



THESIS

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INTRODUCTION.

The nature and purpose of the series of articles submitted in the following collection require a few words of explanation.

The problems concerned in the investigations are, in some respects, not a closely related series. But it is obviously incorrect to assume that any dental problem is, in itself, exclusive. For all, of what are conveniently termed operative or prosthetic procedures, are concerned with basic matters of dental anatomy, physiology and pathology; and ultimately, especially if the investigation or its application be carried out on scientific lines, any problem cannot help but impinge upon, or be connected with, some other aspect of dental knowledge or practice.

Thus the varied nature of the work is due to the fact that the subjects under study arose from practical rather than academic considerations and each was the outcome of a problem important enough

to demand serious attention, in spite of the years of work and development already accomplished by other investigators.

For instance, the need for an efficient, practical and scientifically planned matrix for the operation of filling teeth is one which is almost as old as the practice of tooth restoration itself. Yet from a study of both textbook descriptions and existing designs of this appliance, it can be seen that the matter of matrix development has been slow, laborious and mostly ineffective. And even among the most recent suggestions and appliances, much is left to be desired. On the whole there is abundant evidence to show that the usual types of matrices do not permit accurate results being accomplished for the operation concerned. For many years, the problem of an improved matrix has been a matter of continued thought and experiment by the present writer; the account of this study is here described.

On the subjects of the use of both hydro-colloid impression materials and the so-called

impression 'pastes', some other circumstances prompted the writer to intensify his investigations. These important materials, which have in recent years revolutionized certain sections of prosthetic dentistry techniques, are relatively modern acquirements to our equipment. As mostly happens, these particular dental materials were first developed overseas and for some time no locally manufactured supplies were available. Also, they were new materials and to secure the most benefit from their advantages over older materials, there was obviously much to be learnt in their usage. To the conscientious worker this is not to be accomplished from the mere reading of manufacturer's advertisements and pamphlets.

In the case of hydrocolloid impression material, the imported products, and even the Australian manufactured article, were marketed at a cost which made usage of such material an expensive item for large sized institutions like hospitals and dental schools. The present investigation on hydrocolloid material solved many aspects of the problem for local institutional work where, for

some years, it has been made and used with very satisfactory results.

The War precipitated the problem of these new materials into a serious position. Overseas supplies became scarcer or non-existent. Australian manufacturers were slow to take up the making of these particular products; also certain constituent materials were difficult to secure locally. Thus, in connection with work at the University Dental School we were faced with the situation of either falling back on the older and less satisfactory products of plaster and composition for impression work or solving the problem by devising the new materials for ourselves.

The results of the work entailed in formulating, testing, and using hydrocolloid materials, and later of devising improved formulas, are set out in the following pages. A similar situation arose with the urgent problem of impression pastes, an account of which forms another section of this compilation.

Instrument sterilization, although quite a different problem, was also accentuated by war.

conditions. Delicate instruments such as hand-pieces became difficult to replace and it was necessary to take extra care of such articles. It was soon apparent that the usual methods of sterilization in boiling water and chemical solutions caused considerable damage, particularly to instruments with fine cutting edges and delicate mechanism -- much more than actual usage. Expensive autoclaves are not completely satisfactory for general dental use and are part of the equipment of but few dentists. The present writer, therefore, felt justified in undertaking an investigation of the care and sterilization of dental instruments, not only in the interests of public health but also in the desire to prevent wastage of valuable equipment.

There is no need to stress in detail how various aspects of these problems are closely inter-related theoretically and practically. Concerning the form in which the following papers is presented it must be pointed out that the published matter represents only a portion of the

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account of the investigations carried out. Journal space was not available for any lengthy or detailed account of the research involved. Therefore, in addition to the published pages, typewritten matter is included to precede or supplement the printed journal extracts.

With reference to the subject matter entailed in the research in its relation to those subjects set down, for example, in M.D.S. regulations, and implied to a still greater degree for post graduate work entailed for higher requirements, the following points may be considered. While it is not possible or necessary to elaborate on the many and varied subjects involved in the research, it is fairly obvious that the investigation on matrices, for example, involved studies in tooth form, the behaviour of various materials used for suitable matrix bands, considerable workshop study and experiments in devising the mechanical design convenient for a suitable simple working instrument. Furthermore, in the practical application of the idea and design of my new matrix appliance,

considerable time was spent in actual usage under mouth conditions in surgery work. Here the principles of dental operative procedures were intimately concerned.

The same applies to the studies on both the hydrocolloid impression material and on impression pastes. The experimental work in devising and testing various formulae, involved considerable study of, and reference to works on chemistry and physics and on laboratory and mouth tests. Also the work on sterilization, which involved the problem of the prevention of rust and corrosion of metal instruments, embraced the subjects of metallurgy and physical chemistry and consultation with University and Oil Company departments.

It is claimed that the writer's design for an improved matrix and matrix usage constitutes a definite advance on all other forms of appliances and provides a simple, adequate and scientifically planned method of operative procedure.

Furthermore, the work involved in the years of investigation herein described has been carried

out in conjunction with both hospital and private practice. And thereby the application of these studies and their practical usages to the instructional work in training dental students -- with whom the writer has been intimately associated for many years -- has been of appreciable advantage in providing dental education with a useful knowledge in the developments and the trends of dental science and practical procedures.