

ABSTRACT OF DISCUSSION.

H. H. Schaefer inquired whether Mr. Crockett had made any attempt to purify the siliceous earth; whether the product was obtainable with difficulty because it was not being imported to any great extent, and whether it was not likely that in the near future if there was demand there would be an ample supply on the market.

Mr. Crockett answered that the purified siliceous earth had been formerly imported from Germany; there were large deposits in this country but it seemed impracticable to purify the native product which does not conform to the requirements of the U. S. Pharmacopoeia. He further stated that part of the City of Richmond was built on this deposit.

W. L. Scoville was not prepared to vote on the question of recommending the deletion of purified siliceous earth from the Pharmacopoeia. There is a plentiful supply of it in this country; the need is that it be purified. In his opinion the pharmacist could use other substances to better advantage but it is used in filter presses by manufacturing pharmacists and they obtain better results with it economically and otherwise than by use of other substances.

DEHYDRATED PRODUCTS IN COMMERCE AND IN THE SCIENCES.*

BY LOUIS GERSHENFELD.

One of the oldest and perhaps one of the best methods practiced in the preservation of foodstuffs, drugs, etc., is the use of the process of desiccation. Within recent years the latter method has been extensively employed in the arts and sciences, not only because of the fact that the use of preservatives becomes unnecessary and that a great expense in transportation and storage is saved, but also due to the fact that numerous compounds can be made available for the laity, commerce, and for the scientist, which, merely by the addition of water, will result in the production of a desired end-product.

It will be impossible to cover in detail in a brief article the many products that may be included under this head; however, the important ones will be mentioned and facts which may be of interest to all will be included.

That dehydration is an effective method for the preservation of material was recognized by the ancients in the treatment of various fruits; it will, therefore, be advisable to first consider substances which may be regarded as foodstuffs, that are so treated to rid them of moisture. It may also be mentioned that the recent world war has given impetus to the preparation of dried fruits and vegetables, because of the saving in storage, handling, transportation, etc.

There seems to be a marked differentiation between what one may term a dehydrated product and an evaporated substance. Some are inclined to use the term dehydration only when the drying has been carefully controlled, and evaporation as a term applied to substances which are dried at a high temperature (over 160° F.), one which is not carefully controlled by any specific mechanism.

The following fruits and vegetables may be mentioned as dehydrated or evaporated products that are obtainable in the market:

Apples, apricots, beans, cherries, citron, cowpeas, currants, dates, figs, grapes, lentils, peaches, peas, pears, prunes, raspberries, raisins and tomatoes. These make possible a diet of many fruits and vegetables all the year round, irrespective of climatic conditions or season.

There are two distinct methods practiced in the production of these substances, (a) sun drying, (b) evaporation. Sun drying (an ancient process) is carried out in those regions that are free from rain and excessive moisture during the drying

* Presented to Scientific Section, A. Ph. A., New Orleans meeting, 1921.

season. The fruits and vegetables are given a preliminary treatment prior to a sulphur bath, which acts as a sterilizing agent. They are then placed in trays or suitable containers in the sun. In favorable weather, six or seven days are required for thorough curing. The preliminary treatment consists in cleaning the fruit or vegetable, cutting them in some cases (peaches, apricots), peeling, coring, cutting or slicing in other instances, as is done with apples, pears, etc. Certain fruits, as raisins and prunes, are first dipped in a hot weak solution of potash. This acts on the skin, removing the bloom, thus facilitating drying. In California the open air sun-drying method is carried out extensively.

The evaporation process is beginning to supersede the air-drying process. The following important improvements are claimed for artificial evaporation (a process which is still in its infancy): (a) less bleaching with sulphur is required, (b) one is not dependent upon weather conditions, the process is under control at all times, (c) less space is required for proportionate larger quantities of material than in the sun-drying process, (d) the end-product is cleaner and less liable to insect injury, (e) they appear more attractive than air-dried products, possessing a better quality and flavor, (f) they are always ready for immediate packing. The only disadvantage thus far has been—the cost of the evaporators is so high that the evaporated material is usually more expensive than the corresponding sun-dried fruits and vegetables. The former will be marketed in large enough quantities, providing the laity is willing to pay a little more money for a product which seems to possess superior qualities.

Evaporated or dried fruits and vegetables will keep their flavors for a long time if kept in a cool, dry place. Exposed to dampness they quickly become sour or molds develop. They will retain their flavor even if less than 8 percent of moisture is present. When the latter reaches over 22 percent the vegetables or fruits begin to spoil. In preparing dried fruits best results are obtained by adding enough water to cover them, and then cooking for a few hours at a temperature just below the boiling point.

Dried Meats.—Dried meats as a foodstuff have been employed in various regions. Meat cut into strips and exposed to dry air and sunlight has been found to retain all the nutrient properties, and, when properly cooked, the resultant product is found to be palatable.

There are also found on the market to-day many preparations under trademarked names, which consist of dried and finely ground meats, either in their natural state of desiccation, admixed with other substances, or prepared with some degree of artificial digestion.

Mention may be made here of solid meat extracts. The latter are employed by the laity as a stimulant and condiment, and by the scientist they are used extensively for the preparation of culture media. Meat freed from superfluous fat and bone is extracted with water at a temperature which varies in the different processes. The liquid extract is then concentrated in vacuum kettles until pasty or solid extracts are obtained. The latter are not entirely free from water, containing anywhere from 10 to 20 percent of moisture. On account of the large amount of mineral constituents, due to concentration and the small amount of moisture remaining, the conditions are not such as to maintain the life of the commonly found bacteria that cause fermentation.

So-called dried soups are commonly found marketed as efficient stimulants. These products are usually shaped into cubes, and consist either of meat extract alone or of several varieties of dried vegetables, cut and mixed with dried herbs as flavoring agents, a small amount of gelatin, and a meat basis.

Milk.—The drying of milk and the reduction of the product to a powder has recently been introduced on a very large scale in this country. Desiccated milk was first produced from skim milk and supplied mainly to bakers and confectioners. This was used either in a dry state or brought back to its original condition by adding the amount of water extracted from it.

Whole dry milk has been brought to the attention of the American public probably more so by the recent advertisements of "Klim." By removing the water from milk under such conditions that the soluble principles in the milk are not coagulated during the drying process, a product will be produced, which, when kept in airtight containers, will keep for a long time and can readily be restored to its normal state by the addition of the proper amount of water. Considering that liquid milk contains about 88 percent of water, one can readily see the great economy in so far as saving in transportation is concerned, as well as in the fact that the sanitary regulations can be guarded more closely than can be observed in the marketing of liquid milk. Two methods are mainly employed in converting cows' milk into a dry powder. In one, the milk in form of a spray is forced into a chamber of hot air. The air currents by driving the dry particles against a screen hold the solid portions and the air is allowed to pass on. In the other method, the milk is caused to adhere in a film on heated cylinders (or on metal plates *in vacuo*). As the cylinders revolve, the dried milk is scraped off. The latter is collected, subjected to further drying if necessary, and reduced to a fine powder. In both methods the milk is usually condensed in a vacuum pan, before entering the drying machines.

The keeping qualities of dry whole milk are not as good as dry skim milk. In the case of the former, if it is allowed to come in contact with the air, the fat becomes rancid, and then the fine flavor and freshness, characteristic of cows' milk, is lost. Dry whole milk usually contains anywhere from 25 to 30 percent of fat, and some cases have been reported where as high as 40 percent of fat has been found.

Dried Eggs.—The processes of evaporation and desiccation of eggs have received a greater impetus as a method of preservation, more so since the latter method was employed as a better means of storing and utilizing eggs to the best advantage. Dry egg products made from fresh eggs can be kept for a reasonable length of time if the proper precautions are observed. The method used in drying is usually one in which the eggs are spread in a thin film on a dry surface or by forcing the eggs into a chamber of hot air, as described under milk. The temperature during drying is kept below 50° C. so as to prevent coagulation of the albumen. Some manufacturers add salt or sugar or both to aid in preservation.

Dry eggs are employed by bakers, confectioners, etc. There have been more adulteration and misbranding in the marketing of so-called dry eggs than in any other desiccated or evaporated product thus far introduced. Various protein materials or starchy substances colored yellow have been and are marketed as egg powders,

and offered to the laity for baking, etc. They contain in some instances only the whites or yolks, and in many of the samples no egg at all is found. As such they are to be regarded as adulterations.

Other Dried Foodstuffs.—Dried fish (especially herring, mackerel and cod) are used extensively by the American public. This makes a wholesome and delicate dish. The drying of fish as a process of preservation is an ancient one. Many varieties of fish (as well as meat) change in physical appearance during the drying process, becoming less attractive as a foodstuff.

Many trade-marked products are available in which the basis is gelatin admixed with flavoring agents and other substances. These, when mixed with water to which is added sugar and flavors, are employed as a dessert in many localities.

There are marketed so-called powdered puddings, pan-cake flour with powdered buttermilk, and a host of other trade-marked formulas which result in the production of delicious end-products, after the proper amount of water is added, and heat applied if necessary. Are not biscuits, crackers, macaroni and noodles dried products?

May we not regard as a dried product that substance for which we Americans are chided by our European brethren—chewing gum? This is a chopped or finely ground chicle which is boiled to the proper consistency; sugar and flavoring are added and the mixture is kneaded into a dough. The latter is worked, passed between revolving rollers and cut into the desired shapes and sizes; it is then dried and wrapped. Mention may also be made of dry cocoanuts, and hard candies.

Without going into further detail, one can readily observe the large and ever-increasing numbers of these dried products that are being employed as foodstuffs, and still look forward to many additions that will revolutionize marketing conditions. But as in all changes, new problems are usually encountered. The sanitarians should proceed to caution manufacturers of the many regulations that are to be heeded. The temperatures employed in the drying process are not sterilizing temperatures. It is therefore of the utmost importance to *closely supervise the sanitary conditions of the plant where the products are being made. Factory inspections are more desirable and of greater importance than the examination of the unadulterated end-products.*

Dehydrated Products in the Sciences.—The pharmacist was perhaps one of the first to employ drying for the preservation and the reduction of the bulk of material; he and the chemist began to employ this process as a means of arriving at uniformity in the strength of products.

Just as in foodstuffs, the ancient method of sun-drying is still practiced in various regions for the drying of drugs (by exposing them to the action of the rays of the sun). The use of artificial heat alone or with the aid of vacuum apparatus is employed more extensively for the drying of drugs and chemicals, and in the reduction of the bulk of liquid extracts to semi-solid or solid extracts.

Following pharmacists and chemists, other scientists began to use the process of drying for the preparation of material. Dried immunized blood sera (the sera obtained from animals immunized against specific bacteria, and dried *in vacuo*) are valuable agents in the clinical and bacteriological laboratory, used for the identification of the many varied microorganisms that possess almost identical

characteristics. Dried and powdered blood, other than being used in the food supply, has recently been marketed (usually admixed with other material) as a valuable product to increase the coagulation time of blood.

One of the most important uses of dehydrated products, a value which will be displayed more and more in the future, other than the fact that there is a reduction in bulk, a saving in handling and the preservation of material, is that preparations of simple and complex formulas of *accurate strength* will be quickly available by the addition of the proper amount of water and subsequent heating, baking or sterilization.

Mention was made (when foodstuffs were discussed) of the various formulas that are available in which puddings, desserts, and even ice cream and cake, can be quickly prepared; it remained for the bacteriologist to perfect dried products to a still higher degree of usefulness. He, in his search for simple formulas and short cuts in the technique of the many varied preparations that may be required in investigations, introduced the so-called "*Dehydrated Culture Media*."

"Dehydrated Culture Media" are media in a dried powdered form ready to be prepared into various liquid or solid media by merely restoring the moisture with distilled water and sterilizing the end-product. The advantage of these products is in the fact that it is possible to obtain anywhere at any time any quantity of a medium of a constant adjusted reaction or hydrogen ion concentration, which will be identical in composition and reaction with all other lots of the same medium prepared on a previous occasion. The dehydrated media have also made possible the more extensive use of many of the media of special formulas or media fortified with natural fluids. As a dry powder, they are kept in containers which, if tight, will preserve the contents indefinitely.

The writer's thought in preparing this paper was to direct attention to the wide use of these dehydrated products, so that pharmacists would know more about the application of desiccation to products other than pharmaceutical.

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SOME NOTES ON THE ASTRINGENCIES OF RED ROSE AND PALE ROSE.*

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Last year a paper entitled "The Tannin of Red Rose" was read before this body. In it were discussed the properties of that astringent principle with the result that characteristic differences from other known astringent principles were shown.

Because of the interesting features of this constituent of Red Rose, an examination of Pale Rose was undertaken for report to this meeting.

Concerning the presence of a "tannin" in Pale Rose there seems to have been doubt, for, though some authors state positively its existence in small amounts, Maisch, in his "Manual of Organic Materia Medica," 1892, gives as constituents, "Little volatile oil, mucilage, sugar, tannin (quercitrin?), malates, etc." Certain it is that the matter had not attracted the necessary attention to decide this question.

* Read before Pennsylvania State Pharmaceutical Association, 1921.