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Final Progress Report

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by

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## The Determination of Masticatory Efficiency and its Controlling Factors

### Introduction

A research program covered by the above title was initiated by a grant from the Office of Naval Research on November 1, 1947. The program has been in progress continuously until October 1, 1953.

Essential basic information in the field of oral physiology was lacking in 1947. Since that time considerable advancement has been made in understanding the problems of masticatory efficiency. In spite of the many difficulties that arose in studying the physiological aspects of mastication, a great deal of progress has been made, new procedures have been developed, and new instruments utilized.

### Summary of Results

The research accomplished has been of a theoretical, laboratory, and clinical nature. It has dealt in the main with persons possessing a natural dentition, although some work was accomplished on prosthetic appliances.

Among the problems studied under this contract we can cite the following:

1. The development of a method for determining masticatory efficiency utilizing various types of test foods.
2. An electronic instrument suitable for measuring maximum biting force has been developed.
3. An instrument for measuring occlusal contact area that is effective in mastication has been developed. It is of use in predicting the masticatory efficiency of a given individual by a simple, rapid, laboratory technique.
4. Techniques for measuring tactile sensitivity of teeth and of the mucous membrane surfaces have been accomplished and reported.

5. Procedures for evaluating size and hardness discrimination have been accomplished on both natural and artificial denture wearers.
6. A study has been accomplished which measures the actual forces used by denture wearers during mastication.
7. An instrument for measuring clinical mobility of teeth has been developed and reported on.
8. Information regarding the effects of tooth loss on masticatory performance and efficiency and swallowing threshold has been pointed out.
9. Information concerning the effectiveness of full denture prosthesis has been reported.
10. Information regarding the effectiveness of partial denture prosthesis has been reported.
11. Comparisons regarding the effectiveness of fixed and removable unilateral prosthesis have been evaluated.
12. Data regarding systemic effects that result from a deficient dentition have been reported.
13. The influence of full denture prosthesis on food enjoyment has been evaluated.
14. Factors influencing the size of particles swallowed or swallowing threshold in both natural and artificial dentitions have been evaluated.
15. Studies in the physiology of mastication have been conducted.
16. Factors effecting masticatory efficiency such as occlusal contact area, salivary flow, oral dexterity, masticatory force, size of bolus, hunger, height of cusps, etc. have been evaluated and reported.

For more detailed information we wish to refer you to the progress reports submitted to date and also the following list of publications.

#### Plans for Future

No plans are being made at present since we are terminating.

#### Publications and Reports

1. A. H. Howell and R. S. Manly, An Electronic Strain Gauge for Measuring Oral Forces, J. Dent. Res., 27: 6, 705-712, December 1948.

2. A. Yurkstas and R. S. Manly, Measurement of Occlusal Contact Area Effective in Mastication, American J. of Orthodontics, 35: 3, 185-195, March 1949.
3. A. Yurkstas and R. S. Manly, Value of Different Test Foods in Estimating Masticatory Ability, J. of Applied Physiology, 3: 1, July 1950.
4. R. S. Manly and F. R. Shiere, The Effect of Dental Deficiency on Mastication and Food Preference, Oral Surg., Oral Med., and Oral Path., 3: 5, 674-685, May 1950.
5. R. S. Manly and P. Vinton, A Survey of the Chewing Ability of Denture Wearers, J. Dent. Res., 30: 3, 314-321, June 1951.
6. R. S. Manly, A. Yurkstas, and J. B. Reswick, An Instrument for Measuring Tooth Mobility, J. of Periodontology, 22: 148-155, July 1951.
7. A. Yurkstas, H. H. Fridley, and R. S. Manly, A Functional Evaluation of Fixed and Removable Bridgework, J. Prosthetic Dentistry, 1: 5, 570-577, September 1951.
8. A. Yurkstas, Compensation for Inadequate Mastication, British Dental Journal, November 1951.
9. R. S. Manly, Factors Affecting Masticatory Performance and Efficiency Among Young Adults, J. Dent. Res., 30: 6, 874-882, December 1951.
10. R. S. Manly, Carl Pfaffman, Donald D. Lathrop, and Joan Keyser, Oral Sensory Thresholds of Persons with Natural and Artificial Dentitions, J. Dent. Res., 31: 3, 305-312, June 1952.
11. A. Yurkstas and W. A. Curby, Force Analysis of Prosthetic Appliances During Function, J. Prosthetic Dentistry, 3: 1, 82-87, January 1953.
12. Commander L. F. Abel and R. S. Manly, Masticatory Function of Partial Denture Patients Among Navy Personnel, J. Prosthetic Dentistry, 3: 382-392, May 1953.
13. W. A. Curby, A Simplified Instrument for Measurement of Food Platform Area, J. Dent. Res., 32: 3, 328-331, June 1953.
14. A. Yurkstas, Force Analysis of Prosthetic Appliances During Function, New York State Dental Journal, 20: 1, 31-32, January 1954.
15. A. Yurkstas, The Effect of Missing Teeth on Masticatory Performance and Efficiency, J. Prosthetic Dentistry, 4: 1, 120-123, January 1954.

16. A. A. Yurkstas and W. H. Emerson, A Study of Tooth Contact During Mastication with Artificial Dentures, J. of Prosthetic Dentistry, 4: 2, 168-174, March 1954.
17. Donald B. Giddon, M. E. Dreisbach, Carl Pfaffman, and R. S. Manly, Relative Abilities of Natural and Artificial Dentition Patients for Judging the Sweetness of Solid Foods, J. of Prosthetic Dentistry, 4: 2, 263-268, March 1954.

There are several other papers in various stages of completion that will be published in the near future. These include:

1. Sauser, C. W. and Yurkstas, A. A., The Effect of Occlusal Surface Configuration on Masticatory Efficiency, J. of Prosthetic Dentistry.
2. Yurkstas, A. A., Minor Factors Effecting Masticatory Efficiency and Swallowing Thresholds, J. of Dent. Research.

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