All of the commercial samples were of excellent general appearance. Sample No. 4 was especially bright, bold and clean. Sample No. 5, consisting of roots, was separated from No. 4. The results on the study of the commercial samples indicate that the normal ash of the drug is usually between 3.5 and 4.5 percent.

The University of Minnesota samples were prepared from material collected during the latter part of August and the first of September. All parts were fairly well cleaned before being dried, the underground portions being rinsed with water. Some adhering soil, however, was not removed, as we found upon separating roots from rhizomes. This shows up in the ash of the rhizome and roots No. 8.

The results on the study of the Minnesota drug indicate that the normal ash is between 3.5 and 4.5 percent. From our results it appears that there is very little difference between the normal ash of the roots and the rhizomes. This is indicated in the study of the U. of M. and the commercial samples.

The limit of 6 percent for total ash, set by some foreign pharmacopoeias as pointed out by Viehoever,[1] is undoubtedly too stringent. A limit of 8 percent for total ash would no doubt be satisfactory.

Relative to the acid-insoluble ash we are inclined to believe after a careful study of Viehoever's data, as well as our own, that this had better be set at 3.5 percent for a maximum. The difficulty in cleaning the drug and the relatively high normal ash of the overground portions of the plant as presented herewith, indicate that a rather liberal allowance should be made.

In any event, it is highly important that the amount of dirt permitted in vegetable drugs be limited. We should have clean drugs as well as drugs high in medicinal value. Some of our recent studies indicate that even small amounts of so-called dirt may possess therapeutic qualities, quite different from the drug from which the dirt was separated. Who knows what the therapeutic action of the dirt in our crude drugs is?

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BACTERIA IN (SO-CALLED) SOFT DRINKS.*

BY LOUIS GERSHENFELD.

Scientific investigation has given ample proof that there is a close connection between the spread of diseases and the water that is used in the same community. A pure water supply is of first importance in the prevention of disease and in the conservation of public health.

In the past, and from time to time, there has been considerable discussion over the superiority of the chemical or bacteriological examination of water. This has been quite useless, for though a bacteriological analysis may be shown to be of greater importance, a chemical examination will detect the presence of certain chemical substances, from the relative amounts of which an inference may be drawn as to the existence of pollution with human or animal excreta or, in some instances, with poisonous or injurious compounds. It is, therefore, apparent that both examinations should be carried out.

[1] "Commercial Hydrastis," A. Viehoever, JOUR. A. PH. A., 9, 779 (1920).

* From an article presented by the author before Pennsylvania Pharmaceutical Association, 1920 meeting.

It is with this in mind, that communities are compelled, either by state or other recognized authority, to determine the purity of their water supplies, by performing bacteriological and chemical examinations at such intervals as may be found necessary for the particular community.

It is evident, of course, that steps taken for the careful guarding of our water supplies are justifiable. Furthermore, it is apparent why sanitarians soon became interested in the control of milk, cream, ice cream, ketchup and other food supplies, so as to be assured that these products will not introduce disease into the communities. But there seems to be one class that has been sadly neglected by the sanitarians. There are many who use soft drinks (bottled or otherwise) almost exclusively for drinking purposes.

The writer is aware that some municipalities attempt to guard the market supply of soft drinks, but he is assured that such effort in behalf of the health of the respective communities is indeed small. A pure soft drink is just as essential in the prevention of disease as is potable water, milk, etc. The chemical methods for examining soft drink supplies will not detect the presence of bacteria, much less assist in their identification. A bacteriological examination of such water will, however, reveal the number and in some instances the types of bacteria in a given volume. The fact should not be overlooked that, even though a potable water was used, the finished product may be highly contaminated, due to careless and unsanitary methods in the manufacture of the preparation.

The bacteriological examination of soft drinks is a direct and delicate test of the sanitary efficiency of the plant, and of factors that have an important bearing on the value of the finished product. An analysis of the bacterial content of soft drinks will quickly reveal the hygienic conditions prevailing at the time of the manufacture of the particular preparation. Such early examination will prevent epidemics, inasmuch as they quickly act as a check, if the manufacturer is on his guard. It is advisable and necessary to make periodical inspection of the plant, check up the environmental factors, observe the cause of the pollution, and advise remedial measures to correct defects that may exist.

It has been the pleasure and privilege of the writer to guard, from a sanitary standpoint, the making of soft drinks, and it is for this reason that he advises all manufacturers, not only of soft drinks but of all bottled water, to protect themselves by carefully supervising their finished preparations. It is advisable that they start early and control the bacterial content of their samples, before they are compelled to do so, as there is no doubt that, in the near future, legal requirements will govern such supervision.

The community has a right to demand that whatever qualities soft drinks may claim and possess, these should be secondary to cleanliness. It should be the duty of those who guard the health of the community to determine whether or not these products are free from contamination. The public is demanding this, and they have the right to expect it. Many laymen are under the impression that such strict supervision is at present being conducted by the proper authorities.

The water used in the manufacture of the soft drinks in the plants under the writer's supervision, was usually represented by potable samples. The contamination is frequently due to the careless washing of the containers, or the introduction of a contaminated flavoring syrup, or by other details of the opera-

tion. Actual inspection of the plant at every stage of its handling, together with a close bacteriological examination of all ingredients entering into the preparation of the beverage will quickly disclose the responsibility for an unsuitable end product. Such inspections and examinations save untold worry and considerable expense, in the long run.

An artificially carbonated water prepared under clean conditions will usually show a low bacterial content. In fact, the writer carbonated a number of samples on one particular occasion—the containers were cleansed properly, the flavoring syrup was low in bacteria, and all other procedures were guarded as they would be by any other layman familiar with the simple technique of filling the bottles; the bacterial content of the finished preparation was lower Cc. per Cc. than was observed in the water used in preparing the product.

To actually show what the condition is, so that other workers may join in further investigating this most interesting problem, and that the honest, modern manufacturer who produces soft drinks (bottled or otherwise) may prepare a commercially possible, potable product without burdensome restrictions, the writer obtained 15 samples of different brands of soft drinks. Many of these were bought during the months of April and May 1920; the writer personally obtained them from lots that were delivered (in most instances) in his presence. He was thus assured that the samples represented the finished product, as sent out from the plant by the various manufacturers, and does not represent samples that were allowed to incubate at room temperature or in a hot-bed, as observed in many of the retail stores.

Of the fifteen, six (or 40%) were found to contain *B. Coli* in 10 Cc. portions. Lactose Bile and Lactose Bouillon were used for the presumptive test of *B. Coli*. Three 10 Cc. portions were used. In all of the six reported instances, *B. Coli* were isolated from the fermentation tubes. One gave considerable gas with all three 10 Cc. portions. No *B. Coli* were found, but *B. Welchii*, another sewage bacterium, was found present.

Total bacterial counts on agar at 37° C. after 48 hours incubation:—Two had counts lower than 100 per Cc. Three samples showed the presence of less than 300 bacteria per Cc. Three others had a bacterial content ranging between 500 and 1,000 per Cc. The other seven had a count of over 1,000 bacteria per Cc. The bacterial count on agar at 20° C., in almost all of the foregoing samples, was somewhat higher than the 39° C. counts.

Some of the organisms found were staphylococcus, short and long chain streptococci, *B. Coli*, *B. Welchii*, *B. Cloacae*, *B. Subtilis*, *B. Mycoides*, *B. Mesentericus vulgatus*, diphtheroids, streptothrices and molds.

The occurrence of some of the foregoing does not speak well for the cleanliness of the samples and the desirability of frequently indulging in such drinks. More attention should be given to the sanitary aspect of this important matter so that all concerned may profit thereby.