RIETZ
MASTER FOOD GUIDE

Edited by Norman W. Desrosier

AVI Publishing Company

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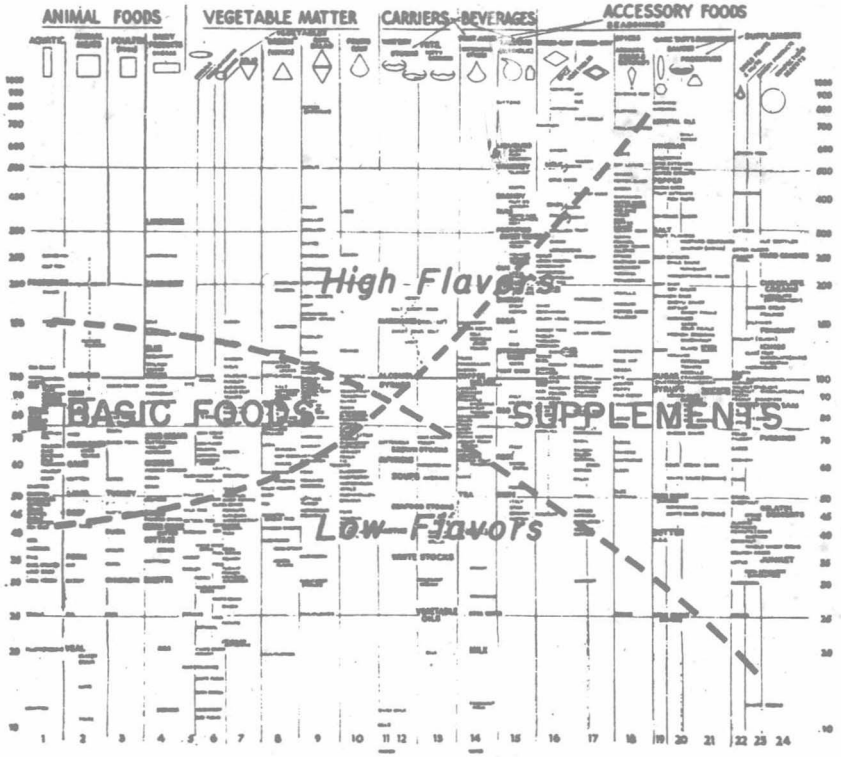

With *any additive* a simple food becomes a composite food; a preprocessed or composite food becomes an elaborated food. Its flavors alter according to the nature and quantity of the additive, time and processing.

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Preface

The purpose of this book is to make available to all those involved in formulating and developing foods the results of over 30 years of research on the subject by Carl A. Rietz, now deceased. Throughout his active and productive life, he developed a sound basis for the general principles involved in food formulation. It was summarized in his much heralded GUSTAMETRIC CHARTS. New ideas in food product formulation resulted.

His work was published in two volumes of A GUIDE TO THE SELECTION, COMBINATION AND COOKING OF FOODS. Volume 1 focused on the "Selection and Combination of Foods" and Volume 2 was directed to the "Formulation and Cooking of Foods." The latter volume was coauthored with Professor Jeremiah J. Wanderstock, also deceased.

Carl Rietz became interested in the study of food flavors early in the 1930's. He began laboratory experiments with foods, combining literally thousands of different foods, cooking, testing and tasting them in a multitude of combinations. Over a period of 30 years he studied his own taste reactions, those of his friends and people he encountered in his travels. He visited most of the market places of the world, checked the different foods of each area, and in one way or another tasted the foods with which he was not familiar. He spent more time in domestic and commercial kitchens than in dining rooms. He studied and compared the food preferences of various peoples and compared them with cookbook writings.

Rietz conducted International Cuisine classes at Mills College on the selection, combination, preparation, serving and participation of intra- and international foods; class reactions were panel-checked and recorded.

Thus the Gustametric chart came into being.

Having personally been involved in industrial food product formulation and development myself, I have found the Rietz approach most useful.

Dr. Donald K. Tressler, President of the AVI Publishing company, asked me to rework the books and condense them into one volume, with the specific goal in mind of preserving the work for those already in the field, and for those to follow.

This book will be found most useful to those not only in new food product development in the food industries, but equally useful to those involved in formulating new foods in food service, hotels and restaurants, food and nutrition and experimental cookery at all levels. It contains a

wealth of information which will be found of enormous help to all those interested in the formulation, selection and combinations of foods.

I would like to express my appreciation to Mrs. Carl A. Rietz and Mrs. Jeremiah J. Wanderstock for granting me permission to rework the original publications in this form.

To all those who have contributed to the advancement of knowledge in this important field, I express my sincere thanks.

NORMAN W. DESROSIER

July 1, 1977

In Memory of
Carl A. Rietz
and
Jeremiah J. Wanderstock

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Periodic Table of Foods

Introduction

This book identifies the elemental nature of foods and ingredients, their basal qualities and how to select, mix and blend them to maximize their utility and appeal. Together, these compose a master food guide of widespread application.

All important foods are covered. It includes fish and shellfish, both fresh and preserved. It describes all important species, their basic qualities and how to select, prepare and combine them with seasonings and sauces. It contains similar information on all important animal meats and meat products, poultry, game birds and egg products. It contains similar information on all important varieties of fruits, vegetables and cheese. It covers the field of soups and beverages. It reveals basic information on herbs, spices and condiments, dips and spreads, including how to use, prepare and apply them to a wide variety of foods.

It contains a full discussion on flavor control in foods, including balancing, adjusting and correcting food and ingredient tastes and flavors, including how to mask undesirable flavors.

It also reveals how to cause flavor norms to increase or decrease. Thus, the flavor of any product can be diminished or increased, submerged or overpowered.

Gustametrics

The periodic table of chemical elements reveals their nature and their natural groupings, from which their actions and reactions are predicted. This is a periodic table of foods and ingredients which yields similar insights into their actions and reactions.

This table was constructed on the basis that there exists: (1) an orderly arrangement of foods according to classes, (2) a separation of the elements in each food class according to how people respond to them, and (3) an orderly interaction between elements of the various classes. The findings are based on laboratory procedures, judgments by large taste panels and many collaborators.

The periodic table of foods has been brought together into a master chart, called the Gustametric Chart. It integrates the classes and elements of classes of foods, ingredients and beverages.

The flavor ratings of the different elements on the Gustametric chart are based on two theorems: (1) it is possible to produce a scale of flavor *intensity* whereby any given element would be assigned an arithmetic flavor value: (2) if all the elements of a certain class are placed on one scale, one or more would be at the bottom of the scale and one or more would be at the top of the scale. In other words, for each class, the flavors range from low to high. With this part of the theorem there can be no disagreement. It is the relative placement of a given item that is subject to question and experimental determination. Example: in the class of dairy products, there can be no question but that skim milk is at the bottom of the flavor range and Limburger is at the top. Placement of the other dairy products is subject to speculation as to their exact intermediate positions.

On the Gustametric Chart all the basic food groups are rated on a numerical basis from 0 to 1000. The numerical figure appearing opposite each item represents the level of flavor intensity of that particular food when the chosen food is prepared in its simplest form. In the case of cooked foods, the process must be *steaming* under controlled laboratory test. That figure is referred to as the *Flavor Norm* (FN) of a particular food. It should be emphasized that the establishment of the flavor norm for any given food must begin with that food in its ideal condition. The resulting flavor can be charted as the *norm* or the *standard flavor* for that food. Other methods of cookery will cause the flavor norm to increase or decrease—up or down the chart. Thus the flavor of any food can be diminished or increased, submerged or overpowered.

At the top of each of the columns of the Gustametric Chart is a symbol for that particular classification of food. The categories of food have been arranged according to the order in which man normally reaches for his food. As man has always been primarily a carnivore and secondarily an omnivore, meats (fish, fowl, and beast) are listed first. Dairy products come second; foods which may be used as substitutes for meat. Next come starches, cereals, and legumes, which have been the mainstay of agricultural man, particularly in time of want. Then there are the fruits and vegetables, many of which are comparatively new developments.

Next come liquid carriers, which include meat stocks, fats, oils, milk, and water; then the beverages, the seasonings, and the condiments—those foods which, while not always nutritionally necessary, are psychosomatically satisfying.

The chart then consists of the graph listing first the *categories* of food, and second the *numerical rating* of *flavor norms* for each food included.

From the standpoint of cookery, it enables one, by means of a straightedge, to select a group of foods that are compatible with one another.

The Gustametric Chart contains only the bare minimum of foods and

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should in time be greatly expanded. The listings have been restricted to more or less well-known foods. It must be realized that there are many more foods than such a relatively small single chart can show. Separate charts are provided to show some of the varieties in a single classification. Used as a foundation, the Gustametric Chart can have endless ramifications.

Self-determination of Flavor Rating

Since any system of flavor rating must be *comparative* and all scaling methods must be established according to *relative* values, flavor rating trials may be made at will and according to the foods at hand and circumstances as one proceeds.

Bear in mind as a prerequisite for any fair weighing of flavor values you must observe the requirements of laboratory procedures. However, even in the absence of ideal conditions you should weigh flavors as you eat, if you are to consider seriously the subject matter of this book. For accuracy you should have peace, quiet, and *time*, although many worthwhile organoleptic observations can be made without them.

Start with the simplest comparisons: compare whole wheat bread with white bread, at room temperature. Compare light, medium, and dark toast with a control slice, but be sure to savor all four at the same temperature, preferably 98.6°F. Then lightly butter half of one of the toasted slices and compare it with the other. Repeat the trial by first buttering the bread and then toasting it in the broiler. Then record what you estimate to be the resultant flavor levels of the different trials. Here realize that two different classes of food have been combined: the bread is vegetable and the butter is animal. Incidentally, the toasting process is a phase of dry cookery. By pan-frying finely minced onion in a little butter and then toasting the bread in that, you can go to a much higher flavor level.

Later compare different combinations of breads and cheeses; some cool, some hot. Evaluate a medium cheddar on plain white bread contrasted with the same cheese on light, medium, and dark toast. Repeat the procedure and compare the flavor of the cheese broiler-melted with that of the cold cheese on toast as a control sample. Then go a step further and sprinkle a little crumbled herb on the cheese before melting it.

Follow this laboratory procedure with each individual food and then with combinations. Judge the effect of the different kinds of cookery, wet and dry, with identical foods, always maintaining equal trial conditions. In the classification of seafood you might start with a radical contrast of fish low in the scale compared with one that is above 50 intensity

units. Try a low-fat fish, such as one of the bass group, with one of the high-fat flat fishes, such as sole or flounder. Then contrast fish of the same genus, perhaps cod versus haddock or lobster versus crawfish. Then differentiate between organoleptic considerations involved in savoring two different parts of the same fish, some of which have substantially different flavors as well as kinesthetic values. Examples would be cod-belly versus cod backmeat, and the dark meat of tuna versus light tuna meat. Compare sand dabs with flounder and pink salmon with red salmon, which are two different species of salmon.

As we proceed through the different classifications of the Gustametric Chart there will be new comparisons of the different foods by kinds and varieties, singly and in groups, and some allusions to variations in cookery techniques. However, it is emphasized that the techniques of cookery are not covered in detail.

The concept of a norm of any given cooked food is based on the enclosure of the specimen in a package or vessel, creating temperature conditions that will heat the mass of food for just long enough to cook it; then sampling the result, both solid and liquid, when the temperature is reduced to 98.6°F. Without laboratory equipment and conditions such results can be approximated by using parchment bags or metal foil envelopes, either of which can be heated to temperatures ranging around 185° to 210°F. in a closed vessel atop the stove or racked in an oven where the temperature is controlled within the required range. Obviously any such procedures must be performed by the individual to meet specific requirements. As neither bags nor envelopes are ordinarily hermetically sealable, there will be some vapor escape with some flavor loss. Under careful procedure, however, the results should be fairly satisfactory.

Obviously other types of cookery would raise or lower flavor values. Steamed lamb is rated at 50. If it is water-cooked (two parts lamb to one part water) its valuation drops to about 40. If the lamb is roasted, the flavor rating, an average of the seared outside and the cooked inside, will rise to about 60. If it is cut into steaks and fried, it rises to about 75. If it is broiled, the rating goes to about 85, primarily because scorching takes the surface to over 100. Similar observations can be made for other meats. Sole is rated at about 62 when steam-cooked, using the entire fish; poached in water, its rating drops to about 50; deep-fat-fried it is about 75; pan-fried in fat it is about 85; broiled it is around 95. However, fillet of sole from which the skin and bone have been removed has a valuation when steamed of only 25. This is because most of the fishy flavor is in the skin or alongside the bone. The most frequent preparations of sole fillets, and most other fish fillets as well, involve frying techniques without the cook's realizing why.

Establishment of a flavor norm for any given food must begin with that food in its ideal condition and cooked by the steaming process indicated earlier. The resulting flavor can be charted as the norm or the standard of flavor for that food; the flavors resulting from any other methods of cookery can be plotted up or down on the same chart.

A flavor sample is always understood to be at 98.6°F. Thus the ideally steamed lamb starts with a rating of 50 but served cold at 60°F. it might rate ten points lower; sampled at 125°F. it would rate nearer 60.

There are still other ways of changing the flavor rating of a given food. Using beef as an example, start with the arbitrarily assumed flavor norm of 45 (see Fig. 5 on p. 9). The *inherent* flavor is represented by the horizontal line and the flavor gradient is represented by the line at an angle.

Here it is obvious that the flavor curve starts below the threshold of perception and goes to infinity, passing the upper reaches of dominance. The flavor curve below the median line represents flavors and seasonings *under* that line of the basic beef norm; and the flavor curve above the median line represents flavors and seasoning *over* the basic beef flavor norm. Only a little pondering of that chart will reveal the startling fact that the ideas thus represented can be considered as basic assertions, probably applicable to all the foods of man. The flavor of any food can be diminished or increased, submerged or overpowered, and both the matter and methodology are represented as straight line progressions from lowest to highest.

Pressure-cook one pound of finely ground meat in two pounds of water and the dilution of flavor is 1 part in 3, assuming no aroma loss in flavor. Slowly bake the same meat under laboratory conditions with equipment that makes possible entrainment of the aroma components that usually escape into the atmosphere, until it is reduced to one-third of its original mass. The flavor of one pound of finely ground meat is then concentrated in one-third of a pound, which naturally has three times as high a flavor rating.

The addition of *any* seasoning raises the flavor rating of any food, the degree varying with kind and quantity. In the small range of concentration usually employed, the seasoning's influence on the basic food will be directly proportional to the quantity added, assuming the same conditions of cookery

Salt may begin with so little as to be imperceptible as a saline taste: it is then below the threshold of perception of salinity, *but* the flavor level of the basic food is proportionately raised. Then as more salt is added it becomes identifiable as such. Beyond the median acceptance of salt we commonly say that it tastes too salty. And if it goes over 100

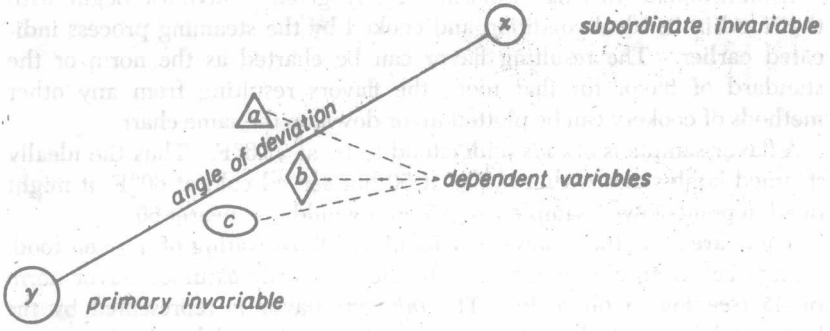

FIG. 2. PLOTTING NOMOGRAPHIC PROJECTIONS

When the flavor norm of the highest (or lowest) secondary accompanying food according to the seasoning of a given made dish) is determined it becomes (x) the *Subordinate* Invariable; the field point of reference for the nomographic Angle of Deviation (from the anchor point.)

The *Dependent* Variables (a, b and c) are the accessory foods that are coordinate with the (flavor) *Angle of Deviation.*

Once the BASIC point of reference (y) is (by selection of a given food and determination of its flavor norm) fixed, it is established as the *Primary* Invariable and anchor point of nomographic reference.

it becomes for the average individual intolerable. Bear in mind that three per cent of salt in solution in the water present in the food is rather generally accepted as constituting maximum average acceptance. Addition of salt to the basic food will have straight line taste characteristics. Granulated sugar, one of the few seasonings with no odor in low-temperature cookery and subject only to a taste curve increment, has straight line characteristics like salt, but we can take larger concentrations of sugar than salt before its sweetness becomes cloying to the average taste.

With white wine as a single seasoning additive to a basic food, beef in this instance, a little consideration of the flavor steps will reveal the same kind of results: at first not enough to be perceptible, then just enough to realize some flavor addition that may not be identified, then up the curve into the area where it is identified and liked as an agreeable foundation or background in the beef broth, which may then be called a sauce. At the median point the flavor of the beef and the wine should be in such balance that the consensus of judgment would be split on whether the beef or the wine was tasted. Any further addition of wine then dominates the basic food. Then, if the curve is pursued, it could be said that one could increasingly taste the wine rather than the beef.

The median flavor level of any solid food in or with a sauce tends to be organoleptically variable primarily according to the kinesthetic factors of the compound or food assembly. If the seasoning of a sauce is below

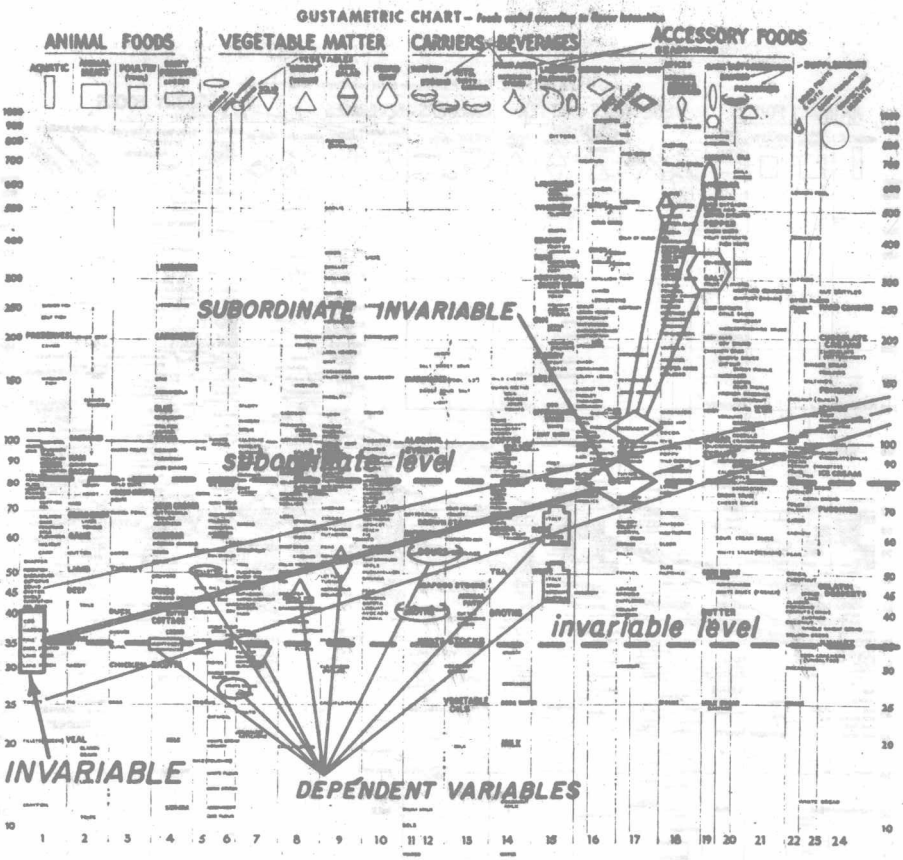

FIG. 3. USE OF FLAVOR EVALUATIONS TO ESTABLISH POINTS OF REFERENCE

Examples of Nomographic Operations. Prerequisite understanding: all basic terms refer to flavor values.
Examples: Invariable—Basic point of (flavor) reference; Invariable level of (flavor) reference; Subordinate Invariable—Field point of (flavor) reference; Subordinate (flavor) level of reference; Angle of (flavor) Deviation; Dependent (flavor) Variables.

the median line of the basic food, it can be thought of as a foundation or background which is dominated by the basic food. If the sauce is equal in flavor rating to the basic food, it parallels the basic food in flavor, and only kinesthetic variations are present. It is like a thin slice of roast beef submerged in its own juice; like fish steamed in parchment where just enough seasoning has been added in the preparational process to balance the inherent flavor of the fish. Finally, making the flavor rating

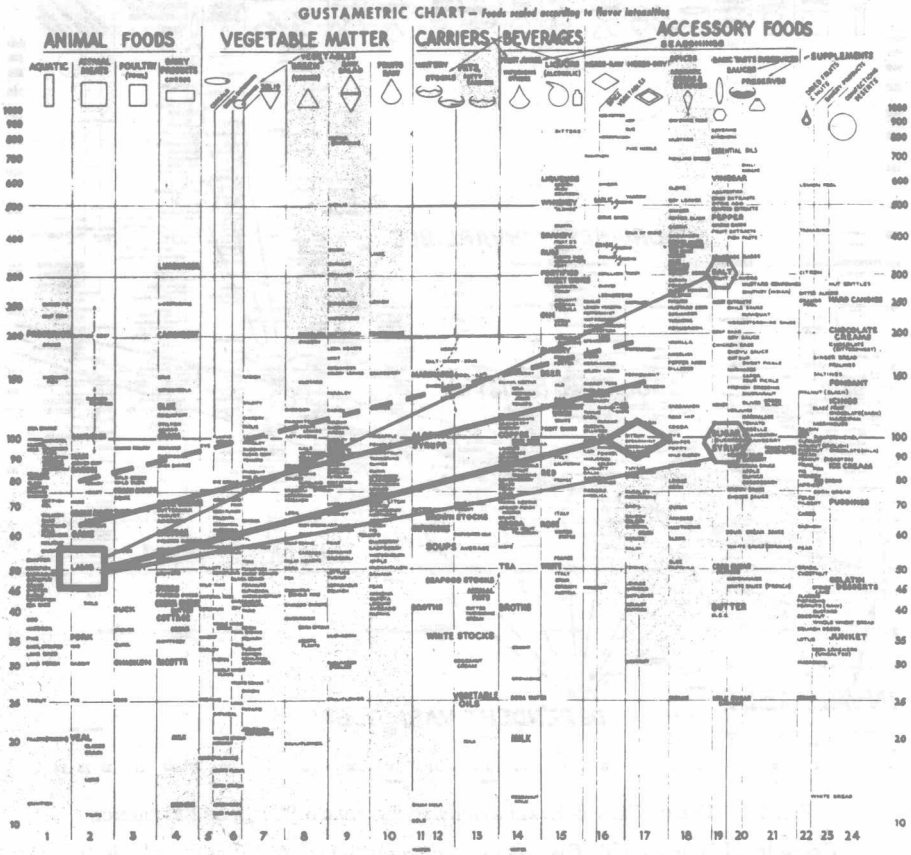

FIG. 4 ESTABLISHING THE ANGLE OF DEVIATION

The degree of the Angle of Deviation is fixed when the Invariable and the Subinvariable points of reference are established. The Angle of Deviation is constant if the Subinvariable (the dominant seasoning) is constant.

Changing the quantity or quality of the Subinvariable *will equally* lower or raise *both* Subinvariable and Invariable but will *not* alter the degree of the Angle of Deviation.

The degree of the Angle of Deviation may be (and usually is) altered *if the nature of* the Subinvariable is changed.

Example by this Nomogram:

A. Simply steamed lamb; FN 50.

B. Lamb steamed with average seasoning of mint, salt and sugar; FN raised to 60.

C. Lamb *baked* with the same seasoning; FN raised to 80.

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