we want the best, and we can better afford to curtail on candy, sodas, etc., than on drugs and medicines.

In some of the U. S. P. preparations the use of glycerin could be readily eliminated, as, for example, Fluidextract Cascara Aromatic, which contains 20 percent of glycerin, and Syrup of Hypophosphites. The fluid glycerates might well be dispensed with until after the war, and fluidextracts used instead. Such changes would be of real value and help to reduce the consumption of glycerin materially.

As a final problem, I might mention the difficulties in transportation both in obtaining supplies and in shipping finished products. Delays of this kind are very annoying, both to the manufacturer and to the consumer, but we must expect such delays and so regulate our affairs as to produce as little inconvenience as possible.

In conclusion, then, we would ask for all the help you can give in increasing the number of graduates in chemistry and pharmacy, in regulating your selling prices to conform to the present cost of goods, in avoiding unwise restrictions on the use of sugar and glycerin and alcohol in pharmaceutical products which are liable to spoil, and in allowing for delays in transportation in ordering your supplies.

ANALYTICAL AND CHEMICAL RESEARCH DEPARTMENT,
PARKE, DAVIS & CO.,
DETROIT, MICH.
July 31, 1918.

THE CONSERVATION OF CRUDE DRUGS.*

BY HUGO H. SCHAEFER.

Much has been said and written of late regarding the conservation of glycerin, alcohol, syrup, etc., products which are used as solvents for drugs and their active principles, but practically nothing has been said about the conservation of the crude drugs themselves. To-day there is a shortage of very many botanicals, some are practically unobtainable, others are scarce, and all have increased more or less in price. These conditions are due partly to the shortage of help restricting the collection, partly to the enormous quantities bought by our and the allied governments, but largely because Europe is the habitat or source of supply of a great many of our official drugs. Much, of course, has been done to overcome this shortage by encouraging both the collection of native drugs as well as the cultivation of drugs which up to the present time were chiefly imported from Europe. Nevertheless, any means which might conserve the supply at hand ought to receive attention.

It has come to the author's attention that drugs often contain a much higher percentage of active constituents than the U. S. P. requires. Many official drugs will contain only slightly more than the requirements call for, but some may be obtained on the market which contain entirely too much active constituent. Jalap, for instance, has been found to contain as much as 15 percent resin instead of the 7 percent required, ipecac with 3 percent soluble alkaloids instead of

* Read before Section on Commercial Interests, A. Ph. A., Chicago meeting, 1918.

1.25 percent, cultivated belladonna, stramonium and hyoscyamus are often found to contain more than double the required percentage of alkaloids.

What happens when such drugs are dispensed? If the drug is assayed it will probably be sold per unit of active constituent for manufacturing purposes. But suppose the manufacturers cannot absorb all of this high quality drug or suppose it is sold to the retailer without assay, naturally the drug or its preparation, when dispensed, will be considerably over strength and the patient will receive an overdose of the drug. This overdose may or may not be harmful, but in either case the excess of drug is lost—is wasted. How much is wasted in this way is hard to estimate, but of 100 assays of various U. S. P. drugs made by the author during the last few months the average drug was found to be 23 percent higher in active constituent than is required, showing that 23 percent of these drugs would be wasted if dispensed by the druggist in any form without first being assayed and adjusted by some means.

How could this be overcome? The U. S. P. in its directions for making tinctures for which assays are given, directs that after an assay has been made the volume of the unfinished tincture should be so adjusted that the finished product will contain a certain quantity of active ingredient. In other words, if a druggist desires to make tincture of hyoscyamus he must purchase an assayed drug containing not less than 0.065 percent alkaloids and after the tincture has been made he must assay it and adjust it so that the finished tincture contains not less than 0.0055 Gm. and not more than 0.0075 Gm. alkaloids in 100 mils. How many pharmacists are in a position to do this? And yet if it is not done the preparation may be too strong, the patient may receive an overdose and the excess of drug may be wasted. Would it not be much better to adjust the strength of the powdered drug? Would it not be more practicable to allow the wholesale druggist or the crude drug merchant, after assaying a drug and finding it above strength, to adjust it by diluting it down with some inert material? Then all assayed drugs of the Pharmacopoeia would be uniform and the overdosage and waste would be eliminated. A pharmacist could buy such a standardized drug from a reputable house and after making his tincture carefully, would be sure that the percentage of active ingredient in the finished preparation would fall within the limits required by the U. S. P. Such tinctures would then truly represent a 10 percent preparation of a standardized drug and one mil of a fluidextract would correspond to 1 gramme of the drug and so with all other official preparations.

Of course, immediately the argument might be brought forth that if such dilution of powdered drugs were allowed, it would simply afford another means for the unscrupulous dealer to market inferior products, but upon further consideration it may be readily seen that diluting drugs with inert material is no different from mixing high grade drugs with low grade in order to obtain a product of exact U. S. P. strength and such mixing is no doubt done every day and is considered legitimate. Or again, it is no different from diluting a fluidextract made from a high grade drug with additional alcohol or menstruum to bring it down to the proper strength as the U. S. P. directs.

No doubt many firms have been in the habit of diluting powdered high grade drugs with extracted drugs or other material, but it is the object of the author in writing this paper to bring about a discussion which may help towards making

this, at present questionable procedure, legal. In the opinion of the author more uniform drugs and preparations could be obtained; overdosage could be prevented, large quantities of drugs could be conserved and incidentally money could be saved. The druggist could make his preparations without being required to assay them and to adjust them, if the diluting of assayed drugs with some inert material were officially sanctioned.

DISCUSSION.

C. O. EWING: This is a question upon which I cannot speak officially and my remarks must be so accepted. It is true, that there are some points in favor of such a procedure; one point mentioned was that it would enable the average pharmacists to make preparations which would not require standardization, if otherwise properly prepared. This might be so, if great care was invariably exercised, but we must admit that there are in the profession some people who cannot be made to be careful at all times, and I am of the opinion that there is no fool-proof method of securing an absolute uniformity of standardization. I think in the preparation of U. S. P. products of which standardization is required it should be done.

C. H. LAWALL: It seems to me that a solution of this problem, as to whether or not it is proper, may be found in the statement made in the Preface to the Pharmacopoeia, which is for the guidance of the manufacturer and the retail druggist who choose to take advantage of it, to the effect that when a product conforms in character to the standards of the products made by the official method, it may be made by any other method. The official procedure need not be followed provided the end products conform to the official requirements.

A. R. L. DOHME: I want to point out one thing that occurs to me in connection with this paper. Everybody who has percolated drugs to any extent knows that, given a drug of a certain alkaloidal percentage for percolation it is practically impossible to secure by any percolation method known an absolutely correct product containing all the contents of that drug. Standardized drugs have their undoubted advantages in many ways, but the uncertainty of a percolation securing all the alkaloid or active principle makes the preparations of them to that extent uncertain.

C. O. EWING: It occurs to me, regardless of how we prepare the finished product, the scientific way is to standardize that. The standards for crude drugs in the Pharmacopoeia are purposely much lower than we can ordinarily expect, because if they were placed too high a large quantity of the drugs would be of so low a standard that they could not be used. The scientific way is to standardize the end product.

J. P. SNYDER: I have read the statement that Professor LaWall refers to, but I think that has reference to the manufactured preparation and not to the crude material.

J. M. FRANCIS: I think the gentleman has overlooked one of the most important features connected with drug conservation. He perhaps refrained from referring to this phase of the matter purposely, but it seems to me that, under the present conditions, one of the most important things before this Association is using its influence in some measure for bringing about certain changes in the specific use of such drugs as belladonna, digitalis, and perhaps others. That digitalis leaves should be gathered from plants of the second year's growth was changed in the U. S. P. IX, and I think the former provision was needless and wholly unnecessary, provided the drug is properly handled and cured and stored. I have seen belladonna grown in the United States better than was ever imported from Europe. It assays in many instances three times the standard required by the Pharmacopoeia. The Pharmacopoeia specifies belladonna leaves containing not more than 20 percent of stems. I have seen belladonna stems with alkaloidal content far above the standard. Why then force the belladonna growers of this country, the drug buyers or the drug manufacturers, to discard such a large portion of this available plant? The same applies to other drugs.

C. H. LAWALL: I can see no reason why such stems should be discarded.

C. O. EWING: I understand there is some demand in the trade for belladonna stems at the present time; but I may say that, recently, belladonna stems have been released by the Department.

H. V. ARNY: I make a motion that this paper be brought to the attention of the U. S. P. Revision Committee.

J. M. FRANCIS: I am sorry the gentlemen have failed to get the drift of my remarks. It comes back to the matter of economy and conservation after all. The suggestion as to the use of the stems of belladonna is exactly in line with the idea of using corn for feeding chickens instead of feeding it to human beings. Valuable grain should not be used for stock food when it is needed for feeding people. The alkaloids are present in the belladonna stems and the stems should be used in the best possible way, and I maintain that the idea of conservation would require that they should be used in the same way as the leaves are. What I have said does not apply to the importation of the drug from abroad. I am talking about the conservation of the drug grown in this country.

C. O. EWING: I think the provisions of the Pharmacopoeia cover this question, if the end product is of standard strength.

CHAIRMAN R. P. FISCHELIS: I make this suggestion; that instead of referring the paper to the Revision Committee it be referred to the Committee on Conservation that is to be appointed. We have asked the Council to appoint a Conservation Committee, and through this Committee it will also reach the Revision Committee.

H. V. ARNY: Then I make the motion that Dr. Schaefer's paper be referred to the Committee on Conservation.

A. R. L. DOHME: The Committee on Standards of the American Drug Manufacturers' Association has made a definite recommendation to the Revision Committee that in the interests of the conservation of belladonna the official requirements of belladonna, instead of being confined to the leaves with a certain amount of stems, include the whole plant. This, I think, should apply to henbane and other drugs as well as belladonna.

C. O. EWING: Right now I am thinking of a drug that should be included—ipecacuanha and ipecacuanha stems. The U. S. P. VIII specifies that the stems can be of certain length—I don't recollect the exact figure—and the present Pharmacopoeia specifies 5 percent of stems. Within the past year quite a number of samples of ipecacuanha and ipecacuanha stems have been assayed in the Department, and in a number of instances we found that the stems contained more alkaloid than the root itself. It is waste not to use a valuable product.

A. R. L. DOHME: Nearly fifteen years ago I presented a paper before the Scientific Section of this Association in which I proved that the stems of ipecacuanha were richer in alkaloid than the root, and, at that time, I recommended to the Revision Committee the inclusion of the stems of ipecacuanha as well as the root. In that same paper I brought out the point that the Carthagena ipecacuanha was even more rich in alkaloids than the Rio, which was the only one officially recognized, and the Revision Committee, in its wisdom, adopted the idea of making the Carthagena official as well as the Rio. I contend that the stems should be made official as well as the root.

C. O. EWING: There is no question at all but that we have the finest pharmacopoeia extant, but there is still room for improvement. It needs some revision and it is needed now. I do not think that we should wait as long as we ordinarily do for the next revision.

C. H. LAWALL: We are working on the Supplement now, which we hope to have ready at the time of the next Convention. If any of you gentlemen have any specific recommendation please send them in to the Revision Committee as soon as possible.

The motion to refer the paper under discussion to the Conservation Committee was adopted, and also a motion by A. R. L. Dohme requesting the U. S. P. Revision Committee, if possible, to issue the Supplement, covering important items, during this year. Other subjects of conservation, not closely related to the paper, were presented; these will be reported in the minutes of the Section.—EDITOR.

THE ADVANCE BY KILOMETERS.*

BY H. V. ARNY.

Recently a friend of the writer, requested to subscribe to a war-fund in the guise of "a mile of dimes," responded as follows:

> While I heartily approve of your fund, I disapproved with equal heartiness of the way in which the money is raised. To an ardent metricist like myself the

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