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TECHNICAL REPORT
EPT-5

FOOD ACCEPTANCE AND PREFERENCE RESEARCH: AN ANNOTATED BIBLIOGRAPHY

PIONEERING RESEARCH DIVISION

July 1965

U. S. Army Materiel Command
U. S. ARMY NATICK LABORATORIES
Natick, Massachusetts

FOOD ACCEPTANCE AND PREFERENCE RESEARCH
AN ANNOTATED BIBLIOGRAPHY

by

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U. S. Army Natick Laboratories

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INTRODUCTION

The 293 items cited in this bibliography represent recent (1950 to 1964) contributions to the rapidly growing fields of food acceptance and preference research and related areas. Particular emphasis has been placed on the work of individuals associated with the former Food Acceptance Branch of the Armed Forces Food and Container Institute, in Chicago.

This bibliography is intended for the use of those persons engaged in government, consumer, or scholarly research programs in which the accurate sensory measurement of acceptance and preference values is the direct or indirect goal.

There are 173 annotated entries. Most of these are items published in the scientific and technical journals of relevant subject areas -- food science and technology, psychology, and marketing research.

The other 120 entries are reports published by several of the branches of the U.S. Government. The titles of the reports are descriptive of their contents and they are not annotated. Although these publications are not generally available in public or university libraries, reprints if available may be obtained by writing to: Head, Acceptance Laboratory, Psychology Laboratories, Pioneering Research Division, U.S. Army Natick Laboratories, Natick, Massachusetts.

The Acceptance Laboratory plans to periodically update the bibliography to include those works which have appeared since the compilation was completed. Additions to this bibliography will be welcomed. Please send the annotated items to the above address.

The bibliography is divided into four major sections and subsections when necessary. Items are listed alphabetically by author within each subsection. A brief description of the type of item contained within each section is included before the section listings.

Cross referencing will be done only between major sections. Since the government reports are not listed by subject, relevant government publications will be listed before each major section.

Acknowledgement

The authors wish to thank the following former members of the staff of the Acceptance Branch at the QMFCI for their assistance:

J. Eindhoven
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H.G. Schutz

Abbreviations

Amer.J.Clin.Nutrition	American Journal of Clinical Nutrition
Amer.J.Psychol.	American Journal of Psychology
A.S.Q.C.	American Society for Quality Control
ASTIA	Armed Services Technical Information Agency
C.F.T.R.I.	Central Food Technological Research Institute
FEA	Field Evaluation Agency, Ft. Lee, Va.
Food Eng.	Food Engineering
Food Technol.	Food Technology
Int.J.Air Poll.	International Journal of Air Pollution
J.Amer.Stat.Assn.	Journal of the American Statistical Association
J.appl.Psychol.	Journal of Applied Psychology
J.comp.physiol.Psychol.	Journal of Comparative and Physiological Psychology
J.consult.Psychol.	Journal of Consulting Psychology
J.exp.Psychol.	Journal of Experimental Psychology
J.Food Sci.	Journal of Food Science
J.Psychol.	Journal of Psychology
MSG	Monosodium Glutamate
Percept.mot.Skills	Perceptual and Motor Skills
Psychol.Reports	Psychological Reports
P.T.C.	Phenylthiocarbamide
QM	Quartermaster
QMC	Quartermaster Corps

QMFCI	Quartermaster Food and Container Institute
QMR&D	Quartermaster Research and Development
QMFEA	Quartermaster Field Evaluation Agency
QMRE	Quartermaster Research and Engineering
RADC	Randolph Air Development Center
WADC	Wright Air Development Center, Dayton, Ohio

I. SENSORY STUDIES

A. GENERAL

Studies concerned with the testing of sensory processes in general and the testing of specific senses other than taste and smell are of value because of the many similarities and contrasts among the sensory processes. It is also apparent that there are interrelationships among the senses which may affect the acceptance or preference for a particular food item. (See also: 198)

B. TASTE

1. Part 1 contains those studies which are concerned with the measurement of the sensitivity and thresholds of individuals for particular taste substances. Physiological and chemical as well as psychophysical studies are included.

2. Part 2 includes studies of flavor and the variables which enhance or diminish a particular flavor.

3. Part 3 contains those studies which discuss the psychological variables which influence taste. This part is related to section II-B in which studies which report the influence of variables on the acceptance or preference for a food item, not the taste of a particular flavor component of that item. (See also: 81, 82, 128, 178, 205, 185, 217, 221, 222, 234, 238, 252)

C. OLFACTION

This subsection includes studies on the sense of smell, especially as it relates to the tastes and preferences of different food items. (See also: 224, 242, 252)

I. SENSORY STUDIES

A. GENERAL

GIRARDOT, N.F., D.R. PERYAM & R. SHAPIRO. 1952. Selection of sensory testing panels, Food Technol., Vol. VI, No. 4, 140-143. 1.

The concept "panel" is used in this paper in the specific sense which limits it to groups with special qualifications which are used for special purposes.

HAMMER, F.J. 1951. The relation of odor, taste, and flicker-fusion thresholds to food intake, J.comp.physiol.Psychol., Vol. XLIV, No. 5, 403-411. 2.

The present experiment was designed to check Goetzl and Stone's work on odor thresholds and to determine if diurnal fluctuations also occur in taste and visual thresholds.

HARPER, R. 1958. Psychological aspects of laboratory work, Laboratory Practice, Vol. VII, No. 10, 578-580. 3.

Part I: General introduction intended simply to orientate the reader to what is to follow.

Part II: A psychological approach to the problems of measurement; consideration of reliability and validity and their relevance to the broader problems of laboratory practice. (Vol. VII, No. 11, 648-651.)

Part IV: The psychophysical methods and laboratory practice. A synopsis of the methods and their functions. (Vol. VIII, No. 1, 17-20.)

PERYAM, D.R. 1958. Sensory difference tests, Food Technol., Vol. XII, No. 5, 231-236. 4.

Concerned mainly with certain methods which are commonly accepted as difference tests.

PERYAM, D.R. May, 1957. Factors affecting the accuracy and reliability of sensory tests, from Proceedings of the 11th National Convention American Society for Quality Control. 5.

A general inquiry into the factors involved in sensory tests, by using review and discussion rather than exposition.

PERYAM, D.R. 1954. New Manual sets forth standards for sensory testing, Activities Report, Vol. V, No. 4, 263-268. 6.

This article discusses the development of a manual for the purpose of finding reliable tests to determine compliance either at the stage of the awarding of subsistence contracts or in checking compliance at time of delivery.

WENZEL, B.M. 1954. The chemical senses, Annual review of Psychol., Vol. V, No. 1, 111-126. 7.

"Sensation is subjective. Nobody can touch or measure anything that is subjective. Sensation is unique for any particular person. It is dealt with by the psychologist."

B. TASTE

1. MEASUREMENT

ANDERSON, C.D. 1955. The effect of subliminal salt solutions on taste thresholds, J.comp.physiol.Psychol., Vol. XLVIII, No. 3, 164-166. 8.

Attempts to determine whether the general rule of ion effects holds for taste.

BEEBE-CENTER, J.G., M.S. ROGERS & D.N. O'CONNELL. 1955. Transmission of information about sucrose and saline solutions through the sense of taste, J.Psychol., Vol. XXXIX, 157-160. 9.

Three experiments carried out concerning the transmission of information about simple and compound solutions.

BEIDLER, L.M. 1952. Our taste receptors, The Scientific Monthly, Vol. LXXV, No. 6, 343-349. 10.

Because of the location of man's gustatory and olfactory receptors it is possible to sample both the food ingested and its aroma.

DZENDOLET, E. 1962. Electrical stimulation of single human taste papillae, Percept.mot.Skills, Vol. XIV, No. 2, 303-317. 11.

Explanation of mechanism of "electric taste".

FISCHER, R. & F. GRIFFIN. 1959. On factors involved in the mechanism of 'taste-blindness', Separatum Experientia, Vol. XV, No. 11, 447-448. 12.

Variations in taste sensitivity are associated with genetic variations controlling the amount and composition of the soluble enzyme system, tyrosine iodinase of the soluble enzyme system.

FISCHER, R. & F. GRIFFIN. 1960. Factors involved in the mechanism of "taste-blindness", J.Heredity, Vol. LI, No. 4, 182-183. 13.

See item 12.

FOURMAN, V.G. December, 1955. Taste panels for pharmaceutical flavors, Drug & Cosmetic Industry. 14.

It is important to know what to reject as well as what to select.

FURCHTGOTT, E. & W.W. WILLINGHAM. 1956. The effect of sleep-deprivation upon the thresholds of taste, Amer.J.Psychol., Vol. LXIX, No. 1, 111-112. 15.

Investigations show that deprivation of sleep does not affect any of the sensory functions except pain -- which is depressed.

FURCHTGOTT, E. & M.P. FRIEDMAN. 1960. The effect of hunger on taste and odor RLs, J.comp.physiol.Psychol., Vol. LIII, No. 6, 576-581. 16.

The effects of hunger have great variability in the influence on the RL's of taste and odor.

GRIFFIN, F. & R. FISCHER. 1960. Differential reactivity of saliva from 'tasters' and 'non-tasters' of 6-n-propylthiouracil, Nature, Vol. CLXXXVII, No. 4735, 417-419. 17.

Concerns taste in general and taste blindness in particular.

IRVIN, D.L. & F.R. GOETZL. 1952. Diurnal variations in acuity of sense of taste for sodium chloride, Proceedings of the Society for Experimental Biology and Medicine, Vol. LXXIX, 115. 18.

Concludes that changes in thresholds relate to changes in sensory acuity and may in turn relate to sensations of hunger or satiety.

KAMEN, J.M. 1959. Interaction of sucrose and calcium cyclamate on perceived intensity of sweetness, Food Research, Vol. XXIV, No. 3, 279-282. 19.

At moderate solution concentrations, the perceived intensities of the mixtures are significantly higher than the intensities of the pure solutions.

KAMEN, J.M., F.J. PILGRIM, B.J. KROLL & N.J. GUTMAN. 1961. Interactions of suprathreshold taste stimuli, J.exp.Psychol., Vol. LXII, No. 4, 348-356. 20.

An investigation of taste interactions.

MACLEOD, S. 1952. A construction and attempted validation of sensory sweetness scales, J.exp.Psychol., Vol. XLIV, No. 5, 316-323. 21.

An attempt to assess the validity of sweetness scales based on fractional judgments of one-half.

MEYER, D.R. 1952. The stability of human gustatory sensitivity during changes in time of food deprivation, J.comp.physiol.Psychol., Vol. XLV, No. 4, 373-376. 22.

Nine human subjects abstained from all foodstuffs for a period of 34 hours, during which time successive determinations of sweet, salt, and bitter thresholds were made at 3-hour intervals.

MITCHELL, J.W. 1956. Duration of sensitivity in trio taste testing, Food Technol., Vol. X, No. 4, 201-203. 23.

With beer as the product and duo-trio as the method of testing, it is shown that five tests can be run in a single session without encountering loss of sensitivity.

PANGBORN, R.M. 1960. Taste interrelationships, Food Research, Vol. XXV, No. 2, 245-255. 24.

Interrelationships among sucrose, citric acid, sodium chloride and caffeine were determined.

SCHUTZ, H.G. 1954. Physiologic need and voluntary food intake -- A QMFCI seminar, Activities Report, Vol. VI, No. 1, 41-44. 25.

Summary of an experiment conducted at the Institute.

SCHUTZ, H.G. & F.J. PILGRIM. 1957. Sweetness of various compounds and its measurement, Food Research, Vol. XXII, No. 2, 206-213. 26.

Sixteen compounds were rated on a subjective intensity scale for sweetness at each of 5 concentrations.

SCHUTZ, H.G. & F.J. PILGRIM. 1957. Differential sensitivity in gustation, J.exp.Psychol., Vol. LIV, No. 1, 41-48. 27.

This study was designed to determine the four basic taste qualities at five levels of intensity.

B. TASTE

2. FLAVOR

BROWN, M.B. & M.C. BOLLMAN. 1959. The use of monosodium glutamate in pre-cooked frozen meals, Quick Frozen Foods, Vol. XXII, No. 3, 231-233. 28.

Ten commercially processed precooked frozen meals, packed with and without MSG were submitted to a comparative preference study.

DRAKE, M.P., B.J. KROLL & F.J. PILGRIM. 1960. Radiation flavor -- fact or fancy, Science, Vol. CXXXII, No. 3437, 1394-1395. 29.

The changes caused by radiation are quite apparent to man's olfactory and gustatory senses.

GIRARDOT, N.F. &. D.R. PERYAM. 1954. MSG's power to perk up foods, Food Eng., Vol. XXVI, No. 12, 71-72, 182, 185. 30.

Many studies have substantiated that MSG has a very definite effect on consumer preference for many foods.

KURTZ, G.W. 1957. Flavor, Activities Report, Vol. VIII, No. 4, 287-290. 31.

Here flavor is defined as that complex of sensations resulting from the stimulation of the senses of taste, odor, feel and sometimes vision and audition.

LOCKHART, E.E. & J.M. GAINER. 1950. Effect of MSG on taste of pure sucrose and sodium chloride, Food Research, Vol. XV, No. 6, 459-464. 32.

Eight experienced judges of tested sensitivity were used to determine the possible enhancement of supraliminal sweetness and saltiness by subliminal concentrations of monosodium glutamate.

MOSEL, J.N. & G. KAMTROWITZ. 1952. The effect of MSG on acuity of the primary tastes, Amer.J.Psychol., Vol. LXV, No. 4, 573-579. 33.

Results showed that 'Ac'cent' and 'Zest' greatly increased acuity to salt and no effect to sugar.

PERYAM, D.R. 1950. Quality control in the production of blended whiskey, Industrial Quality Control, Vol. VII, No. 3, 17-21. 34.

Chemical tests are by comparison to panel tests but gross predictors of flavor.

PERYAM, D.R. 1950. Measurement and control of flavor quality, Proceedings of 4th National Convention A.S.Q.C., June 1, 1950. 35.

"Quality control can apply to almost anything that is manufactured, at least wherever it is possible to evaluate in terms of good and less good".

PERYAM, D.R. 1955. Monosodium glutamate and food flavors, Quick Frozen Foods, Vol. 17. 36.

The potential of monosodium glutamate for use in improving the acceptability of military rations is discussed.

PERYAM, D.R. & R. SHAPIRO. 1955. Perception, preference, judgment--clues to food quality, Industrial Quality Control, Vol. XI, No. 7, 1-6. 37.

One of three objectives of this article is to gain acceptance of the idea that effective flavor quality control requires use of human observers.

PILGRIM, F.J. & H.G. SCHUTZ. 1955. Influence of monosodium glutamate on taste perception, Food Research, Vol. XX, No. 4, 310-314. 38.

MSG is not a condiment, it does not impart a flavor of its own but serves only to enhance the natural flavors of foods by increasing the sensitivity of the taste receptors.

PILGRIM, F.J. & H.G. SCHUTZ. May, 1957. Measurement of the quantitative and qualitative attributes of flavor, Chemistry of Natural Food Flavors - A symposium. National Academy of Sciences - National Research Council Advisory Board on QMR&D Committee on foods, Chicago, Illinois. 39.

SINGLETON, V.L. & C.S. OUGH. 1962. Complexity of flavor and blending of wines, J.Food Sci., Vol. XXVII, No. 2, 189-196. 40.

Complexity has long been considered a desirable factor in the quality of most flavorsome or odorous products.

SJÖSTRÖM, L.B. October, 1954. The descriptive analysis of flavor, Food Acceptance Testing Methodology, 25-30. 41.

The flavor profile concepts and method, when properly practiced, have some value in the field of food acceptance.

B. TASTE

3. PSYCHOLOGY

FOSTER, D. January, 1952. A new method of predicting the qualities of flavor mixtures, Presented before the Ohio Valley Section of the Institute of Food Technologists. 42.

A method is presented for analyzing all of the psychological properties of any food or beverage product.

GOETZL, F.R., A.J. AHOKAS & J.G. PAYNE. 1950. Occurrence in normal individuals of diurnal variations in acuity of the sense of taste for sucrose, J.appl.Physiol., Vol. II, No. 11, 619-626. 43.

Experiments are described which demonstrate the existence in normal individuals of diurnal variations in acuity of the sense of taste for sucrose.

GRIDGEMAN, N.T. 1957. Aspects of taste, Wallerstein Communications, Vol. XLIV, No. 70, 203-213. 44.

Gustation, the act of tasting is most legitimately used when the topic is food not esthetics.

JONES, L.V. & L.L. THURSTONE. 1955. The psychophysics of semantics: an experimental investigation, J.appl.Psychol., Vol. XXXIX, No. 1, 31-36. 45.

Investigates the "meanings" of terms used on hedonic rating scales.

PANGBORN, R.M. 1959. Influence of hunger on sweetness preferences and taste thresholds, American Journal of Clinical Nutrition, Vol. VII, No. 3, 280-287. 46.

a. Relationship between hunger and sweetness preferences of 11,456 consumers.

b. Taste thresholds under fasting and no fasting conditions.

PANGBORN, R.M. 1960. Influence of color on the discrimination of sweetness, Amer.J.Psychol., Vol. LXXIII, No. 2, 229-238. 47.

The effect of red, green and yellow food coloring on the judged sweetness and flavor of aqueous and nectar solutions was tested by the method of paired comparison.

PANGBORN, R.M., H.W. BERG & B. HANSEN. 1963. Influence of color on the discrimination of sweetness in dry table wine, Amer.J. Psychol., Vol. LXXVI, No. 4, 492-495. 48.

White wines were colored to simulate, sauterne (yellow), sherry (brown), rosé (pink), claret (red), and burgundy (purple).

PANGBORN, R.M. & B. HANSEN. 1963. Influence of color on the discrimination of sweetness and sourness in pear nectar, Amer.J. Psychol., Vol. LXXVI, No. 2, 315-317. 49.

Shows that correct identification of the sweeter sample within pairs was always more frequent in uncolored than in colored nectars.

PERYAM, D.R. 1960. The variable taste perception of sodium benzoate, Food Technol., Vol. XIV, No. 8, 383-386. 50.

The sensory experience aroused by sodium benzoate may be common among all persons, yet responses may be variable because the taste is unfamiliar and ambiguous so that the response is mediated in part in the central nervous system, where it is influenced to a large extent by attitudes and expectations.

PERYAM, D.R. 1963. Variability of taste perception, J.Food Sci., Vol. XXVIII, No. 6, 734-740. 51.

Learning appears to be important in the taste qualities people report for various items.

PFAFFMANN, C. 1961. The sensory and motivating properties of the sense of taste, Nebraska Symposium on Motivation, 71-108. 52.

Deals with low and high intensity sensory studies.

SRINIVASAN, M. 1955. Has the ear a role in registering flavour? The Bull.C.F.T.R.I., Vol. IV, No. 6, 136. 53.

The taste reactions of different subjects (30 tested) to cane sugar and common salt differed with ears closed and ears open.

THOMAS, C.B. & B.H. COHEN. 1960. Comparison of smokers and non-smokers, Bulletin of the Johns Hopkins Hospital, Vol. CVI, No. 4, 205-214. 54.

Explores the frequency of genetic traits among smokers and non-smokers affecting their ability to taste P.T.C.

C. OLFACTION

BAKER, R.A. & R.C. DOERR. 1959. Methods of sampling and storage of air containing vapors and gases, Int.J.Air Poll., Pergamon Press, Vol. II, 142-158. 55.

The object of this study was to determine the effect of various storage techniques and materials on known concentrations of gases in air.

BECK, L.H., L. KRUGER & P. CALABRESI. 1954. Observations on olfactory intensity: 1. Training procedure, methods, and data for two aliphatic homologous series, Annals of the New York Academy of Sciences, Vol. LVIII, Art. 2, 225-238. 56.

A technique for measuring odorous intensity is described.

BEIDLER, L.M. & D. TUCKER. 1956. Olfactory and trigeminal nerve responses to odors, Federation Proceedings, Vol. XV, No. 1, 14. 57.

The responses of the two nerves to odors presented to the nose were simultaneously displayed on a dual beam oscilloscope.

FOSTER, D., E.H. SCOFIELD & K.M. DALLENBACH. 1950. An Olfactorium, Amer.J.Psychol., Vol. LXIII, No. 3, 431-440. 58.

Includes a "Floor-Plan" of the Olfactory Laboratory.

GOETZL, F.R., M.S. ABEL & A.J. AHOKAS. 1950. Occurrence in normal individuals of diurnal variations in olfactory acuity, J.appl. Physiol., Vol. II, No. 10, 553-562. 59.

Experiments show that the decrease in olfactory acuity appeared to depend upon ingestion of food because it failed to occur when meals had been omitted.

GOETZL, F.R., A.J. AHOKAS & M. GOLDSCHMIDT. 1951. Influence of sucrose in various concentrations upon olfactory acuity and sensations assocated with food intake, J.appl.Physiol., Vol. IV, No. 1. 60.

Changes in olfactory threshold values indicate changes in olfactory acuity.

JOHNSTON, J.W. 1960. Current problems in olfaction, The Georgetown Medical Bulletin, Vol. XIII, No. 3. 61.

Arbitrary limit of precision for this experiment is the ability to analyze three primary qualities in a compound with constant dependability by the judges.

JOHNSTON, J.W. & A.B. PARKS. December, 1960. Odor-intensity and the sterochemical theory on olfaction, Proceedings of the Scientific Section of the Toilet Goods Association, No. 34. 62.

Triangle tests are sensory testing at its best and are essential when the differences are near the threshold.

JONES, N.F. 1953. A test of validity of the Elsberg method of olfactometry, Amer.J.Psychol., Vol. LXVI, No. 1, 81-85. 63.

Appears that thresholds obtained by use of the Elsberg or blast-injection technique are not understandable in terms of molecular concentration.

KRUGER, L., A.N. FELDZAMEN & W.R. MILES. 1955. Comparative olfactory intensities of the aliphatic alcohols in man, Amer.J.Psychol., Vol. LXVIII, No. 3, 386-395. 64.

Reports the results of measurements of olfactory intensity for a homologous series of aliphatic alcohols.

MONCRIEFF, R.W. 1957. Olfactory adaptation and odor-intensity, Amer.J.Psychol., Vol. LXX, No. 1, 1-20. 65.

The odor-intensity of a substance is defined as the number of times that its normal odor-threshold concentration is enhanced by one just prior inspiration of the undiluted substance.

NADER, J.S. 1958. An odor evaluation apparatus for field and laboratory use, American Industrial Hygiene Association Journal, Vol. XIX, No. 1, 1-7. 66.

Odors which exist in the atmosphere differ from one another in the type of response they evoke in various individuals.

NADER, J.S. 1958. Current techniques of odor measurement, A.M.A. Archives of Industrial Health, Vol. XVII, No. 5, 537-541. 67.

Proper evaluation of odor on the basis of its definition requires both a measurement of odorant concentration and a measurement of human response.

SAGARIN, E., J. MIDDLETON, J. HIRSH, B.M. WENZEL & D. FOSTER. 1950. Symposium on olfaction, Proceedings of the Scientific Section of the Toilet Goods Association, No. 14. 68.

1. Erroneous literature prompted this study to eliminate fallacious and unverified data concerning olfaction.

2. The proverbial "man in the street" has little or no concern for the physiological basis of the odor sense, but will avoid unpleasant odors and will ring those cash registers which furnish them with desirable odors.

3. Impairment of or distortion of the sense of smell may result from conditions which affect the nasal passages, nasal nerve endings, nerves or the portion of the brain in which the olfactory sense is located.

4. Olfactometry is concerned with the measurement of the strength of olfactory sensations or obtaining a number to represent odor intensity.

STOLL, M. January, 1954. Special problems in odor perception, Drug and Cosmetic Industry. 69.

The odor perception mechanism is one of those unsolved problems which puzzle men of science.

TRACHTMAN, L.E. 1961. Sense of smell, Purdue Research Foundation, Vol. VII, No. 5. 70.

The "messages" sent by the environment are written in many languages and the organism has developed a variety of receptor organs of fantastic sensitivity and complexity with which it can receive and interpret these messages.

TUCKER, D. & L.M. BEIDLER. 1956. Efferent impulses to the nasal area, Federation Proceedings, Vol. XV, Nol. 1, 188. 71.

The electrical activity in this study has been recorded peripherally and centrally from nerves identified as olfactory and trigeminal.

TUCKER, D. & L.M. BEIDLER. 1956. Autonomic nervous system influence on olfactory receptors, Amer.J.Physiol., Vol. CLXXXVII, No. 3. 72.

Efferent nervous activity in the nasal area of the rabbit was recorded on the central side of cut branches of the ethmoidal nerve.

II. FOOD ACCEPTANCE AND PREFERENCE RESEARCH

A. THEORY

Articles and studies describing the basic frames of reference, assumptions, theories and problems of food acceptance and preference research are included.

B. CONTRIBUTING VARIABLES

This sub-section includes studies reporting the influence of specific variables on the judged acceptance or preference for a food item. (See also studies listed below for the following topics:

Attitude	148, 183, 239, 248
Combination of foods	176, 232
Drugs	204
Environment	
Altitude	266, 267, 268, 283
Background	237
Changing	187
Tropics	188, 189, 235
Innovation	247
Personality	275
Radiation	29, 207, 240, 257, 258
Repetition - monotony	243, 244, 245, 259, 283)

C. METHODOLOGY

Included in this sub-section are studies of experimental design and procedure as well as possible statistical analyses to be used with food acceptance and preference tests. (See also: 4, 6, 23, 41, 143, 196, 198, 208, 231, 254, 269).

D. PANEL SELECTION

This sub-section contains studies of the problem of valid selection of a panel to reliably judge food items. (See also: 1, 14, 253).

E. APPLICATIONS TO SPECIFIC POPULATIONS

1. Military - The specific problems of military feeding have been considered in the studies included herein. In addition, almost all of the government reports are applicable to this topic.

2. Consumer - This part contains studies which apply acceptance and preference research principles to the particular problems of consumer behavior. (See also: 229, 251, 274).

II. FOOD ACCEPTANCE AND PREFERENCE RESEARCH

A. THEORY

HARPER, R. 1960. Food assessment and food acceptance as a psychological theme, Occupational Psychol., Vol. XXXIV, No. 4, 233-240. 73.

Attention is drawn to selected problems faced by food acceptance techniques and the study of food acceptance by man.

HARPER, R. 1962. The psychologist's role in food acceptance research, Food Technol., Vol. XVI, No. 10, 70-74. 74.

Reviews ways in which psychological knowledge has contributed, or potentially could contribute, to food sciences.

KAMEN, J.M. 1962. Decision-making by users of food acceptance data, Food Technol., Vol. XVI, No. 1, 48-53. 75.

Here are the results of special questionnaires devised to establish the effect of certain variables on those who use data obtained from food consumption surveys.

KRAMER, A. 1959. Glossary of some terms used in the sensory (panel) evaluation of foods and beverages, Food Technol., Vol. XIII, No. 12, 733-736. 76.

Defines 85 terms concentrating on those frequently used in food testing.

PERYAM, D.R., F.J. PILGRIM & M.S. PETERSON. October, 1954. Food acceptance testing methodology, A symposium sponsored by the QMFCI, National Academy of Sciences - National Research Council. 77.

PERYAM, D.R. 1964. Sensory testing at the Quartermaster Food and Container Institute, Laboratory Practice, Vol. XIII, No. 7, 605-609. 78.

Food acceptance programme is discussed to fully explain working methods of the laboratory.

PILGRIM, F.J. 1953. Acceptance problems -- a summary of the recent QMFCI conference, Activities Report, Vol. V, No. 1, 28-32. 79.

Highlights the importance of the acceptance division.

PILGRIM, F.J. 1957. The components of food acceptance and their measurement, Amer.J.Clin.Nutrition, Vol. V, No. 2, 171-175. 80.

Preference not only predicts the average amount of food consumed in certain situations but also the proportion of persons taking or "accepting" a serving of the food.

B. CONTRIBUTING VARIABLES

GIRARDOT, N.F. & D.R. PERYAM. 1953. Does pepper contribute to food preference?, Food Technol., Vol. VII, No. 5, 205-207. 81.

The effect of omitting pepper from certain foods is explored.

GREGSON, R.A.M. 1963. The effect of psychological expectations on preferences for taste mixtures, Food Technol., Vol. XVII, No. 3, 44. 82.

Mixtures of grapefruit and lemon drinks with different proportions in each were tested for preference then verbal descriptions were matched with samples.

KAMEN, J.M. & J. EINDHOVEN. 1963. Instructions affecting food preferences, Journal of Advertising Research, Vol. III, No. 2, 35-38. 83.

The more a person was told about the purpose of unfamiliar foods, the more he tended to rate them alike.

KAMEN, J.M. & D.R. PERYAM. 1961. Acceptability of repetitive diet, Food Technol., Vol. XV, No. 4, 173-177. 84.

Concludes that most foods decline in consumption and preference with repetitive eating.

KROLL, B.J. & F.J. PILGRIM. 1961. Sensory evaluation of accessory foods with and without carriers, J.Food Sci., Vol. XXVI, No. 2, 122-124. 85.

Accessory foods (jelly or catsup) can be evaluated without an appropriate carrier, i.e. bread or hamburger, at least as effectively as with the carrier.

PERYAM, D.R. 1963. The acceptance of novel foods, Food Technol., Vol. XVII, No. 6, 33-37, 39. 86.

Generally, food habits in individuals or in a culture tend to be resistant to change. But the general principles of learning can still be expected to apply.

PERYAM, D.R. & N. GIRARDOT. 1952. QM pins food "likes" and "dislikes" with advanced taste-test method, Food Eng., Vol. XXIV, No. 7, 58-61, 194. 87.

Small differences in similar foods, gross differences in checking general overall preferences, and group attitudes toward foods are now being quantitatively pegged using the hedonic scale adaption.

PILGRIM, F.J. 1961. What foods do people accept or reject?, Journal of the American Dietetic Association, Vol. XXXVIII, No. 5, 439-443. 88.

There are personal or individual attitudes and beliefs, and there are group and cultural attitudes that help determine whether a person will accept a food.

PILGRIM, F.J. & J.M. KAMEN. 1963. Predictors of human food consumption, Science, Vol. CXXXII, No. 3554, 501-502. 89.

Three-fourths of the variation in percentage of enlisted military personnel who take the foods at the serving table is predictable from knowledge of food preferences, the fillingness of the food, and the amount of 2 major nutrients, the food contains.

RAFFENSPERGER, E.L. & F.J. PILGRIM. 1956. Knowledge of the stimulus variable as an aid in discrimination tests, Food Technol., Vol. X, No. 6, 254-257. 90.

It is recognized that taste discrimination can be influenced by a person's knowledge of what he is tasting and his expectations about it.

SCHUTZ, H.G. November, 1954. Color in relation to food preference. Color in foods - a symposium. Ed. by Kenneth T. Farrell, J.R. Wagner, M.S. Peterson & G. MacKinney. National Academy of Sciences - National Research Council Advisory Board on QMR&D. Committee on Foods. University of Chicago, Chicago, Illinois. 91.

SCHUTZ, H.G. & J. KAMENETZKY. 1958. Response set in measurement of food preference, J.appl.Psychol., Vol. XLIII, No. 3, 175-177. 92.

Questionnaires consisting of 54 foods were administered to 305 mail enlisted personnel attending service training schools at the Great Lakes Naval Training Center, Illinois.

SCHUTZ, H.G. & F.J. PILGRIM. 1958. A field study of food monotony, Psychol.Reports, Vol. IV, No. 4, 559-565. 93.

Food monotony, overtly expressed as lowered consumption and preference, is primarily a function of repetition.

SEATON, R.W. & B.W. GARDNER. 1959. Acceptance measurement of unusual foods, Food Research, Vol. XXIV, No. 3, 272-278. 94.

Acceptance of unusual foods could be maximized if they are introduced with a specific functional application and in a form in which their "unusual" qualities are least apparent.

C. METHODOLOGY

BURRIL, L.M., D. DEETHARDT & R.L. SAFFLE. 1962. Two mechanical devices compared with taste-panel evaluation of tenderness, Food Technol., Vol. XVI, No. 10, 145-146. 95.

6-panel members scored 82 cooked beef samples for tenderness and counted the number of chews to ready a ½ inch cube for swallowing.

BYRNE, D., C. GOLIGHTLY, & E.J. CAPALDI. 1963. Construction and validation of the food attitude scale, J.consult.Psychol., Vol. XXVII, 215-222. 96.

A scale designed to measure personality dimensions involving attitudes toward food.

CATTELL, R.B. & W. SULLIVAN. 1962. The scientific nature of factors: A demonstration by cups of coffee, Behavioral Science, Vol. VII, No. 2, 184-193. 97.

Deals with the use of factor analysis in food testing.

EINDHOVEN, J. & D.R. PERYAM. 1960. Measurement of preferences for food combinations, Food Technol., Vol. XIII, No. 7, 379-382. 98.

Preference for a food combination differs from the sum or weighted average of the individual component preferences.

EINDHOVEN, J., D.R. PERYAM, F. HEILIGMAN, & J.W. HAMMAN. 1964. Effects of sample sequence or food preferences, J.Food Sci., Vol. XXIX, No. 4, 520-524. 99.

Here contrast and convergence effects in sample sequence are shown to be independent of position effect.

GORDON, J. & I. NOBLE. 1960. Application of the paired comparison method to the study of flavor differences in cooked vegetables, Food Research, Vol. XXV, No. 2, 257-262. 100.

Flavor differences in vegetables cooked in boiling water and by steaming methods have been studied by the use of a paired compairson method.

GREGSON, R.A.M. 1960. Bias in the measurement of food preferences by the difference test, Occupational Psychol., Vol. XXXIV, No. 4, 249-257. 101.

Replication of the triangle test preference method, outlining possible biases including cultural effects.

GRIDGEMAN, N.T. 1959. The lady tasting tea and allied topics, J.Amer.Stat.Assn., Vol. LIV, No. 288, 776-783. 102.

Statistical designs for taste tests.

HAMMAN, J.W. & J. EINDHOVEN. September, 1963. Effectiveness of certain experimental plans utilized in sensory evaluations. (Paper presented at 71st Annual Meeting of the American Psychological Association, Division 23 Symposium, "Testing and Measuring the Consumer's Behavior"). Measurement Problems in Food Acceptance Research. 103.

HARPER, R. & M. BARON. 1951. The application of factor analysis to tests on cheese, British Journal of Applied Physics, Vol. II, No. 2, 35-41. 104.

The basic principles of factor analysis are discussed.

KAMENETZKY, J. 1959. Contrast and convergence effect in ratings of foods, J. appl. Psychol., Vol. XLIII, No. 1, 47-52. 105.

Confirmed that preference ratings for poor quality food will be lower when preceeded by a good quality food than when preceeded by another poor-quality item. (contrast effects).

KRAMER, A., E. MURPHY, A. BRIANT, M. WANG & M. KIRKPATRICK. 1961. Studies in taste panel methodology, J. Agri.Food Chemistry, Vol. IX, No. 3, 224-228. 106.

Uses of trained panels to determine presence of chemicals in foods.

MITCHELL, J.W. 1956. The effect of assignment of testing materials to the paired and odd position in the duo-trio taste difference test, Food Technol., Vol. X, No. 4, 169-171. 107.

Discusses responses from Duo-Trio taste difference tests.

MITCHELL, J.W. 1956. Time-errors in the paired comparison taste preference test, Food Technol., Vol. X, No. 5, 218-220. 108.

Over-selection of the first or second sample in a paired comparison test is a time error.

MOORJANI, M.N., W. MONTGOMERY & G. COOTE. 1960. Correlations of taste panel gradings with salt extractable protein of frozen fish fillets, Food Research, Vol. XXV, No. 2, 263-269. 109.

Panelists were able to distinguish differences in stored fish measured as different in amounts of salt extractable protein.

PERYAM, D.R. 1964. Consumer preference evaluation of the storage stability of foods, Food Technol., Vol. XVIII, No. 9, 214-217. 110.

A system of evaluating the storage stability of foods was developed and empirically validated by the wealth of useful information it has provided.

PERYAM, D.R., D.V. JOSEPHSON, R.J. REMALEY & H. FEVOLD. 1951. New flavor evaluation method, Food Eng., Vol. XXIII, No. 8, 83-86, 167. 111.

Developed for dried milk, procedure employs special panel selected for skill in detecting small differences between two samples.

PERYAM, D.R. & F.J. PILGRIM. 1957. Hedonic scale method of measuring food preferences, Food Technol., Vol. XI, No. 9, 9-14. 112.

The background of this scale method is not a new discovery and contains the whole history of the development of rating scales.

PERYAM, D.R. & V.W. SWARTZ. 1950. Measure of sensory differences, Food Technol., Vol. IV, No. 10, 390-395. 113.

Three tests designed for the measurement of sensory differences are described, and a method for statistical analysis of the results is suggested.

PERYAM, D.R. & V.W. SWARTZ. 1951. Methodology for sensory evaluation of imitation peppers, Food Technol., Vol. V, No. 5, 207-210. 114.

Concerned with development of sensory evaluation methods only, and not with the physical and chemical aspects.

PILGRIM, F.J. & J.M. KAMEN. October, 1959. Patterns of food preferences through factor analysis, Journal of Marketing, 68-71. 115.

Questionnaires were used to obtain information on more than 400 foods, and on certain background characteristics of the respondents such as age and region of origin.

PILGRIM, F.J. & K.R. WOOD. 1955. Comparative sensitivity of rating scale and paired comparison methods for measuring consumer preference, Food Technol., Vol. IX, No. 8, 385-387. 116.

Rating scale and paired comparison methods were tested for comparability in detecting differences in preference.

RAFFENSPERGER, E.L., D.R. PERYAM & K.R. WOOD. 1956. Development of a scale for grading toughness-tenderness in beef, Food Technol., Vol. X, No. 12, 627-630. 117.

The fact that toughness and tenderness lie on the same continuum of measuring and sensory discrimination is not clearly established, though taken for granted.

ROZEBOOM, W.W. & L.V. JONES. 1956. The validity of successive intervals method of psychometric scaling, Psychometrika, Vol. XXI, No. 2, 165-183. 118.

Discusses possible errors when rating scale technique is used and methodological considerations to avoid error.

SCHUTZ, H.G. & F.J. PILGRIM. 1952. Psychophysiology in food acceptance research, Activities Report, Vol. IV, No. 3, 212-217. 119.

Objectives of psychophysiological research.

SHUFORD, E.H., L.V. JONES & R.D. BOCK. 1960. A rational origin obtained by the method of contingent paired comparisons, Psychometrika, Vol. XXV, No. 4, 343-356. 120.

Development of a new paired comparison method.

STARKS, T.H. & H.A. DAVID. 1961. Significant tests for paired-comparison experiments, Biometrika, Vol. XLVIII, Nos 1 & 2, 95-108. 121.

Comparisons in relation to preference testing.

TERRY, M.E., R.A. BRADLEY & L.L. DAVIS. 1952. New designs and techniques for organoleptic testing, Food Technol., Vol. VI, No. 7, 250-254. 122.

Method of analysis is proposed for paired comparisons which is exact for small samples and involves only extremely simple computations. The experimental design is well known, the statistical analysis is new.

THURSTONE, L.L. & L.V. JONES. 1957. The rational origin for measuring subjective values, J.Amer.Stat.Assn., Vol. LII, No. 280, 458-471. 123.

Describes a method of locating experimentally the subjective origin of a stimulus.

WOOD, K.R. 1953. Applications of experimental design to research at the QMFCI, Activities Report, Vol. V, No. 3, 186-193. 124.

This design is concerned with detection and adequate description of the relationships of results to factors under study, despite the disturbing influence of other factors.

D. PANEL SELECTION

BENDIG, A.W. 1955. Rater reliability and "judgmental fatigue", J.appl.Psychol., Vol. XXXIX, No. 6, 451-453. 125.

"Judgmental fatigue" does not affect rater reliability or bias when the subjects report food preference self-ratings.

BOCK, R.D. 1956. The selection of judges for preference testing, Psychometrika, Vol. XXI, No. 4, 349-366. 126.

A scheme for choosing a few individuals whose preferences for given objects are most representative of those larger groups of individuals is proposed.

EHRENBERG, A.S.C. & J.M. SHEWAN. 1960. The development and use of taste panel technique, Occupational Psychol., Vol. XXXIV, No. 4, 241-248. 127.

Development and application of procedures for the sensory assessment of eating quality; includes descriptive rating scales and results.

HALL, B.A., M. TARVER & J. MCDONALD. 1959. Method for screening flavor panel members and application to a two sample difference test, Food Technol., Vol. XIII, No. 12, 699-732. 128.

Describes the screening method in selecting panel members for 2-sample test (1 standard and 1 experimental sample).

KRAMER, C.Y. 1955. A method of choosing judges for a sensory experiment, Food Research, Vol. XX, No. 5, 492-496. 129.

A method for choosing a panel of judges for a sensory experiment to insure that the individual judges and the panel as a whole can detect differences at any given probability level is described.

KRAMER, C.Y. 1956. Additional tables for a method of choosing judges for a sensory experiment, Food Research, Vol. XXI, No. 5, 598-600. 130.

Gives additional tables for a method of choosing a panel of judges for a sensory experiment to insure that the individual judges can detect differences at any given probability.

SAWYER, F.M., H. STONE, H. ABPLANALP & G.F. STEWART. 1962. Repeatability estimates in panel selection, J.Food Sci., Vol. XXVII, No. 4, 386-393. 131.

Concludes that repeatability estimates can predict the proportion of judges whose sensitivity meets established specifications.

E. APPLICATION TO SPECIFIC POPULATION

1. MILITARY

BENSON, P.H. & D.R. PERYAM. 1958. Preference for foods in relation to cost, J.appl.Psychol., Vol. XLIII, No. 3, 171-178. 132.

Planning meals which give optimum satisfaction thereby contributing to morale and efficiency is ultimate goal in food preference studies of military personnel.

BENSON, P.H. 1960. A psychometric approach to predicting consumer preference, Personnel Psychol., Vol. XIII, No. 1, 71-79. 133.

This paper employs questionnaire data to establish functions from which predictions are made of the preferred frequency with which foods are served on meals planned by the QM for military personnel.

DUBOIS, W.L. 1950. Taste No.1 combat-food ingredient, Food Industries, Vol. XXII, No. 7, 57-58. 134.

Appetite appeal is discussed as a key problem in the development of adequate foods and containers for the armed forces.

GARDNER, L.W. 1950. Meats for the military, Food Industries, Vol. XXII, No. 4, 53-55. 135.

Meat as a highly valued difficult to process military ration is discussed.

JONES, L.V., D.R. PERYAM, & L.L. THURSTONE. 1955. Development of a scale for measuring soldiers' food preferences, Food Research, Vol. XX, No. 5, 512-520. 136.

The "hedonic scale" was developed at QMF&CI in 1949 and has become the standard instrument for use by QMC in lab and field tests of acceptability.

KAMEN, J.M. 1962. Reasons for non-consumption of food in the Army, Journal of the American Dietetic Association, Vol. XLI, No. 5, 437-442. 137.

Studies have shown that preferences for specific foods often depend on certain personal characteristics of the consumer.

KUJAWSKI, J.S. 1950. QMC asks industry aid, Food Industries, Vol. XXII, No. 3, 36-39. 138.

Discusses problems in designing foods and containers for the armed forces.

PEDERSEN, S. 1953. Quartermaster subsistence problems in arctic and sub-arctic regions, Activities Report, Vol. IV, No. 4, 273-277. 139.

Dr. Pedersen presents some of the key difficulties associated with the procurement, transportation, storage, etc., of class 1 perishable subsistence items and the resources used in solving them.

PERYAM, D.R. 1950. How QM maps the food acceptance salient, Food Industries, Vol. XXII, No. 11, 83-86, 182. 140.

Food acceptance is not a study of food but of what people do about food.

PERYAM, D.R. 1950. Problem of preference gets QM focus, Food Industries, Vol. XXII, No. 12, 42-44, 178. 141.

Discusses details of food acceptance determinations and describes foods in terms of sensory properties.

PERYAM, D.R. & N.J. GUTMAN. 1958. Variation in preference ratings for foods served at meals, Food Technol., Vol. XII, No. 1, 30-33. 142.

Nine messes, each which fed 1 company of about 200 men were served orange juice of good quality, as the test food. All men were basic trainees.

PERYAM, D.R. & J.G. HAYNES. 1957. Prediction of soldiers' food preferences by laboratory methods, J.appl.Psychol., Vol. XLI, No. 1, 2-6. 143.

The most common, the most efficient and probably the most reliable method of accessing acceptability is to measure the verbally expressed affective responses of a sample of consumers, and from these measurements establish the positions of various food items on some continuum from which acceptance behavior may be inferred.

REYNOLDS, C.H. 1959. Feeding future combat forces, feeding systems to meet tactical needs, Activities Report, Vol. XI, No. 4, 221-226. 144.

Gives a general picture of background of U.S. Army QMC program of developing new feeding systems of the Armed Forces.

ROGERS, M.R., A.M. KAPLAN & E. PILLION. 1960. The compatibility of dehydrated army rations with chlorinated and iodine-treated surface-waters, Food Technol., Vol. XIV, No. 5, 240-245. 145.

Ground, river and swamp waters from different areas were used along with distilled water to reconstitute dehydrated army rations and were found to be acceptable under the conditions of the experiment.

SEATON, R.W., P.H. ROSSI, H. HAMILTON & D. GOTTLIEB. 1960. Changing food attitudes -- role of groups in affecting individual preferences, Activities Report, Vol. XII, No. 4, 235-242. 146.

Soldiers attitudes toward the army (whether favorable or unfavorable) reflects in their preference ratings of foods.

TISCHER, R.G. 1957. Quick-serve meals for the army, Food Eng., Vol. XXIX, No. 2, 64-67. 147.

The end products sought here are quick-serve food items of great acceptability, considerable storage life and high field utility.

TUXBURY, G.P. & D.R. PERYAM. March 20 & 21, 1952. The application of food acceptance methods and results to military feeding problems, Proceedings of the 4th Research Conference, sponsored by the American Meat Institute at the University of Chicago. 148.

Concerns the armed forces feeding problems.

WODICKA, V.O. 1957. Food logistics, Quartermaster Review, Vol. XXXVII, No. 3, 6-7, 146. 149.

A feeding system has been conceived which will provide a good tasting ration in any climate while escaping some of supply limitations of our present rations which become critically important in the tactical conditions envisioned.

WODICKA, V.O. 1960. Feeding the armed forces, The Cornell Hotel and Restaurant Administration Quarterly, Vol. I, No. 2, 22-27. 150.

Research in problems of feeding armed service personnel results in improved civilian feeding.

WOOD, K.R. & D.R. PERYAM. 1953. Preliminary analysis of five army food preference surveys, Food Technol., Vol. VII, No. 6, 248-249. 151.

Soldiers' relative preferences for more than 300 army recipes were established through five surveys conducted by the QM Corps during a two-year period.

Institute published monograph on military food preference surveys, Activities Report, 1960. Vol. XII, No. 1, 16-17. 152.

Reports on "Food preferences of men in the U.S. Armed Forces".

E. APPLICATION TO SPECIFIC POPULATION

2. CONSUMER

ABBOTT, O.D., R.O. TOWNSEND & R.B. FRENCH. August, 1952. A survey of food preferences of Florida men, Bulletin 500. (Single copies free to Florida residents on request to Agricultural Experiment Station, Gainesville, Florida). 153.

BENSON, P.H. 1955. A model for the analysis of consumer preference and an exploratory test, J.Appl.Psychol., Vol. XXXIX, No. 5, 375-381. 154.

This paper seeks to call attention to economic implications of preference measurements of data of a form commonly collected in consumer studies, implications which apparently merit further empirical and theoretical examination.

BENSON, P.H. September 5-6, 1957. Optimizing product acceptability through marginal preference analysis, Quality Control and the Consumer Conference, Rutgers, the State University. 155.

Several problems facing the consumer are discussed.

BENSON, P.H. & F.J. PILGRIM. 1961. Testing less desirable product possibilities, Journal of Marketing, Vol. XXV, No. 5, 65-68. 156.

Concerns problems in consumer research.

GIRARDOT, N.F. & D.R. PERYAM. 1953. Use of consumer preference methods for evaluating dried eggs during storage, Proceedings of "Dehydrated Eggs", a symposium sponsored by the National Research Council and the QMF&CI, February, 1953. 157.

Tries to determine "When does a good egg cease to be good?" and "How bad must a bad egg be before it won't be eaten?"

JONES, L.V. 1959. Prediction of consumer purchase and the utility of money, J.Appl.Psychol., Vol. XLIII, No. 5, 334-337. 158.

People do not always buy to get the most from their money.

KENNEDY, B.M. 1952. Food preferences of pre-army age California boys, Food Technol., Vol. VI, No. 3, 93-97. 159.

A study of attitudes toward 258 foods and typical preferred menus was carried out on 144 boys, 17 to 19 years of age, in northern California.

SHAFFER, J.D. 1963. Contributions of sociologists and cultural anthropologists to analysis of U.S. demand for food, Journal of Farm Economics, Vol. XLV, No. 5, 1420-1428. 160.

Sociology and anthropology are extensive, complex subjects with many possible ways of drawing connections between them and demand analysis.

WELLS, W.D. 1961. Measuring readiness to buy, Harvard Business Review, Vol. XXXIX, No. 4, 81-87. 161.

"The uses of readiness-to-buy measures outlined here suggest that a shift in emphasis in the use of predisposition measures is needed."

WELLS, W.D. & J. DAMES. 1962. Hidden errors in survey data, Journal of Marketing, Vol. XXVI, No. 4, 50-54. 162.

Shows that survey results can be correct for a total sample, even when many individuals have not reported accurately. Also that seemingly correct results sometimes conceal a bias which leads to false conclusions.

III. ANIMAL STUDIES

Studies on animals include those on taste, smell, food acceptance and preference and the influence of external variables on food-related behavior. Differences and similarities between humans and animals are worthy of consideration and are necessary in the planning for future research.

III. ANIMAL STUDIES

DETHIER, V.G. 1952. The relation between olfactory response and receptor population in the blowfly, Biological Bulletin, Vol. CII, No. 2, 111-117. 163.

An investigation to determine rejection thresholds of the blowfly.

DETHIER, V.G. 1952. Adaptation to chemical stimulation of the tarsal receptors of the blowfly, Biological Bulletin, Vol. CIII, No. 2, 178-189. 164.

When receptors located on the tarsi of blowfly are stimulated by solutions of certain sugars the insect responds by extending its proboscis and, when permitted, by drinking.

DETHIER, V.G. 1954. Olfactory responses of blowflies to aliphatic aldehydes, Journal of General Physiology, Vol. XXXVII, No. 6, 743-751. 165.

The response of the blowfly phormia regina has been studied by means of a specially designed olfactometer.

DETHIER, V.G. & M.V. RHOADES. 1954. Sugar preference-aversion functions for the blowfly, Journal of Experimental Zoology, Vol. CXXVI, No. 2, 177-204. 166.

"This study was designed to supply information which might serve to correlate some of the existing knowledge relative to feeding preferences, food selection, and nutritive requirements".

EPSTEIN, A.N. & E. STELLAR. 1955. The control of salt preference in the adrenalectomized rat, J.comp.physiol.Psychol., Vol. XLVIII, No. 3, 167-172. 167.

The salt preference of the adrenalectomized rat, as well as the normal rat, is under multifactor control.

JACOBS, H.L. 1958. Studies on sugar preference: I. The preference for glucose solutions and its modification by injections of insulin, J.comp.physiol.Psychol., Vol. LI, No. 3, 304-310. 168.

Summarizes the first of a series of studies on the motivation of sugar preference, and was designed to investigate some of the factors producing glucose preference under normal dietary conditions and under an experimentally induced need for glucose.

HOSHISHIMA, K., S. YOKOYAMA & K. SETO. 1962. Taste sensitivity in various strains of mice, Amer.J.Physiol., Vol. CII, No. 6, 1200-1204. 169.

This study was designed to elucidate the differences in taste sensitivity in various strains of mice, and to study the relationship between taste sensitivity and color of the fur.

KARE, M.R., R. BLACK & E.G. ALLISON. 1957. The sense of taste in the fowl, Poultry Science., Vol. XXXVI, No. 1, 129-138. 170.

Calls attention to fact that a reaction to a flavor was modified by the simultaneously offered alternatives.

KIMURA, K. & L.M. BEIDLER. 1956. Microelectrode study of taste bud of the rat, Amer.J.Physiol, Vol. CLXXXVII, No. 3, 1-7. 171.

Study of gustatory sense in the rat.

SCHUTZ, H.G. & F.J. PILGRIM. 1954. Changes in the self-selection pattern for purified dietary components by rats after starvation, J.comp.physiol.Psychol., Vol. XLVII, No. 6, 444-449. 172.

After two days starvation, rats prefer high fat foods no matter what their pre-starvation diet had been.

TAMAR, H. 1956. Taste responses of opossum and bat, Amer.J.Physiol., Vol. CLXXXVII, No. 3. 173.

Concerns the effectiveness of taste stimulation in mammals.

IV. GOVERNMENT REPORTS

The studies in this section are divided into sub-sections based on the type of publication. Items are arranged alphabetically by author within each sub-section. The items are not arranged by topic but include items relevant to other major sections as indicated in the prefaces to these sections.

IV. GOVERNMENT REPORTS

A. INTERIM REPORTS

EINDHOVEN, J. November, 1962. A questionnaire study of army mess personnel, 37-62. 174.

EINDHOVEN, J. & J. KAMMETZKY. February, 1956. The stability of food preferences. 175.

EINDHOVEN, J. & F.J. PILGRIM. December, 1959. Compatibility of menu items, 35-59. 176.

FOOD ACCEPTANCE BRANCH. July, 1959. Food preference study conducted in 1958, 23-59. 177.

GIRARDOT, N.F. & D.R. PERYAM. June, 1951. Laboratory survey of the effect of monosodium glutamate on consumer preference for various food items and recipes. 178.

KAMEN, J.M. December, 1958. Preliminary field evaluation of all-purpose survival ration prototype, 23-58. 179.

KAMEN, J.M. 1959. Variability of food acceptance behavior under normal feeding conditions, Part 1 - Basic results of consumption survey, 30-59. 180.

KAMEN, J.M. December, 1959. Variability of food acceptance behavior under normal feeding conditions, Part 2 - Reasons for non-consumption, 38-59. 181.

KAMEN, J.M. August, 1962. Food preferences in a stressful situation, 31-62. 182.

KAMEN, J.M. December, 1962. Methods of shaping soldiers' attitudes toward quick-serve meals, 41-62. 183.

KAMEN, J.M. July, 1963. Survey of food preferences of U.S. soldiers, 5-63. 184.

KAMEN, J.M., F.J. PILGRIM, N.J. GUTMAN & B.J. KROLL. 1960. Interactions of suprathreshold taste stimuli, 14-60. 185.

KAMENETSKY, J. & F.J. PILGRIM. June, 1958. Interpretation of preference ratings, 16-58. 186.

KAMENETSKY, J., F.J. PILGRIM & H.G. SCHUTZ. 1957. Relationship of consumption to preference under different field conditions, 37-57. 187.

MC COY, J.L. July, 1963. Soldiers' attitudes toward foods in a tropical environment, Part 1: The nature of the tropical environment and soldiers' reactions toward operational rations, 3-63. 188.

MC COY, J.L. August, 1963. Soldiers' attitudes toward foods in a tropical environment, Part 2: Methods for inducing favorable attitudes toward novel and familiar foods in a tropical environment, 7-63. 189.

PERYAM, D.R. May, 1952. Field preference evaluation of canned bread vs. crackers during operation snowfall, Project No. 7-84-15-007, Project title - Acceptability of rations and ration items. 190.

PERYAM, D.R. October, 1954. Field preference evaluation of canned bread vs. crackers after 33 months of storage during exercise flashburn, Project No. 7-84-15-007, Project title - Food acceptance study - termination report. 191.

PERYAM, D.R. October, 1960. Food attitudes in an unusual environment, 32-60. 192.

PERYAM, D.R. March, 1962. Food attitudes in an unusual environment, a second study, 2-62. 193.

PERYAM, D.R. & N.J. GUTMAN. February, 1955. Acceptability of soluble coffee to members of the armed forces. 194.

PERYAM, D.R. & N.J. GUTMAN. July, 1955. Variation in preference ratings for foods served at meals. 195.

PERYAM, D.R. & J.G. HAYNES. December, 1952. Evaluation of acceptance testing methods: Validation of laboratory preference ratings. 196.

PERYAM, D.R. & R. SEATON. December, 1962. Food consumption and preferences under conditions of restricted and non-restricted feeding, 40-62. 197.

PILGRIM, F.J. October, 1958. Sensory testing methods - a manual, 35-58. 198.

POLEMIS, B.W. April, 1950. Summary of food preference survey conducted among army field force personnel. 199.

POLEMIS, B.W. October, 1950. Summary of food preference survey conducted among army personnel -- Zone of Interior. 200.

POLEMIS, B.W. February, 1951. Summary and analysis of data obtained from first national survey of food preferences in the armed forces. 201.

POLEMIS, B.W. & W.H. JONES. January, 1950. Food preference study conducted at Fort Riley, Kansas, Project No. 7-84-15-01. 202.

SCHUTZ, H.G. October, 1956. Preference ratings as predictors of food consumption. 203.

SCHUTZ, H.G. & D.M. PAULL. March, 1956. Modification of food intake by the use of drugs. 204.

SCHUTZ, H.G. & F.J. PILGRIM. October, 1956. The sweetness of various compounds and its measurement. 205.

SCHUTZ, H.G., F.J. PILGRIM, G.W. LADWIG & J.H. CARDWELL. June, 1958. Effect of deteriorated foods on food consumption, preference and satiety, 11-58. 206.

SEATON, R.W. January, 1960. Response patterns to an appeal to taste irradiated foods, 34-59. 207.

SEATON, R.W. June, 1962. The length and direction of rating scales, 11-62. 208.

SEATON, R.W. August, 1962. Hunger in groups: An arctic experiment, 34-62. 209.

SHAPIRO, R. April, 1953. Summary of food preference survey conducted among army personnel -- Zone of Interior, Project No. 7-84-15-007. 210.

TUOMY, J.M., R.J. LECHNIE & T. MILLER. August, 1962. Effect of temperature on the tenderness of cooked beef, 28-62. 211.

WOOD, K.R. December, 1951. Summary of food preference survey conducted among army personnel -- Zone of Interior, February, 1951. 212.

WOOD, K.R. March, 1952. Summary of food preference survey conducted among army personnel -- Zone of Interior, Survey 004 - June 51, Survey 005 - September 51. 213.

B. CONTRACT REPORTS

ADOLPH, E.F. March, 1952. Basic investigation of thirst in mammals, Final Report, Contract DA11-009-qm-532, University of Rochester. 214.

ADOLPH, E.F. December, 1952. Basic investigation of thirst in mammals, Final Report, Contract DA11-009-qm-14855, University of Rochester. 215.

ADOLPH, E.F. December, 1953. Basic investigation of thirst, Final Report, Contract DA44-109-qm-1257, University of Rochester. 216.

BEIDLER, L.M. December, 1953. Nerve responses to organic salts applied to the tongue, Final Report, Contract DA11-009-qm-18401, Florida State University. 217.

BENSON, P.H. April, 1958. Relation of food frequency of serving, Final Report, Contract DA19-129-qm-972, Drew University. 218.

DEATHERAGE, F.E. 1 February 1957 - 16 April 1957. Ion-protein interrelationships affecting the quality of dehydrated meat, Report No. 5, Contract DA19-129-qm-613. 219.

DEFELICE, D. 16 June 1961 - 15 June 1962. Fundamental aspects of meat texture, Reports #1, #2, #3, #4, Contract DA19-129-qm-1844. 220.

FERGUSON, L.N. July, 1956. Chemistry of taste, Final Report, Contract DA19-129-qm-484, Howard University. 221.

FERGUSON, L.N. 6 April 1957 - 5 June 1957. Studies in the sense of taste, Report #2, Contract DA19-129-qm-811. 222.

FURCHTGOTT, E. December 1953. Human food preferences under stress, Final Report, Contract DA11-009-qm-18152, University of Tennessee. 223.

FURCHTGOTT, E. August 1959. Effect of hunger and satiety on odor sensitivity, Final Report, Contract DA19-129-qm-884, University of Tennessee. 224.

GOETZL, F.R. June, 1950. Human appetite, Annual Report, Contract W11-183-qm-8133, The Permanente Foundation. 225.

GOETZL, F.R. February, 1952. Human appetite, Final Report, Contract DA11-009-qm-391, The Permanente Foundation. 226.

GOETZL, F.R. April, 1953. Human appetite, Final Report, Contract DA11-009-qm-14557, The Permanente Foundation. 227.

JONES, L.V. February, 1953. Measurement of food preference and prediction of choice, Final Report, Contract DA11-009-qm-17032, The University of Chicago. 228.

JONES, L.V. 1 February 1953 - 31 March 1954. Prediction of consumer choice, III, Report #12 - Termination, Contract DA44-109-qm-1370. 229.

JONES, L.V. 1 June 1955 - 31 July 1956. Methodology of preference measurement, Reports #2, #3, #4, #5, Contract DA19-129-qm-272. 230.

JONES, L.V. 1 October 1956 - 30 September 1957. Methodology of preference measurement, Final Report, Contract DA12-129-qm-774. 231.

JONES, L.V. 1 April 1958 - 31 January 1959. Preference for food combinations, Reports #1, #2, #3, #4, Contract DA19-129-qm-1045. 232.

JOSEPHSON, D.V. September, 1950. Mechanisms of chemical changes affecting the acceptability of beverage milk products, Annual Report, Contract DA11-183-qm-22, The Pennsylvania State College. 233.

KEENEY, M. 2 December 1956 - 1 February 1957. Investigation of flavor stability in non-fat dry milk, Report #5, Contract DA19-129-qm-569. 234.

LUCIER, R.O. 13 July 1962 - 12 January 1963. Effect of military operations in the tropics on soldiers' attitudes toward QM materiel, Reports #1, #2, Contract DA19-129-qm-2076. 235.

MOORE, F.W. 13 July 1962 - 12 January 1963. Survey of dietary patterns and food habits of major ethnic groups, Reports #1, #2, Contract 2074. 236.

MRAK, E.M. 1 March 1957 - 30 April 1957. Study on freestone peaches, Report #5, Contract DA19-129-qm-632. 237.

PFAFFMAN, C. September, 1953. An analysis of sensory methods for testing flavor, Final Report, Contract DA11-009-qm-18404, Brown University. 238.

ROSSI, P.H. 14 May 1958 - 15 September 1960. Study of the bases for changing food attitudes, Reports #1, #2, #3, Contract DA19-129-qm-1117. 239.

SCHUTZ, H.G. 14 April 1961 - 13 July 1961. A study of flavor of irradiated meat, Report #2, Contract DA19-129-qm-1734. 240.

SCHUTZ, H.G., R.C. OVERBECK & R.S. LAYMON. 12 April 1958 - 31 August 1958, Relationship between flavor and physico-chemical properties of compounds, Reports #1, #2, Contract DA19-129-qm-1141. 241.

SCHUTZ, H.G., V.G. VELY, R.B. IDEN & S.M. SOLIDAY. 5 December 1959 - 27 February 1962. Relations of odor to physiocochemical properties of compounds, Report #8 (Final), Contract DA19-129-qm-1500. 242.

SIEGEL, P.S. May, 1953. The monotony problem in food acceptance, Final Report, Contract DA11-009-qm-18153, University of Alabama. 243.

SIEGEL, P.S. July, 1954. The monotony problem in food acceptance, Final Report, Contract DA44-109-qm-1448, University of Alabama. 244.

SIEGEL, P.S. July, 1956. Factors contributing to food monotony, Final Report, Contract DA19-129-qm-264, University of Alabama. 245.

SIMON, S. 31 May 1962 - 31 August 1962, Measurement of texture in frankfurters and luncheon meat, Report #1, Contract DA19-129-qm-2015. 246.

SMITH, E.E. 13 June 1960 - 12 June 1961. Shaping user acceptance of innovation, Report #1, Contract DA19-129-qm-1619. 247.

SMITH, E.E. February, 1961. Methods for changing consumer attitudes: A report of three experiments, PRA report 6-2. Contract DA19-129-qm-1619. 248.

STELLAR, E. June, 1954. Physiological mechanisms regulating food acceptance, Final Report, Contract DA44-109-qm-1328, The Johns Hopkins University. 249.

STERN, J.A. 21 August 1958 - 30 June 1960. Physiological stress and food consumption, Reports #7, #9, #10, #11, #12 (Final), Contract DA19-129-qm-802. 250.

THURSTONE, L.L. March, 1952. Prediction of consumer choice, Final Report, Contract DA11-009-qm-598, University of Chicago. 251.

C. TECHNICAL REPORTS

BAKER, R.A. Taste and odor in water, a critical review, copy No. 41, F-A2333, The Franklin Institute. 252.

BERRYHILL, F.M., M.A. KENNEDY & M.C. FLEMING. January 1955. Acceptability panels as tools for predicting the acceptability of ration items in the field, Defense Research Medical Laboratories, Defense Research Board, Department of National Defense, Canada. 253.

BOCK, R.D. & L.V. JONES. June, 1963. The measurement and prediction of judgmental response statistical methods, USATECOM, Project 7-3-0901-01E. 254.

BURT, T.B. December, 1957. A field test of the ration, individual, combat, meal type, FEA, T-50 56002-F. 255.

BURT, T.B. July, 1958. Preference ratings for operational rations, FEA, T-74 57035-F. 256.

BURT, T.B. September, 1958. Troop acceptability tests of radiation preserved pork and bacon, FEA, T-81 57029-F. 257.

BURT, T.B. March, 1959. Troop acceptability tests of selected items of radiated foods, FEA, T-104 58040-F. 258.

BURT, T.B. March, 1960. A study of repetitive menu cycles in the feeding of small groups, FEA, T-152 58063. 259.

BURT, T.B. January 1962. Exploratory study of food preferences and conumption of soldiers in a stressful field condition, FEA, T-214 61041. 260.

BURT, T.B. February, 1962. Soldier preference test for instant coffee - 1962, T-216 FEA 62002. 261.

BURT, T.B. March, 1962. A study of factors affecting receptivity of soldiers toward precooked dehydrated foods, T-220 FEA 61070. 262.

BURT, T.B. March, 1963. A preliminary study of the relationships between food preference ratings obtained under field and garrison conditions, USATECOM Project 7E-3907-01. 263.

CECIL, S.R. & J.G. WOODROOF. 1962. Long-term storage of military rations, QMFCI. 264.

CONSOLAZIO, C.F., V.N. BRICE, C.J. KOEHN, & V.R. BIRCHLER. 30 January 1958. The response of patients to a high-calorie, high-protein chocolate beverage powder, Report 218, USA Medical Nutrition Laboratory. 265.

FINKELSTEIN, B. & B. MCGHEE. March, 1959. Liquid diets for use in high-altitude, high-performance vehicles, WADC-T R 59-32, ASTIA Document No. AD 209064. 266.

FINKELSTEIN, B. & B.MCGHEE. April, 1959. Nutritional aspects of a high-altitude balloon flight, WADC Technical Note 59-69, ASTIA Document No. AD213597. 267.

FINDELSTEIN, B. & R.G. PIPPITT. April, 1957. Effect of altitude and oxygen upon taste, WADC Technical Report 57-261, ASTIA Document No. AD118245. 268.

GHOSH, B.K. & H. FREEMAN. October, 1961. Investigation of sequential methods in design and analysis of experiments, R-11, FEA MRS 60-7j, Groton Assoc., Inc., Groton, Mass. 269.

HEMBREE, H.W. May, 1954. Criteria of soldier acceptance, QMREC, Report No. 229. 270.

MACLEOD, S. June, 1956. State-of-the-art in olfaction, RADC-TN-56-199. 271.

MACLEOD, S., P.J. BERSH, H.I. FREEMAN, A.W. LEAVITT, & V. WEEKMAN. January 1957. The acquisition and retention of odor identifications, RADC-TR-57-7, ASTIA Document No. AD 97901. 272.

NORTON, G.T. & H.C. DYME. December, 1952. Operational study to evaluate food packet, individual, combat, in-flight (IF-4), WADC TR 52-336. 273.

OLMSTEAD, P.S. June 21, 1951. Symposium on measurement of consumer wants, Special Technical Publication No. 117, American Society for Testing Materials. 274.

TORRANCE, E.P. June, 1955. Personality factors and survival ration acceptability, Randolph Air Force Base, Technical Memorandum CRL-TM-55-9. 275.

WEEKS, E. April, 1959. A soldier preference test for instant coffee - 1959, FEA, T-105 58052F. 276.

WEEKS, E. September, 1959. An engineering test of the 6-man and 25-man modules of the experimental quick-serve meal, FEA, T-127 58037-F. 277.

WEEKS, E. January, 1960. An evaluation soldier preferences for various blends of roasted and ground coffees, T-144 FEA 59035. 278.

WEEKS, E. May, 1960. A soldier preference test for instant coffee - 1960, T-154 FEA 59054. 279.

WEEKS, E. March, 1961. Soldier preference test for instant coffee - 1961, T-187 FEA 61020. 280.

DEPARTMENT OF THE ARMY, Office of the Quartermaster General. July, 1962. Subsistence research and development program of the DOD, Reports control symbol QMGRE-22, Annual Report. 281.

THE QUARTERMASTER BOARD. 1951. Final report of consumption phase of the "A" ration survey, QMQMBS S-266-49128, Ft. Lee, Va. 282.

WRIGHT AIR DEVELOPMENT CENTER. December, 1960. Effects of repetitive eating of limited groups of food items on food acceptance -- QMP&CI, Chicago, Ill., WADD Technical Report 60-750, MIPR No. 33 (616) 59-19. 283.

D. BIBLIOGRAPHIES

GOTTLIEB, D. & P.H. ROSSI. January, 1961. A bibliography and bibliographic review of food and food habit research, QMF&CI. 284.

MICHELS, K.M., D.S. PHILLIPS, R.H. WRIGHT & J. PUSTEK, JR. 1948-1960. Odor and olfaction, Project No. PRF 2095. 285.

Technical Report. March, 1957. Bibliography, publications and technical papers, 1957, QMRE-16. 286.

Index of Quartermaster R & E Command representatives on governmental and non-governmental technical and professional committees. March, 1958. 287.

Technical Report. June, 1959. Bibliography, publications and technical papers, 1958, QMRE-19. 288.

Technical Report. June, 1962. Bibliography, publications and technical papers, 1961, QMRE-26. 289.

E. CONFERENCE NOTES

Assignment to the Army of primary responsibility for research and development in the field of food, Coordination Meeting held:

24 September 1954 at U.S. Naval Supply Research and Development Facility, Bayonne, New Jersey.

14 - 15 September 1955 at Medical Nutrition Laboratory, Fitzsimons Army Hospital, Denver, Colorado.

15 - 16 February 1956 at QMF&CI, Chicago, Illinois.

8 - 10 October 1956 at WADC, Wright-Patterson Air Force Base, Dayton, Ohio.

13 - 14 February 1957 at QMF&CI, Chicago, Illinois.

21 - 22 May 1957 at QMR&EC, Natick, Massachusetts.

7 - 8 May 1958 at Camp LeJuene, North Carolina. 290.

Eastern Experiment Station Collaborators' Conference on flavor and texture of foods. October 30-31, 1962, U.S. Department of Agriculture. 291.

Seventh Annual Army Human Factors Engineering Conference. October, 1961. 192-196, Ann Arbor, Michigan. 292.

Southern Utilization Research & Development Division Conference on Advances in Flavor Research, March 25-26, 1963, U.S. Department of Agriculture. 293.

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