

The Significance of the Term "Bite-analysis" in Modern Dentistry.

By

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In recent years we have been coming across the term "bite-analysis" more and more frequently, particularly in Swedish odontological literature.

I wish to point out that in trying to elucidate the term and its significance, I am merely enlarging on the lectures I have held at previous Scandinavian congresses about the "term balanced occlusion" (Stockholm 1926), "the importance of balanced articulation in the treatment of marginal paradentitis" (Helsinki 1932), and the illustration of the meaning of this term by reports of cases treated, and X-ray photography of the mandibular joints (Oslo 1936). It is possible that "bite-analysis" may not be the most adequate or even suitable term, but since it was first coined by me in 1935—36 it seems to have been fairly generally adopted. I think therefore, that as a more popular overall term for the manipulations which we undertake with a view to studying a case before commencing treatment, I am justified in keeping it.

What then do we mean by *bite-analysis*?

The term can of course be used in a more or less limited sense.

Literally and in the widest sense we mean merely the study of the human bite, without specifying any purpose.

In formulating the term *bite-analysis* what I had in mind more particularly was primarily an examination, by all means at our disposal, of the human bite from the point of view of *articulation* and particularly *loading*. It is obvious that in this

connection all factors which contribute to the satisfactory functioning and healthy condition of the bite, must be taken into account.

Thus an examination of this kind should precede and form the foundation not only of every *prosthetic treatment* but also of the (surgical) *treatment of paradentopathies*, in fact I do not even hesitate to say that *bite-analysis* of this kind should precede *orthodontic treatment*. The purely *conservatory treatment* of a bite should also be based on a careful preliminary study of conditions of articulation. Finally we come to the large group of *arthrosis of the mandibular joints*, for which bite-analysis is often of decisive importance.

Bite-analysis in this sense should therefore include: 1) the recording of as complete an *anamnesis* as possible, 2) a complete *X-ray status* of all the teeth, 3) a careful *examination of the condition of the mouth*, 4) a *study cast of the teeth*, 5) a *study of occlusion and articulation* based on these models to bring to light possible irregularities in the articulation movements, which in their turn may give rise to over- or underloading of individual or whole groups of teeth, and finally 6) guided by the knowledge gained the *preparing of a plan of treatment* for reconstructing the whole bite in such a manner that physiologically its function comes as close to the ideal state as possible.

1) As to the *anamnesis* this should include not only those factors which concern the purely odontological side such as caries frequency, hygiene of the mouth, the appearance of the gum, the nature of the saliva, frequency and appearance of tartar, formation of pockets, suppuration, type of bite etc., but also the purely social background should be included. Internal medical factors which can be connected with the mouth status should also be carefully noted, and it is often advisable to cooperate with a physician, who can examine the blood, metabolism, vitamin percentage and possible hormonal deficiency etc. — It is quite evident that it is through cooperation between medicine and odontology that we may hope to find a solution to the deep mysteries with which we have to confess that we are still confronted even if we have in some respects been able to catch a small glimpse of the truth.

2) There is not much to be said about *X-ray status* in this connection, except that it should give *clear* and correct images of *all the teeth* in the mouth. Furthermore these images should

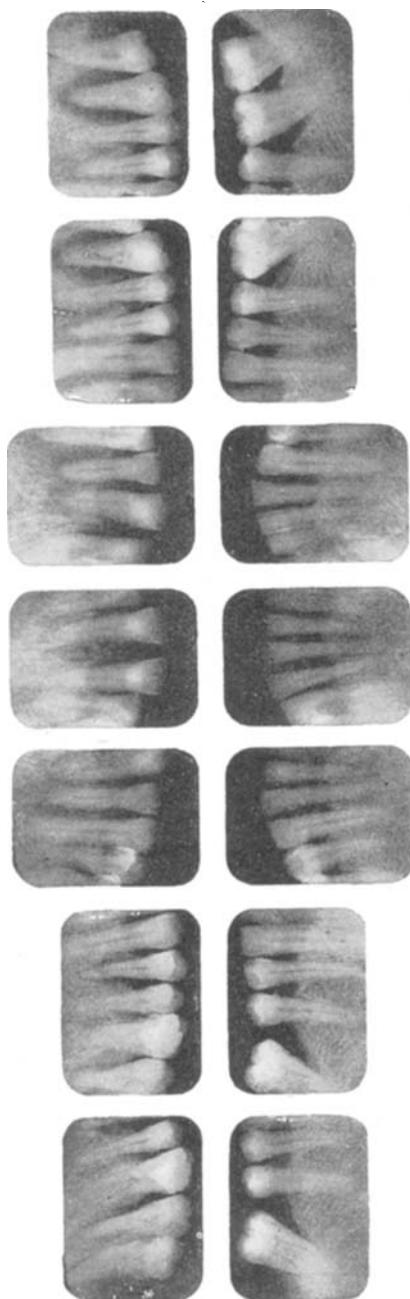


Fig. 1.

be mounted in such a way that they give a clear and unbroken picture of both rows of teeth with their parodontal areas. Mounting is unfortunately not always as good as it might be, it being often necessary to twist and turn the status in order to follow the course of for instance a bone atrophy through the whole bite. (Fig. 1.)

It should in this connection be pointed out that X-ray status, particularly as regards parodontal changes, is only a gauge of how serious or how far advanced the disease is, if it is correlated with the other items of information in the anamnesis . . . particularly the patient's age. The question of race and hereditary characteristics in certain families should also be taken into consideration.

3) The examination of the *condition of the mouth* should include such conspicuous external factors as the colour and nature of the gum, the degree of firmness of the teeth, type of bite, general hygiene of the

Fig. 1. Proper mounting of X-ray films. The contour of the alveolar bone can be followed all through the mouth and thus get an idea of horizontal or vertical bone-atrophy.

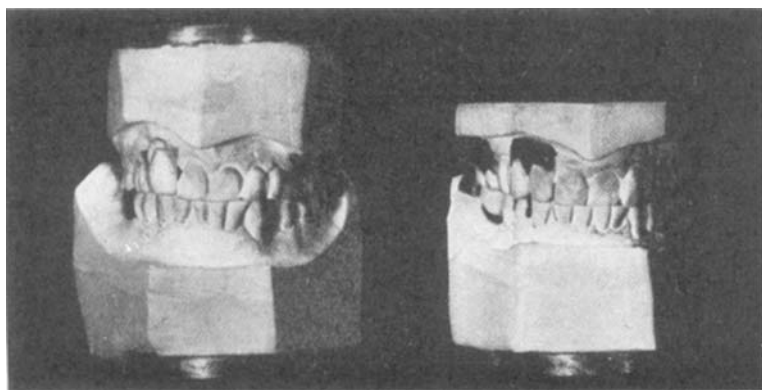


Fig. 2. Study models mounted in articulator rings.

mouth, formation of tartar, suppuration, if there are any pockets, their depth and so on.

4) *Via* the so-called *study-models* we come to the actual study of the *bite*. One would think that it was obvious that the models must be exact reproductions of the rows of teeth, but one comes across many offences against this rule. It is not only the purely occlusal details which should be absolutely exactly reproduced in the model, it should also be possible to follow the marginal gum contours on the model. Consequently the only impression-material which can be used for such study-models is plaster of Paris or the more convenient forms of colloidal material such as dentocoll, surgident or the latest forms known as alginates. (Fig. 2.)

It must be obvious that it is easier to study the position of the teeth and any irregularities which may occur, such as abrasive surfaces, cusp-trauma etc., on an exact study-model than in the mouth itself. At quite an early stage ÖSTMAN also pointed out that it was useful to note for instance the depth of pockets and degree of firmness of the teeth on such models.

With the aid of these study-models how is one to study articulation and any upsetting of its balance (articulation balance as THIELEMAN calls it) which may occur? Is it possible, by placing these models on each other and, guided by the details of the occlusion surfaces, let them slide on each other, to gain an impression of what is taking place in the mouth?

In my opinion only on *very broad lines*. In this assertion, which I justified as far back as 1932, I am definitely opposed to other

authors in this field. In my works, published later, on the importance of the mandibular joint for articulation balance, I think I have succeeded in offering clinical proof which suggests that this assertion is correct.



Fig. 3. In occlusal contact the lower jaw rests against the upper and the condyles are in rest position in the fossae and under no load.

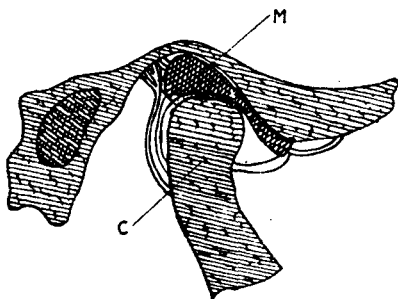


Fig. 4. Condyle in central occlusion (Schem. drawing).

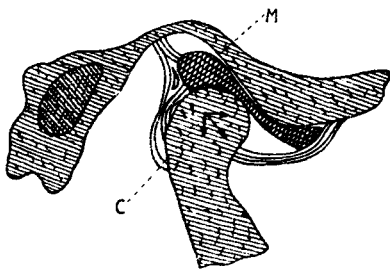


Fig. 5. Condyle in starting opening movement (Schem. drawing).

Those who represent the other view state that the mandibular joint is of no primary importance for the articulation movements and that these are entirely guided by the details of the occlusion surfaces in the teeth.

None can deny that such guidance of the mandible does take place, but that these movements and the path which the condyle simultaneously describes in the mandibular joint should conform, this should be self-evident to anyone who has studied these problems and from his clinical experience been able to ascertain that such really is the case.

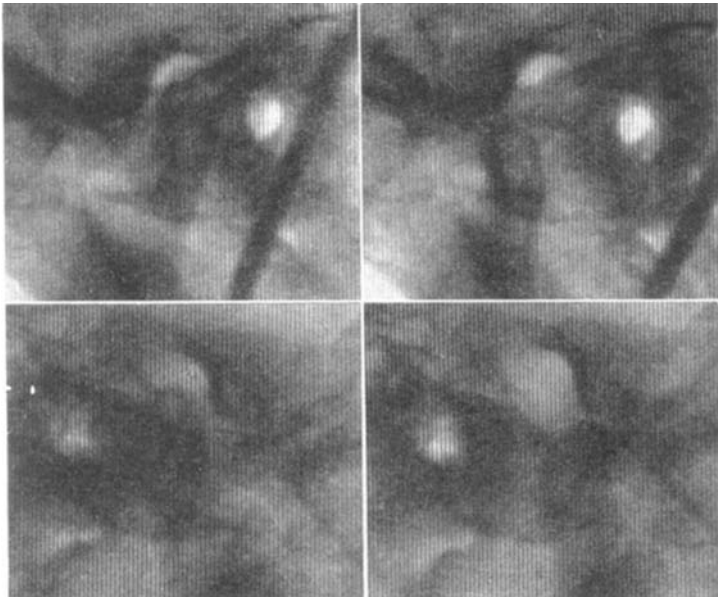


Fig. 6. X-ray picture of left and right Temp. mand. joint in a normal bite, showing condyles in rest position and in maximal opening.

I stated in 1932, more in the form of an assertion, based on clinical experience and logic, that a *centric occlusion* (*i. e.* when both jaws are biting tightly together with all cusps clenched) *need not necessarily conform to the correct central relation* (which I call the *real*, or relaxed central occlusal relation as distinguished from what I call the *habitual* central occlusal relation). This should now have been proved by X-ray studies of the Temp.-Mandib. joint undertaken in recent years both by myself and other authors in accordance with the method which I introduced in 1935. (Figs. 3, 4, 5 and 6.)

If a single tooth (or several) is malpositioned, thereby causing the formation of a cusp-trauma for the mandible, then the latter is forced by this cusp-trauma into a *habitual* position, and if this displacement of the mandible is fairly conspicuous (forwards, backwards or to either side) it will be demonstrable by an X-ray of the mandibular joint. It is easy to demonstrate whether or not the mandible is guided by the occlusal surfaces into a malposition by comparing the X-ray photographs of the patient's mandibular joints, both when they are completely

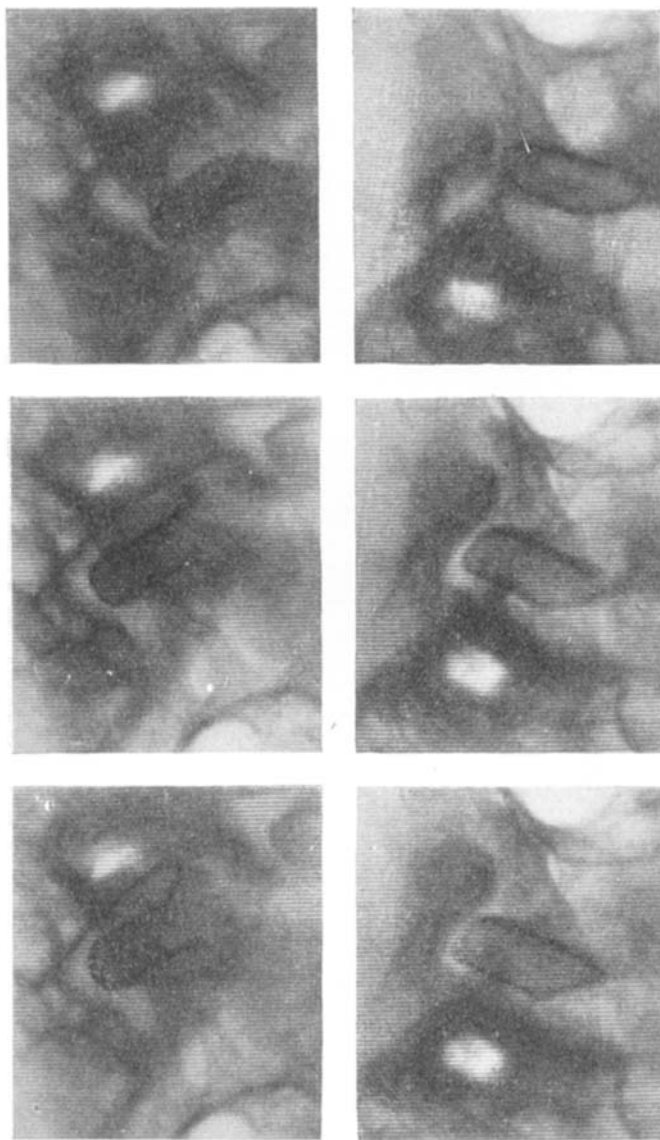


Fig. 7. Shows the difference between "habitual" and "relaxed" centric occlusion. From left to right in upper row the right condyle, in lower row the left in habitual (biting tightly together), in relaxed rest position and finally in maximal opening position.

clenched, and when their central occlusal relation is so relaxed that the cusps of the teeth do not touch each other, thereby avoiding any guiding of the cusps. I would advise those who are interested in this discussion but still doubtful, to turn to my other works

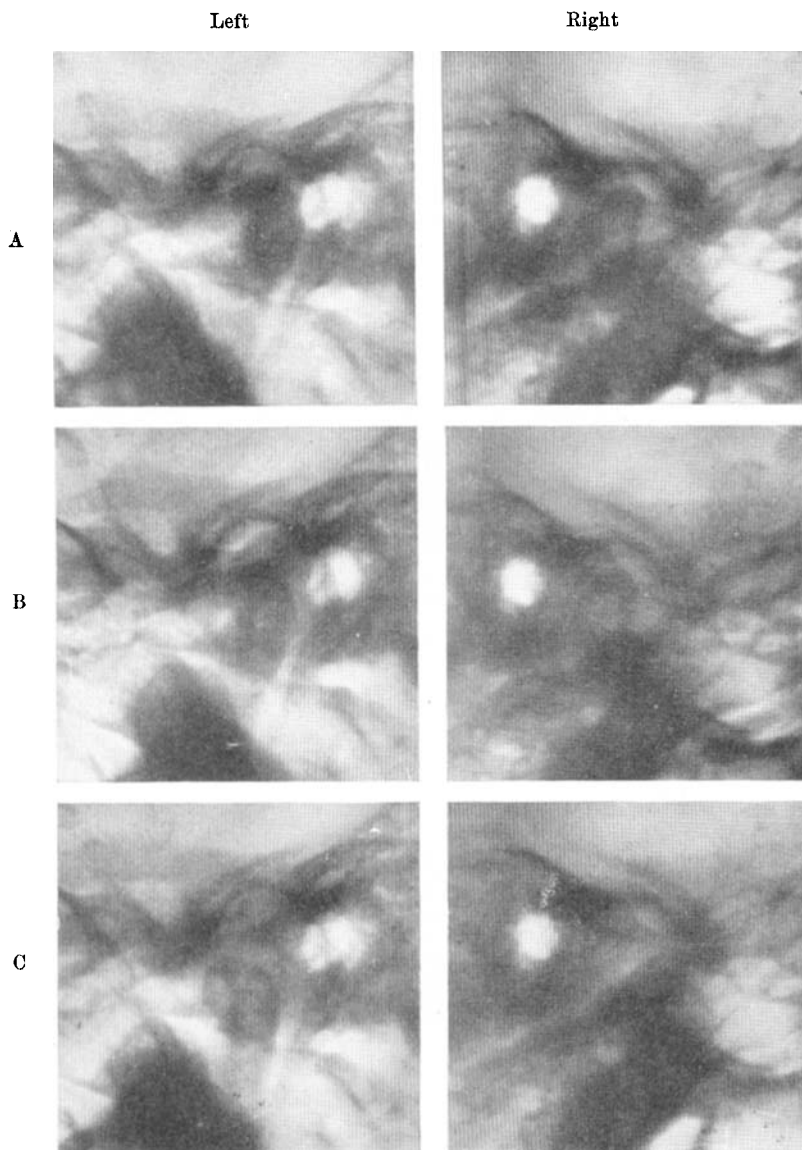


Fig. 8. Shows the faulty position of left condyle in habitual occlusion "A" in a case of arthrosis. The left condyle is forced upward and backward in the fossa due to cuspal interference in the traumatic occlusion. "B" shows the symmetric and right position in both joints in relaxed and corrected jaw position. When this position was fixed by mouth rehabilitation, the symptoms from the left joint disappeared. "C" shows maximal and symmetric opening position.

in this field for further justification of the argument. (Figs. 7 and 8.)

The logical consequence of this whole reasoning is that the study-models cannot give a correct interpretation of what is taking place in the mouth during the act of articulation, unless they can be mounted in an instrument (an articulator), in such a relation to each other that any cusp-trauma which may occur are not allowed to misguide the mandible. In other words: *the models must not be mounted in a habitual central occlusal relation but in the relaxed or real central occlusal relation* ("Rest position" — THOMPSON).

For this reason bite-analysis must in my opinion *be performed with study-models mounted (by means of a face-bow) in an individually adjustable articulator*, in which the path of the condyle can be copied with a necessary degree of accuracy. It is not possible to obtain complete accuracy with such an instrument, nor is it desirable because there are bound to be errors in the registering procedure carried out on the patient.

I cannot in this connection enter into the purely technical manipulations, and the difficulties involved in transferring the models to the articulator, but I should nevertheless like to state that I am quite convinced that not only is the *intraoral method of registration* not frighteningly difficult to master but also that it gives far superior results compared to the *extraoral method*.

After the models have been inserted in the articulator in accordance with the above mentioned principles it is now possible to perform the actual bite-analysis or study of the upset articulation balance and of how this is to be restored.

There are different ways of doing this:

In the case of a bite without any defects of the teeth it is possible with blue-paper to demonstrate on the models the presence of possible cusp-trauma, which can then be removed by scraping. The work of grinding the bite in the mouth is considerably facilitated by noting tooth by tooth *where* and *how much* of the tooth is to be ground. Furthermore there is no risk of grinding too much or in the wrong place in the mouth. As far back as 1932 I called attention to the great importance of the grinding of the bite as a preventive treatment against the appearance later of a paradentopathy, which in the course of analysis is often demonstrable at this early stage. Developments also appear to have confirmed that bite-analysis will be the most important weapon in the battle against the paradentopathies. It is I think

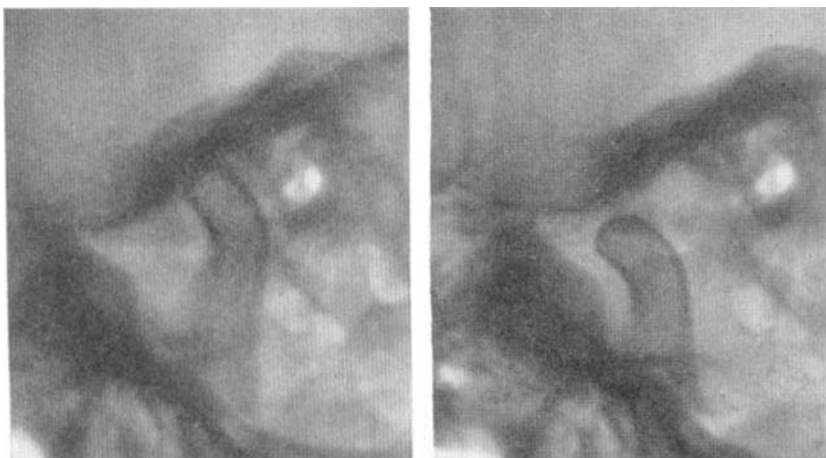


Fig. 9. Shows the typical shape of the condyle and the fossa in a "normal bite"
—left in centric occlusion, right in 2 cm. opening position.

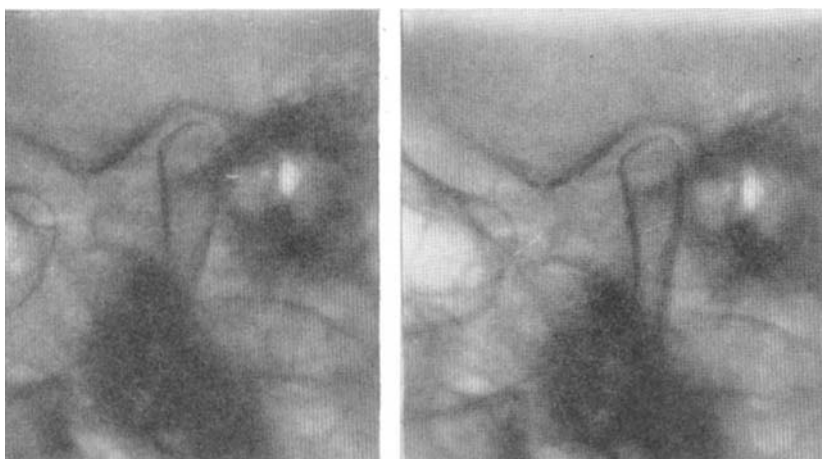


Fig. 10. Shows the typical shape of the condyle and the fossa in an "edge-to-edge bite"—left in centric occlusion, right in 2 cm. opening position.
Notice the shallow fossa and the blunt condyle.

by now generally accepted, that loading — particularly overloading — is the factor in the formula of this disease, which we can influence most certainly and effectively.

This kind of bite-analysis should of course precede every kind of prosthetic work, as it is hereby possible to avoid locking

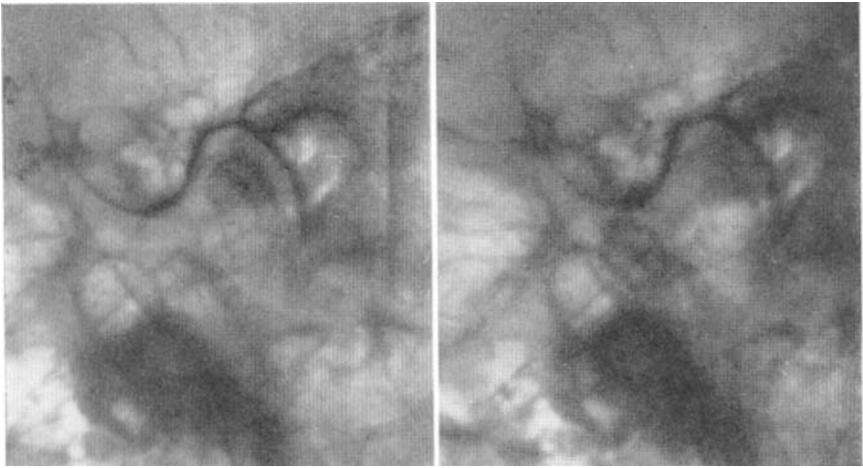


Fig. 11. Shows the typical shape of the condyle and the fossa in a genuine "deep bite"—left in centric occlusion, right in 2 cm. opening position. Notice the very deep fossa with almost vertical slope and the very limited space in sagittal direction.

the bite in a position where the loading is incorrect. By studying the models in the articulator and X-ray photographs of the mandibular joint it is possible in advance to make a differential diagnosis between a *deep* and a *sunk* bite. In other words whether the "bite is to be raised" in connection with the prosthetic work which is to be undertaken, in which case how much, or if the increase of vertical dimension should be accompanied by a sagittal adjustment of the lower jaw in relation to the upper.

I need hardly point out how important it is that one is sure how to act in a case of this kind before commencing treatment.

The studies of the mandibular joints of such cases which I have undertaken have quite definitely shown that a deep bite usually has a form of joint which practically only permits a hinge-joint movement with a very inconsiderable sagittal adjustment of the mandible. A sunk bite on the other hand is often followed by a distal displacement of the mandible (demonstrable by X-ray), if the bite is raised in such a case the lower jaw *automatically* protrudes, but only as far as the joint permits. It is I think in such a case customary to perform a haphazard sagittal adjustment of the mandible allowing oneself to be guided merely by a desire to get a good intercuspal relationship between the two rows of teeth. This may however lead to considerable

misjudgements, which in their turn may very seriously affect the bite. (Figs. 9, 10 and 11.)

Finally I should like to stress the importance of performing bite-analysis with the greatest care so as to understand how a comprehensive reconstruction of the bite can and should be performed. Such an analysis will then enable us to plan our therapy in a way which we have not been able to before.

A well thought out plan based on the study-models makes it possible to work out ahead and often by stages a therapy, with which we know that when we *do* reach the final stage the result will not be haphazard from a functional point of view but just what we planned from the beginning.

It would be tempting to elaborate this theme, but I think that from what has been hinted every practitioner with a sense of responsibility must realise that we in our profession have at last got a *firm foundation* to stand on. Just as an architect plans all the details for the building of a house, from the investigation of the foundation to the smallest constructional detail, so that he knows *beforehand* what the house is going to look like, we dentists of today can carefully think out and plan in advance the solution of a case. We have in fact in the reconstructed study-models not only a model of the finished product, but also a direct guidance for the work of preparation. We can see *how much* each tooth must be ground or straightened in order that when the treated mouth is ready it shall give satisfactory balanced articulation and its function come as near to the ideal as possible. This is perhaps the task of bite-analysis which is of the most far-reaching importance for odontology today.

Practical Application of Above Mentioned Ideas.

When the bite-analysis has been carried out to plan for a bite rehabilitation of an actual case, according to what has just been described, the next difficulties will be how to carry out all the technical procedures in the patient's mouth and in the laboratory without losing the exactness of the plan and without introducing new possibilities of error through repeated transfer- and wax-record operations.

During more than ten years daily routine work the following scheme has been worked out to enable the operator to carry out his reconstructive work — may be in intervals if necessary —

taking into consideration above mentioned points of view. During the reconstruction work he thus uses all the time the *first* face-bow transfer and wax-records taken when the bite-analysis was performed with the study models.

The finished case will be as identical as possible to the planned reconstruction, and the function in the mouth will correspond in minute details to the one in the articulator. The finer so called spot-grinding has of course to be performed in the mouth after the patient's wearing the reconstructions for some days.

An outline for operations in a hypothetical case, where both cusp interference prevents the lower jaw from acquiring the right centric relation, and prosthetic reconstructions have to be undertaken in upper as well as in lower jaws:

1. Study casts of the upper and lower jaws are prepared in dental stone — — — called models A.

These are copied in duplicate models B.

2. Upper model A. is transferred by means of face-bow to an individually adjustable articulator, whereupon the upper model B. also is transferred to the instrument in identical position — — — this time not using the face-bow but a so called remounting block.

3. Lower model A. is transferred to articulator and mounted against the upper model A. by an intra-orally taken wax-record in relaxed centric occlusion (also called the rest-position of the mandible).

By means of the same wax-record the lower model B. is also mounted to the articulator, and then replaced by model A.

4. When now closing the jaw members of the instrument, until occlusal details of the teeth come in contact (wax-records taken away), eventual cusp-interference that has dirigated the mandible into a false centric occlusion (s. c. "habitual centr. ocel.") will easily be detected, and can also be corrected by scraping on corresponding teeth. Careful notation about these corrections is made tooth by tooth.
5. Condylar inclination is registered by intra-oral wax-record transferred to the articulator, and the Bennet movement adjusted in regular way.
6. The models are now finally adjusted for balanced articulation by further scraping on disturbing cusps, or adding blue inlay-wax on lacking contact surfaces. The upper model A. is thus shaped to ideal compensating curve, and the

occlusal details of molars and bicuspid carved to ideal forms to be used later on when building up the lower reconstructions.

7. In the articulator a light-metal splint is now built upon the lower incisors, that secures the upper incisors in a fixed position when the right centric relation is performed. If the vertical dimension has to be increased on purpose — may it be with or without sagittal adjustment of the mandible — this is also secured and fixed at this stage by the metal guide.
8. Preparations of all abutment teeth in the lower jaw are executed, and a working model C. is poured in dental stone in which the corresponding dies have been transferred in the regular way. (Should the reconstruction also include the incisors, these teeth have to be left out at this stage to enable the operator to use the metal guide in the front — see next step — and the preparation of these teeth must be postponed until the reconstructions of the bicuspid- and molar region are finished and temporarily cemented. Then the front is reconstructed.)
9. A wax-record (best in Aluwax) is now taken in the patient's mouth. The soft wax only placed in the bicuspid-molar-region and the lower jaw directed into right position by the metal guide in the front region.
10. In the articulator the upper model A. is now changed for the untouched model B.
11. Against this model B. the stone model C. of the prepared lower jaw is mounted in the articulator by means of the chilled wax-records and the metal guide.
12. Now replace upper model B. with the corrected model A.
13. Against this model A. the reconstructive work in the lower model are built up in wax and corrected to perfect balanced articulation — necessary corrections being carried out also in the wax details of upper model A.
14. The castings are made in usual manner, tried in mouth separately and finally (if bridges) soldered together and finished to a half-polished state. They are now cemented temporarily to place, and a wax-record taken in mouth against the upper jaw, using the metal guide in the front.
15. An impression (in plaster, Dentocol or Alginate) is taken of the lower jaw, and a stone-model poured — model D.

16. This model D. is mounted in the articulator against the upper model B. by means of the wax-records and the metal-guide (the working model C has been taken out from the instrument).
17. All preparations in upper jaw are carried out with exception of event. preparations upon the central incisors; dies of the individual preparations are produced and transferred in regular way to a working stone-model — model E.
18. New wax-records (in Aluwax) are taken in the mouth, placing the soft wax in bicuspid-molar region and using the metal guide in the front.
19. By means of the chilled wax-records and the metal guide the model E. is transferred to the articulator against the model D.
20. The reconstructions are modelled in wax and articulated to balance against model D. Investing, casting, trying in mouth and soldering together as usual.
21. The reconstructions in upper jaw are placed in mouth in a half-polished way and left there (temporarily cemented) for some time for finer adjustments. Small shining spots will indicate where to "spot-grind" to create a perfect articulation.
22. If the central incisors in the upper jaw also have to be prepared and included in the reconstruction work, this has to be done now.
23. The reconstructions are now taken out from the mouth, one at a time, finished and polished definitely for permanent cementation.

Zusammenfassung.

Der Ausdruck »Gebiss-Analyse« (bettanalys), der um 1935 vom Verfasser eingeführt wurde, hat in der heutigen zahnärztlichen Welt ein weit verbreitetes Interesse gefunden. Er stammt aus einem tiefen Verstehen der physiologischen Funktionen des Kauapparates und aus der Ansicht, dass die Aufgabe des modernen Zahnarztes nicht nur darin besteht, Einzelheiten im Mund des Patienten wiederherzustellen, sondern vor allem, die einwandfrei balancierte Funktion der Kiefer als Ziel für die Routinearbeit zu haben.

In diesem Sinne ist die »Gebiss-Analyse« der fundamentale Grundstein in der modernen Zahnheilkunde, und sie sollte jedem Unter-

nehmen von Seiten des Zahnarztes vorausgehen, sowohl der konservierenden Behandlung, der Zahnfleischbehandlung, den Prothesenfällen, den ortodontischen Fällen oder der Behandlung irgend einer Arthrose in den Kiefergelenken.

Folgende Momente sind in dem Ausdruck »Gebiss-Analyse« einbegriffen: 1) Anamnese, 2) vollständige Röntgenuntersuchung, 3) digitale und okulare Inspektion der Mundverhältnisse, 4) Anfertigung eines Studienmodells über die Zähne, 5) Montieren desselben in einen individuellen, stellbaren Artikulator, um etwaige Höckertrauma oder andere Störungen in der harmonisch balancierten Okklusion zu entdecken und wiederherzustellen, und schliesslich 6) als Ergebnis dieser Untersuchungen, das Ausarbeiten eines Schemas für die geplante Behandlung.

Der Verfasser unterstreicht besonders die Bedeutung der *Ruhelage der Mandibel* (schon 1932 von ihm beschrieben), d. h. wenn sie schlaff ist und die Zähne sich nicht berühren, und er betont, dass die »gewöhnheitsmässige Zentrallage« sehr oft gar nicht mit der *wirklichen (abgeschlafften) Zentrallage* übereinstimmt, weil die Mandibel von den okklusalen Details gelenkt wird.

Der Unterschied zwischen diesen beiden Lagen der Mandibel können leicht und genau festgestellt werden, wenn man sich bei der Röntgenaufnahme der Lage der Kondyle in dem Temporo-Mandibulargelenk einer speziellen Methode bedient, die vom Verfasser ausgearbeitet und bereits 1935 beschrieben worden ist.

Durch diese Methode ist es leicht, die wirkliche vertikale Dimension festzustellen, sowohl bei einem *ganz unbezahnten Fall* als auch bei *einem Fall von sog. Bisshebung*; die grösste vertikale Dimension steht immer in einem gewissen Verhältnis zu einer bestimmten Lage der Kondyle in der Fossa.

Weiterhin ist es möglich, eine einwandfreie Differentialdiagnose zu stellen zwischen einem ursprünglichen »tiefen Gebiss« und einem sog. »gesenkten Gebiss«. Das Erstere ist öfters mit einer sehr tiefen Fossa glenoidalis verbunden und mit einer praktisch genommen vertikalen oder steilen Kondylenbahn; deswegen würde eine Steigerung der vertikalen Dimension in einem solchen Falle in einer einfachen Scharniergelenkbewegung resultieren, mit sehr kleiner, wenn überhaupt irgendwelcher sagittalen Bewegungsmöglichkeit.

In gleicher Weise ist es möglich mittels Röntgenaufnahmen zu entdecken, ob die Kondyle auf Grund einer Malokklusion auf der

einen oder auf beiden Seiten eine falsche Lage in der Fossa einnimmt und dadurch irgend eine Störung in der Funktion der Gelenke hervorruft (sog. Arthrose).

Zum Schluss erklärt der Verfasser die Bedeutung der *Gebissanalyse* dadurch, dass er eine Parallele zwischen dem heutigen Zahnarzt und einem Architekten zieht. Letzterer bereitet sehr sorgfältig das Bauen eines Hauses vor. Er prüft zum Beispiel den Grund, macht Zeichnungen, sowohl in grossen Zügen als auch im kleinsten Detail, bevor er den Bau beginnt, u. s. w.

In genau der gleichen Weise muss der Zahnarzt alle Umstände, die auf das Ergebnis Einfluss haben können, durchaus erforschen und prüfen. Durch sein rekonstruiertes Studienmodell wird er betreffend der Präparation u. s. w. in die Detailarbeit eingeführt, und es wird ihm auch möglich, das endgültige Ergebnis von vielleicht vieler Jahre mühsamer Arbeit voraus zu sehen, bevor er seine rekonstruierende Arbeit im Munde beginnt.

Résumé.

Le terme «analyse d'articulation» (bettanalys), introduit par l'auteur environ 1935, a gagné un grand intérêt dans la profession dentaire d'aujourd'hui. Il tire son origine d'une compréhension plus profonde de la fonction physiologique de l'appareil masticatoire et de l'idée que la mission du dentiste moderne n'est pas seulement de raccommoder des détails dans la bouche du client mais avant tout d'avoir une fonction parfaitement balancée des mâchoires comme le but de son travail de routine.

Dans ce sens «l'analyse d'articulation» est la pierre fondamentale dans l'odontologie moderne et il devait précéder chaque intervention du dentiste, s'il fait des opérations conservatrices c'est-à-dire le traitement périodontique, prothétique, orthodontique ou le traitement de quelque façon d'arthrose dans les joints mandibulaires.

Les divers examens compris par le terme «analyse d'articulation» sont 1) anamnèse, 2) état radiographique complet, 3) inspection digitale et oculaire des conditions de la bouche, 4) reproduction des dents en plâtre, 5) montage de celles-ci dans un articulateur individuellement réglable pour découvrir et corriger du cusp-trauma éventuel ou d'autres perturbations de l'occlusion balancée harmonieuse et enfin 6) comme le résultat de ces recherches, la composition d'un projet du traitement.

Surtout l'auteur fait remarquer l'importance de «l'état de repos» de la mâchoire (décrit par lui dès 1932), c'est-à-dire lorsqu'elle est relâchée et les dents ne sont pas en contact et il rappelle que très souvent «la relation centrale habituelle» ne coïncide pas avec la relation centrale réelle (relâchée), à cause de la conduite de la mâchoire par les détails occlusaux.

La différence entre ces deux positions de la mâchoire peut être diagnostiquée aisément et exactement par l'emploi d'une méthode spéciale en faisant des radiographies de la position du condyle dans le joint temporo-mandibulaire, composée par l'auteur et décrite dès 1935.

Par cette méthode c'est facile à déterminer la dimension verticale propre dans un cas de prothèse complète ainsi que dans un cas soi-disant d'occlusion élevée, puisque la dimension verticale véritable est toujours à ranger parmi une certaine position du condyle dans la fosse.

En outre il est possible de faire un diagnostic différentiel correct entre un cas «d'articulation profonde» véritable et un cas soi-disant d'articulation descendue. L'un est le plus souvent combiné avec une fosse articulaire très profonde et un cours presque vertical; par conséquent une augmentation de la dimension verticale dans un tel cas aura pour résultat presque une charnière — un mouvement du joint avec une très petite possibilité éventuelle d'un mouvement sagittal.

De la même manière il est possible de découvrir par la radiographie, si le condyle est déplacé dans la fosse, unilatéralement ou des deux côtés, à cause de malocclusion, en causant quelque trouble dans la fonction propre des joints (soi-disant arthrose).

Enfin l'auteur explique l'importance «d'analyse d'articulation» en établissant un parallèle entre le dentiste d'aujourd'hui et un architecte. Celui-ci approche très prudemment le bâtiment d'une maison par exemple en investigant le fond, en faisant des dessins de la maison, généralement ainsi que dans le plus petit détail, avant qu'il commence de bâtir, etc.

Exactement de la même manière il faut au dentiste explorer et investiger minutieusement toutes les conditions qui peuvent influencer sur son résultat et il est aidé par ses modèles reconstruits dans son travail de détail par égard pour les préparations etc., et aussi il peut anticiper le résultat final de peut-être beaucoup d'années de travail pénible avant le commencement de son travail de reconstruction dans la bouche.

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