestations, which ceased after repeated removal of local nuclei, many of dental origin. To an allergical condition it does not matter where the nucleus is located, in the glands, in the teeth, in the skin or somewhere else. Bacterial allergy has

altered our conception of focal infection. It looks as if one conception were to supersede the other: only the mechanism is different.

Conscientious work from medical and odontological quarters is going on at present to clear up these conditions.

Even if a great deal remains to be done to clear up to what extent and in which cases a dental cryptogenous sepsis exists, the assertion is justified that nuclei or foci in and around the teeth may give rise to general pathological conditions.

On the other hand, some general diseases appear with their symptoms first in the gingiva — the classical example of this is scurvy — which is also the case with an over-dose of some medicines and in some cases of poisoning. All this shows the connexion between the masticatory apparatus and the rest of the organism, and that odontology and medicine are closely related to one another. The former is just as little entitled to appear as a science, unworried by the injuries that may be caused to the organism as a whole, as the latter is entitled to reject the masticatory organ or its diseases as a matter of subordinate importance for the function of the organism.

Since medicine at least for the time being does not know of any method by which the carious process can be prevented or it or its immediate consequences treated, nor any other method for replacing lost teeth, while on the other hand the art of dentistry has developed methods of treatment suitable for the same, and also such as relate to the prevention of the too early loosening of the teeth, it performs by doing so a task without which a troublesome gap would occur in medical science. By this the value of the dental art and its natural place in the wider connexion can be considered as proved, and with this the most elementary conditions for its claim to acknowledgement as a science to be fulfilled.

In the preceding have been dealt with quite cursorily some of the tasks and duties of the art of dentistry. As, however, the task when it is a matter of deciding *what the dental art is*, must be considered as being of fundamental importance, it calls for more thorough treatment.

The task and duty of the art of dentistry must be looked at against the background that by the researches of the last few decades it is a practical application oriented and built up on a theoretical foundation. Scarcely a generation ago it consisted mainly of the extraction of teeth and mechanical substitution of defects and gaps that had occurred, without any other biological

considerations than those which had their origin in the most palpable empiricisms. In this way it lacked possibilities for development, nor did it fulfil the first commandment drawn up for him who has to treat the human organism: "Do not injure".

On this foundation has then been developed the *surgical*, *preserving* and *prothetical* art of dentistry from its primitive state to the uniform, though far from finished, structure it now is — into odontology. The character of odontology is by this indicated, but we shall revert in the ensuing to a closer determination.

How is it, then, that we lump together such different conceptions into a joint whole? Because all the said parts of the art of dentistry are different forms for retaining the optimal function of the masticatory apparatus. By taking into consideration the patient's age, constitution and all kinds of other circumstances in each separate case they mesh with one another and prepare the soil for each other. There is no material difference between conserving and prothetic art of dentistry. Built up each one from its quarter, the gap between them has gradually been bridged. The difference between the great filling, affecting all the surfaces, and the gold crown or pin-tooth, is little. And the task of dental surgery is, as a matter of fact, not only interference in a pathological condition and the removal of pathological tissue, but it also prepares by plastic and other operations the foundation for the prothesis itself. "Selbst die zahnärztliche Chirurgie bereitet da, wo sie Lücken schafft zugleich die Schliessung der Lücken, die Wiederherstellung vor" (Christian Bruhn).

In the preceding it is stated that the three spheres into which the art of dentistry is generally divided, dental surgery, operative dentistry and prothetis are all different forms for "keeping the masticatory apparatus at its optimal function". With this the task of the art of dentistry is also expressed as briefly as possible. In the expression "maintaining the masticatory apparatus' optimal function" lies the whole task and purpose of the art of dentistry: To prevent dental diseases and to replace lost or diseased teeth which are of importance for the denture or parts of teeth that have been destroyed.

Those diseases to which the masticatory apparatus is heir carry already in their latent form the seed for a reduced function. Prophylaxis which, infortunately, we are as yet able to make use in a small degree, must, therefore, be looked upon as the most important means for the upkeep of the function.

The diminished function appears distinctly when these diseases have made themselves manifest: When the contact points and masticatory surfaces have been destroyed; when the gingiva has changed pathologically, and the surrounding bone has more or less disappeared; and when, ultimately, the tooth has become sensitive to the different kinds of irritation to which it is subject.

But how are things with the tooth which, even if it is able wholly or partly to fill its place in the denture looked at as a masticatory mechanism, can be considered as being a focus for infection? In such a case it has also a negative phase, a disfunction which may be of such a serious nature that it puts the physiological function in the background and which, unless some treatment is administered for its removal, as a matter of course would lead to the removal of the tooth.

The art of prothesis comes clearly under the said task and orthodonty is meant to bring about an optimal function, partly directly by giving to the teeth a position which enables them to grind to pieces the food better, and partly indirectly by creating hygienic conditions by which the ravages of dental diseases are prevented.

But even the purely esthetic point of view which the dental art has to take into consideration, can be subordinated to the optimal function of the denture not only from the point of view that the causes of the reduced function — the dental diseases and irregularities — spoils the linear play, the impression of the teeth and the gingiva, and by so doing the total impression, but also because the natural harmonious shape as a rule is best fitted for a reconstruction and sets up the best hygienic conditions.

The tasks of the art of dentistry may, therefore, be summarised under the term "maintenance of the optimal function of the denture". This term has been selected because disease and also the contrary — health — are conceptions difficult to define, and, when it is a question of the dental system a definition becomes still more difficult. To this has to be added the bringing in line prothetics, whose task in the first instance must be seen from the functional point of view.

If, therefore, the art of dentistry is able clearly and distinctly to state its task, the question may be asked: Can it fulfil its task? When it is a matter of the carious process and symptoms of paradentoses, yes. When it concerns a prevention of these processes

the answer must be more hesitant. These dental diseases are conceived now generally as due to local and general causes. The dentist is able to use local prophylaxis, but hardly general, since neither the medical man nor the dentist has yet succeeded in solving elucidatingly the certainly very complex causes of the occurrence of dental diseases.

To enter farther into these actual and highly interesting questions would, however, be to stray from the subject under discussion, for which reason we shall, after stating that the art of dentistry is fully aware of its duty and has been able to prove itself as a necessary link in the struggle against disease, suffering and impairment of the important function of the denture, revert to the other claims postulated in the quotation here before.

The literature which is dealing with the problems of the art of dentistry may be considered as having grown in a way which makes it hardly come within reach of normal receptivity. The same as the parent science, medicine, it is beginning to be divided into special branches. But merely a collection or accumulation of knowledge will not constitute any science. For a science to arise, the branches of knowledge comprising the same must be systematically arranged and held together by a joint sensible view point or principle of order which must not be arbitrarily selected. "When the archaeologist collects and arranges the remains of old-time stone implements, this is a scientific performance, and likewise when the geologist collects different species of rock. When, on the other hand, the collector of curios arranges his finds according to their appearance, colour, shape or place of discovery, this is no science and cannot become one, because his principles of arrangement are quite arbitrarily selected". (Nygren.) It is scientifically worthless, because no conclusions can be drawn from the material arranged in this way, and because it has not for its aim the solution of any problem which from one point of view or the other is of any importance. The guiding principle for dealing with a subject or group of subjects is just the task that has been set, and which indicates from which angle a subject is to be studied. Therefore, the same subject may also come within different branches of knowledge, but each time be subjected to a new angle of view or at any rate to a changing view.

When operative dentistry and prothesis take their material for filling or making protheses from chemistry it has certainly

benefit of a good deal of the science which chemistry lends to these substances, but they take less interest in such conditions or circumstances as the value of these substances or their compounds which are of no direct importance for these branches. On the other hand, they look upon these substances from a new angle: Their relation to the live tissue, their constancy to the buccal fluids, their relation to other material used, etc. When chemistry, to take one example, is dealing with the matter christobalite, which is nothing else but silicious dioxide heated to or above 1,470° C, it states hardly more than the difference in specific weight between these two substances. This view point interests the art of dentistry less but rather its constancy to heat and its capacity as an ingredient in a bedding compound to compensate the contraction of the gold after a cast is made.

For dental surgery holds good the same principle of organisation as for surgery in general, but with a special eye to the function of the dental organ.

That the separate kinds or branches of knowledge forming the art of dentistry in its different spheres are arranged into a systematic whole and on a principle of organisation, which correspond to the task of dental art, can, of course, only be demonstrated and proved practically. It can, therefore, only point to monographs and those text-books which deal with some one of these branches as a whole, and which works very likely are quite on a par with similar ones in other disciplines.

Without an organisation of the branches of knowledge belonging to this multifarious sphere acceptable teaching would be impossible already from the teacher's point of view, how much the more so then to those who in a not too generously measured space of time have to benefit by the same.

In the preceding the art of dentistry has been looked upon as an existing reality, and its scientific quality dealt with from an objective point of view.

But if we do not consider the conception science from an objective but from a formal point of view, it becomes equivalent to systematically carried out research. The formal in research is methodics and systematics. As every separate subject dealt with in a science can be considered as part of the same or one of its elements, and every kind of knowledge demands methodicalness or system, it follows then also that the part must be characterized by systematic orderliness.

No science will ever be finished with its work. It may stagnate, and it may look as if the utmost possible limit had been reached, but then a looked for or unexpected discovery opens out fresh vistas and possibilities for development. In its first attempts to discover that which is dark and unknown science proceeds methodically. At long last our knowledge rests upon observation. Many discoveries have been made by a wakeful capacity for observation, of which only one example shall be cited, viz. Finlay's opinion in 1881 about the spread of yellow fever by a species of gnat. His views aroused opposition and jeers, but twenty years later his conception was confirmed by an American commission studying the subject. Furthermore, there may be mentioned the discovery of ether as an anaesthetic and cocaine as a narcotic.

In the preceding regarding the case of the yellow fever the association cannot be so easily proved. Research then proceeds experimentally and inductively. The experiment enables us to isolate a chain of cause or causes in a complicated process. Induction is the method according to which from one characteristic or a process in few cases one concludes that the result under ordinary conditions will be the same in all others.

The inductional conclusion, therefore, builds upon the uniform and constitutional in nature, or in other words, a general rule is set up on the foundation of separate cases. The method calls for observation, but it is also supported by logical conditions and hypotheses. It distinguishes the essential from the unessential and abstracts from the latter; it values the qualities in an object or the relation between the links in the process that is to be investigated. The qualities must not be superficial or casual; they must be of an inherent nature and characteristic. Judgment in this case plays a great part. If, by way of example, with a starting point from there having been 10 to 20 fine days last summer we wished to draw the conclusion that all days will be just as fine, this would, of course, be a mistake for the judgment "fine" in respect of a day is a casual term and not a characteristic one; or to take an example from odontology: If a writer in several cases has been able to prove the constant occurrence of the formation of hard substances in the pulp cavity with a shortage of C-vitamine, and if he has been able to exclude other factors or moments that may contribute towards such formations, he is entitled to maintain that the shortage or lack of C-vitamine causes such formations. But if all the cases he would be able to point to were

"wall-fixed" new formations and he drew from this the conclusion that the lack or shortage of C-vitamine always causes wall-fixed formations of hard substances, this conclusion would be erroneous, because the determination quoted is of a casual kind. Research has already shown this, but even if this fact were unknown the circumstance that some are altogether "wall-fixed" and others are connected by a narrow bridge with the wall, may give rise to an investigation, if not also this connection may be missing.

Every question gives rise to fresh questions more specified in detail but with a minor scope. Research proceeds analytically. But if it lost itself in details the goal might easily become obfuscated, for which reason it must create classifications and surveys. It therefore also proceeds synthetically.

Analysis and synthesis are methods which in science occur in constant reciprocity, not only within a minor but also within a major sphere. They are found in the origin of special sciences, and their cohesion and re-uniting in philosophy, which latter in Sweden has found expression in the "Society for Philosophy and Special Science" recently formed at the University of Uppsala. They are reflected in the existence of medical specialists and general practitioners, and corresponding differentiations in our profession.

Other methods which research makes use of are analogous conclusion and hypothesis.

Hypothesis is an assumption about something that is set up to explain certain phenomena or manifestations for the purpose of filling gaps in our knowledge and in this way bring experience into unity and cohesion. "A hypothesis is *disproved* if from the same result consequences which clash with the actual conditions. A hypothesis is *weakened* if there are manifestations which are in connexion with the assumptions made, but which cannot be deduced as consequences of the hypothesis. It is *strengthened* if further consequences of the same are found to coincide and agree with the actual circumstance" (Sjöstedt: Formal Logic). Hypothesis can in such a way become a real certainty and acquire a demonstrable character. But it need not necessarily be true. As a so-called working hypothesis are often used uncertain assumptions for the purpose of simplifying the condition of affairs.

However, all research can, even if no objection can be raised to its methodics, become unfertile if the postulation of questions is impossible or the answer returned already lies in the question

asked. In his critical views of the modern Uppsala Philosophy Hj. Lindroth deals with this matter. He quotes that "there are two different ways of asking, one of them of a scientific nature, the other metaphysical. The natural scientist postulates for example the question what chemical qualities occur by a chemical union of the fundamental substances A and B. It would be unscientific if he tried to get from the very question the answer, and if, e. g., he reasoned thus: The fundamental substance A possesses the qualities a, b and c; the fundamental substance the qualities x, y, z, therefore the chemical union of A and B must have the sum of the said qualities, neither more nor less. The method of procedure is unscientific, first and foremost in so far as the propounding of the problem itself does not purport the asking of a real question. If the answer is already analytically contained within the question, it is no question but a seeming question. The whole may have the appearance of research, scientific work, production of fresh experiences, but is a feigned movement. The real scientist does, however, not proceed in this way. At the moment of asking he has no answer contained in the question. He pursues the road of experiment. He stands full of expectation before the answer which will be given him. The actual, i. e. the answer given by reality itself to a real question, is synthetical."

The terms "analytical" and "synthetical" used in this connexion have reference to judgments and must certainly be distinguished from the analytical and synthetical method mentioned in the preceding. An analytical judgment or answer to a question tells us in the best case nothing new but may lead us astray, but a synthetical one widens our experience. An analytical method may very well give, and does mostly give, a synthetical answer. In order to take an example very similar to the one quoted in the preceding it may be mentioned that if we want to investigate what water is, we proceed analytically, we divide it into hydrogen and oxygen, we have gained a fresh experience, we have received a synthetical answer.

The question is now, does odontological research satisfy the demands that may be made upon all research, and which have here been outlined insufficiently and very briefly? To this question only the production of work which odontology has performed in the form of treatises, monographs and papers, can give the answer. The scrutiny and the criticism to which a published work is exposed entails that faulty methods or ways in putting

a question are not allowed to pass muster without any further ado, and the cross-fire to which a treatise is exposed, at least in the Nordic countries, prevents to the utmost degree its being passed if any weighty reasons in any one of the directions cited or in any other way can be directed against it.

It may be remarked that the treatises that have seen the light of day in Sweden, are few. It may then be pointed out that here one may talk about more or less primitive dental art for quite a long time past — this holds in fact good about the rest of the world — but odontology which has systematically tried to investigate the bases for carrying out the art can hardly be talked about until the scientific union, the Swedish Dental Society, began to bear fruit, or at the establishment of the educational institution, The Dental Institute. It is, therefore, hardly older than the century in which we live.

We must also recollect that a dentist is not entitled to have a treatise discussed until after dispensation or seeking the position of teacher at the Dental Institute, a thing that has not contributed towards inspiring the appearance of treatises, and that our relatively small country, with only one educational institution, when it is a question of the quantity of the treatises, cannot compete with the large civilised countries. As regards quality, no well-founded objection can very likely be raised against the same. On the contrary, the thorough treatment which each one separately has devoted to his subject, and the testimony accorded to them before the forum which has had to judge them as treatises for the award of the degree of doctor of medicine, show that they satisfy the severe demands made upon them.

The dental art of to-day, or odontology, which latter term corresponds to the tasks of this profession and its aims and objects, fulfils therefore the demands which from an objective and formal point of view may be made upon a science. We are then entitled to lay down that it is a science. It is based upon the fundamental principles: Anatomy, histology, physiology, pathology, bacteriology, roentgenology, etc. and it is trying by itself to develop these subjects within its particular branch.

In the practical application it must further come into relation with such branches as chemistry, metallography and physics, whose part knowledge it considers from a view point for its task. All this shows that, like medicine, it is a complex science, or when it concentrates upon its special task, is nothing else than a part

of medicine, a speciality which necessitates fundamental knowledge within the said branches.

This is not meant to say that dental education should be arranged on the pattern of medicine such as this is at present laid down, or that such an education or training would be ideal for the dentist, for education is a form of imparting knowledge which more and more according to development is bound to undergo modifications. Besides, medicine has to solve its own problems in regard to education and training. This is shown by the discussion on this matter which some years ago took place in Sweden. Reference may also be made to the view points relating to education in both medicine and odontology, which have been put forward by U. Hylin, and published in the Inquiry of the Committee of the Swedish Dental Society, appointed on the 31st January, 1931, regarding the question if and to what degree the education of dentists in Sweden should be reformed". The Fédération dentaire internationale (F. D. I.) has also dealt with this question and published its findings in its bulletin for the year 1931 (translated and published in the Journal of the Swedish Dental Union for the year 1933). At the parliamentary session in Sweden the question regarding re-organisation of the education and training of dentists was again taken up and a Bill introduced into the Houses of Parliament.

To organise the teaching of dentists under such circumstances in a form that is ready to collapse, would certainly not be fortunate. Nor would it be rational, for a great deal of what is now being taught in the medical section would be of very little or no value to the dentist, *but act as an encumbrance.* But that on the other hand the dentist is in need of increased medical knowledge in some branches, can very likely not be denied by anybody.

But a dealing in detail with this interesting question would take us too far and outside the subject.

If we now sum up we find that the art of dentistry, from originally being in the nature of a handicraft, has developed into a systematic knowledge not only of the teeth but also of the masticatory apparatus as a whole — into odontology.

The scientifically founded art of dentistry is then equivalent or synonymous with odontology if we interpret this word in its most far reaching sense.

Odontology — from the Greek odous, possessive odontos = tooth, and logos = doctrine or teaching — has been defined as "the science of the teeth in a healthy and diseased condition". This definition must be considered as being too circumscribed, for odontology cannot only deal with the separate tooth or the sum total of teeth but the complex of organs which the teeth together constitute and which is termed the masticatory organ or denture, with factors affecting the same. If it does not do so there will occur an interfering gap which cannot be bridged over with the aid of any other science.

Nor is the preceding definition elucidating, since the terms health and sickness are conceptions difficult of definition, and no distinct border exists between them. Many circumstances which may be detrimental to, or at least diminish the function of the denture, have otherwise no reference to health or sickness.

From the discussion it is seen that odontology is something more than the mere translation of what the name indicates.

But also from another point of view it is something more than can be gathered from the name, for if the word is interpreted in its widest sense, it will embrace not only a science within a certain sphere but also the practical application of this science. These conceptions are in respect of odontology intimately connected with one another, and to separate them would be just as difficult as to separate surgical science from its practical application.

A condition for the practitioner to attain the best result is that he has benefited by the results of research, and the investigator gets material and openings through all the cases which in practice have passed in review before his eyes, and he himself has an opportunity to observe the changes from case to case, which, of course, is of vast importance for the solution of this question.

Odontology can now, after this analysis, be defined as the science *dealing with the masticatory organ and maintaining it in its optimal function.*

## Summary.

The author gives first a brief historical review of the development and evolution of odontology. In doing so he has not been able to avoid in the more primitive stage of this science to make use of the term "art of dentistry" or "dental art".

This history has been written with an orientation purpose.

As it is a question of ascertaining what odontology is, the historical development and evolution cannot serve as a safe foundation to build upon, for development and evolution may err and during different periods move in different directions.

If the term odontology shall be capable of determination it must be seen from the view point of its task. The task of odontology cannot, as the name indicates, be limited to a knowledge of the separate tooth or all the teeth. It is impossible to draw a line. The teeth taken together must be considered as a uniform organ in which the elements composing the same must be seen in relation to one another, to the surrounding tissue and to the general organism.

In principle odontology can, therefore, never become anything else but a part of medicine. The maintenance of a difference is only justified by practical reasons or, in other words, by the different methods which the disciplines of these two employ. The problems of the masticatory organ have in essential parts as yet been incapable of solution by the methods employed by medicine. Therefore, odontology has developed other methods for this purpose. It has collected its knowledge and made it into a systematic whole. Without this knowledge a troublesome gap would be caused in medical science. By its systematics and its necessary place in the greater connexion odontology fulfils the claims which in the first instance can be made upon a science.

Since the terms health and sickness are conceptions difficult of definition, but all medical work is aimed at maintaining the function of the different parts of the organism, *odontology may be defined as the science dealing with the masticatory organ and maintaining it in its optimal function.*

Odontology has in doing so to try to investigate this organ from a morphological and physiological point of view, and correlated parts of the organism, to try to determine causes and prevent those diseases and anomalies which may befall the organ, and, if they have broken out, to discover, treat and cure them, and to replace lost teeth in so far as this is of importance for the functioning of the organ.

## Zusammenfassung.

Der Verf. gibt vorerst einen kurzgefassten historischen Rückblick über die Entwicklung der Odontologie. Für das primitivere Sta-

dium dieser Wissenschaft konnte er nicht umhin, den Ausdruck »Zahnheil-Kunst« anzuwenden.

Dieser einleitende geschichtliche Überblick mag zur Orientierung dienen.

Wenn es sich indes darum handelt, das Wesen der Odontologie klarzustellen, kann die geschichtliche Entwicklung keine sichere Grundlage bieten; denn der Werdegang einer Wissenschaft kann oft den rechten Weg verfehlen und in verschiedenen Epochen verschiedene Richtungen einschlagen.

Wenn man zur Bestimmung des Begriffes Odontologie kommen will, muss man ihre Aufgabe in Betracht ziehen. Die Aufgabe der Odontologie kann nicht auf das Wissen um den einzelnen Zahn oder um eine Anzahl von Zähnen beschränkt werden, wie es sich in der Bezeichnung »Odontologie« ausdrückt. So lässt sich das Gebiet nicht umgrenzen. Die Gesamtheit der Zähne ist vielmehr — und zwar im Zinne eines einheitlichen Organes — in der Vordergrund zu stellen. Gleichzeitig müssen die in diesem Organ enthaltenen Elemente in ihren Beziehungen zueinander, zu dem sie umgebenden Gewebe und zum Allgemeinorganismus betrachtet werden.

Ihrem Wesen nach kann die Odontologie deshalb niemals etwas anderes sein als ein Teil der Medizin. Die Aufrechterhaltung einer Trennung hat ihre Berechtigung nur in praktischen Gründen oder mit anderen Worten in den verschiedenen therapeutischen Methoden, die die beiden Disziplinen anwenden. Das Problem des Kauorgans konnte in wesentlichen Teilen noch nicht durch die Methoden gelöst werden, deren sich die Medizin bedient. Darum hat die Odontologie zu diesem Zweck andere Methoden entwickelt. Sie hat jedenfalls ihr Wissen zu einem systematischen Ganzen vereinigt. Ohne dieses Wissen würde eine störende Lücke in der medizinischen Wissenschaft entstehen. Durch ihre Systematik und ihren notwendigen Platz in dem grösseren Zusammenhange erfüllt die Odontologie die Forderungen, die an eine Wissenschaft in erster Linie gestellt werden müssen.

Da Gesundheit und Krankheit schwer definierbare Begriffe sind, aber alle ärztliche Tätigkeit darauf hinausgeht, die Funktion der verschiedenen Teile des Organismus aufrechtzuerhalten, kann die Odontologie als die Wissenschaft vom Kauorgan und die Bewahrung seiner optimalen Funktion definiert werden.

Die Odontologie hat dabei zu versuchen, dieses Organ und die in Beziehung zu ihm stehenden Teile des Organismus vom mor-

phologischen und physiologischen Gesichtspunkte zu erforschen, und die Ursachen von Krankheiten und Anomalien, die das Organ treffen können, zu bestimmen, ihnen vorzubeugen, bezw., wenn sie schon ausgebrochen sind, sie zu entdecken, zu behandeln und zu heilen, und schliesslich für verlorene Zähne in dem Masse Ersatz zu schaffen, als es für die Funktion des Organismus von Bedeutung ist.

## Résumé.

L'auteur donne d'abord une brève revue historique du développement et de l'évolution de l'odontologie. Ce faisant, il n'a pas pu éviter pendant l'epoque primitive de cette science d'employer le terme "l'art dentaire".

Cette rétrospective est faite pour orienter le lecteur.

Comme il s'agit de définir l'odontologie, le développement historique ne peut être un fondement suffisant. Le développement et l'évolution peuvent faire des écarts et poursuivre des directions différentes au cours des différentes périodes.

Si l'on veut être à même de définir l'odontologie on doit la considérer du point de vue de ses buts. L'effort de l'odontologie ne peut pas, comme le nom l'indique, se limiter à la connaissance des différentes dents ou de toutes les dents. Il est impossible d'y faire une limite. Les dents dans leur ensemble doivent être considérées comme un organe uniforme dans lequel les éléments qui le composent doivent être vus dans leurs relations les uns avec les autres, ainsi qu'avec les tissus environnants et avec l'économie générale.

En principe l'odontologie ne peut donc jamais être autre chose qu'une branche de la médecine. Le maintien d'une différence n'est justifié que par des raisons pratiques, ou en d'autres mots, par les différentes méthodes employées dans l'exercice des deux disciplines. Des problèmes essentiels pour l'organe masticateur n'ont pu encore être résolus par suite des procédés employés en médecine.

Aussi, l'odontologie a-t-elle eu recours à d'autres méthodes. Les connaissances acquises ont été rassemblées et érigées en système. Sans elles il y aurait un gouffre inquiétant dans la science médicale. Par ses systèmes, et sa place indiscutable dans l'ensemble de la médecine l'odontologie remplit les exigences qu'on peut avoir en premier lieu sur une science.

Puisque les termes de santé et de maladie sont difficiles à définir, et la médecine s'est toujours efforcé de maintenir la fonction des divers organes, l'odontologie peut être définie comme la science traitant de l'organe masticateur et du maintien de sa fonction optimale.

Pour y parvenir l'odontologie doit s'appliquer à étudier cet organe des points de vue morphologique et physiologique, ainsi que les parties corrélatives de l'économie; essayer de déterminer et de prévenir les causes de maladies et d'anomalies qui peuvent affecter cet organe; et s'ils se sont installés, de les découvrir, de les traiter et de les guérir, et enfin de remplacer les dents perdues quand cela a de l'importance pour la fonction de l'organe.

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