osote, or both, are not indicative of therapeutic strength, and that the best procedure, apparently, for the Pharmacopœia, would be to eliminate the phrase "most of it" in the paragraph "when distilled most of it comes over between 200 and 220° C." and to require that, when distilled between 200 and 220° C., *a certain specified percentage of distillate (by volume) shall be obtained,* probably between 80 and 90 per cent., as indicated by the experiments of Parry and Becker.

It might be desirable, also, to raise the official specific gravity of creosote slightly, so as to ensure the presence of more guaiacol. The higher the gravity the greater the percentage of guaiacol, since guaiacol has the highest gravity of the several principles of creosote. The U. S. P. (VIII) gravity (corrected) of 1.078 at 25° C. is about 1.085 at 15.5° C. (the B. P. standard is not below 1.079) and this is lower than the gravity of either guaiacol (1.143-1.149 at 15° C.) or creosol (1.0894 at 13° C.). As has been shown (Am. Journ. Pharm., L. F. Kebler, 1899, 411), a gravity of 1.070 at 15° C. can be easily met by a creosote that does not contain any guaiacol. Parry recommends a gravity of 1.085 at 15.5° C. or about 1.079 at 25° C., which latter is practically the same as the present (corrected) U. S. P. gravity of 1.078 at 25° C.

ADULTERATION OF DRUGS.*

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The Food and Drugs Act of June 30, 1906, was enacted primarily for the purpose of preventing the manufacture, sale or transportation of adulterated, or misbranded, or poisonous, or deleterious foods, drugs, medicines and liquors. I would emphasize the words *adulterated, poisonous* and *deleterious drugs,* as they are in line with what I have to say this evening and because they have an important bearing on the other topics on the program, viz., the "Richardson amendment."

The Food and Drugs Act includes under the term *drug* all medicines and preparations recognized in the United States Pharmacopœia and National Formulary, for internal and external use, and any substance or mixture of substances intended to be used for the cure, mitigation or prevention of disease, of either man or other animals. This little word *drug* with its four letters is fraught with a mighty meaning. By the provisions of this law it embraces within its scope not only all the products enumerated in the U. S. P. and the National Formulary, which your association publishes, but every substance described in the most comprehensive dispensatory or dictionary of medicine, every true patent medicine and every popularly so-called *patent medicine,* every nostrum; all manner of "dope" if you please. Indeed it seems that we may catalogue here almost everything mineral and vegetable, and some animal, that God has created and that man, aided and abetted at times by the devil, has devised or fabricated. The surf and weeds of

*Read before the Denver Branch.

the beach, the metals of the mountains, the chalk and clay of the plains, the weeds and flowers of the fields; bugs that crawl, insects that sting, beetles that bite; all have been offered to poor, sick, suffering humanity, and the lower orders of fauna, to alleviate their ills, and all come within the provisions of the Food and Drugs Act. Medicines for the horse, cow, the chickens, the cat and the dog, are subject to the same legal requirements as those for man. It is appalling what a vast list of substances falls within this category.

There are described in the National Dispensatory approximately 5000 substances that are used or have been tried as medicines! This does not include any of the bottled and boxed "remedies," "cures," "balms" that infest every drug store. A brave man he would be who would undertake to count this class of material. It has been estimated that there are at present on the market in the United States no less than 50,000 different kinds of drug products, proprietary and other kinds. Think of it! Fifty thousand varieties! Fifty-seven varieties of pickles hardly make a ripple in comparison. Out of this vast number only about 1500 are described in the United States Pharmacopœia and National Formulary.

The little word "food," with the same number of letters as in drug, is not nearly so expansible. There are comparatively few kinds of natural substances that are fit to eat, and the number of edible products manufactured from them are fewer still. This is fortunate for us, for we all know that the closer we keep to Nature's foods the better we are nourished and, incidentally, the cheaper. It is reported that a group of chemists in one of our technical schools is seriously attempting to manufacture foods from petroleum. Let us pray that they may be unsuccessful! We've been abused enough by coal tar, let's not insult our stomachs by providing paraffin steaks or hydrocarbon jelly, no matter how artfully masked by the magic of chemistry they may be. Let us rather encourage these chemists to till the soil and feed us bread.

We sometimes think we have an oversupply of brands of breakfast foods on the market, but they are like Gideon's band compared with the whole Philistine army of headache cures or rheumatism remedies.

Speaking of breakfast foods and drugs, it seems whenever a numbskull with a fat pocketbook concocts a breakfast food and burns and frazzles it, or loads it with husks or hulls so it isn't fit to eat, he brands it as a medicinal agent, claims that it nourishes the brain, soothes jaded nerves, cures constipation, etc., and then, with the aid of a cunning advertising agent, he proceeds to wax opulent. I am not far from the truth when I say that whatever in nature is not fit for food is, or has been, classed as a drug. There is surely food for reflection in this.

I have enlarged on this matter of the scope of the term drug in order to emphasize what a colossal task is before those of us who are charged with the enforcement of the Food and Drugs Act. It will take time and money and brains and courage, lots of each, to carry out the intent of the Congress and the wishes of the people in this regard. To enforce the law in respect to drugs will require more courage, more money and a higher order of chemical knowledge than in respect of foods, because of the relative difficulties of the problems involved. The analysis of foods is by no means an easy task, but the examination and analysis of drugs, simple or mixed, are usually more complex and difficult, for reasons that are obvious. And yet there are those who criticize the Chief of the Bureau of

Chemistry for the employment of a Rusby at $20.00 a day or a Kebler at a salary that is but little beyond the cost of living at the present day.

But coming to the subject of this paper—What is it that constitutes adulteration of drugs? To what extent and in what manner is it practiced at the present time? According to Section 7 of the Food and Drugs Act, a drug is regarded as adulterated, first, if when sold under or by a name recognized in the United States Pharmacopœia or National Formulary, it differs from the standard strength, quality or purity, as determined by the test prescribed in those standard texts. This fundamental principle is qualified or modified by the provision that no such "official" drug shall be deemed adulterated if the standard of strength, quality or purity be plainly stated on the label, although the quality may differ from the official standard. In the second place, a drug is held to be adulterated if its quality, strength or purity fall below the professed standard or quality under which it is sold.

It is plain that these two clauses of the law defining adulteration affect only a small proportion of the vast number of drugs and medicines that have just been mentioned. In fact, broadly speaking, the crude and refined natural drugs and the manufactured, synthetized chemical compounds used in medicines, together with the simple extracts, tinctures and solutions of them, are the only classes of drugs clearly affected by these provisions. To the remaining tens of thousands of legally defined drugs, proprietary medicines, "patents," etc., the law does not apply as to adulteration, but only in regard to branding.

Although the stated purpose of the act is to prevent the manufacture and sale of adulterated, or misbranded, or poisonous, or deleterious foods, drugs and medicines it is obviously anomalous to attempt to restrict traffic in poisonous or deleterious *drugs* and *medicines*. A very large proportion of the known drugs are poisonous and hence would be deleterious. Many of them are potent, virulent poisons. Drugs stripped of their poisonous ingredients in many cases would be adulterated within the meaning of the law. When one speaks of a *deleterious medicine,* he should immediately qualify his remarks to clear up the antithesis. In fact, the statement that any substance is deleterious should always be made guardedly, owing to the range of tolerances of the human system and the idiosyncrasies of individuals. For instance, we may say that acetanilide is deleterious, but one person may consume a whole case of "Bromo Seltzer" without turning blue, while another may show the symptoms of acetanilide poisoning by merely looking at the stuff through the bottle. Lord Byron said:

> " 'Tis pity wine should be so deleterious,
> For tea and coffee leave us much more serious."

When sifted, therefore, the Food and Drugs Act aims to prevent traffic in adulterated and misbranded drugs. This aim is high enough. I have no doubt that each of you gentlemen has observed time and again the beneficent effect of the law and has noted the improvement in the quality of drugs, especially the crude drugs, sold to you.

In the drug markets of the world there are today, as there have been since the beginning of pharmacy, two classes of merchandise, the genuine and the adulter-

ated. How closely the Century Dictionary definition of "drug" differentiates between these two classes, viz:

"(1) Any vegetable, animal or mineral substance used in the composition or preparation of medicines.

"(2) A thing which has lost its value and is no longer wanted; specifically, a commodity that is not salable, especially from overproduction, as a *drug* in the market."

A genuine, pure drug is a thing worth while; a trusty weapon in the hands of the physician and a boon to the sick. But a drug that isn't a drug, the thing that has lost its value, its potent principles, should find no place in the pharmacist's stock. Adulterating food is bad enough, but the adulteration of drugs is so infamous that inquisitorial punishment is none too severe for him who stoops to practice it. In about the proportion that the number of those in good health is vastly greater than those in sickness, the adulteration of food affects almost entirely the healthy. The sophistication of drugs, however, reaches those utterly unable to help themselves. Life itself may depend, as it often does, upon the purity and strength of the medicine administered. The suppression of frauds of this sort is work that one may well feel proud to be engaged in.

Thank goodness, there is not nearly so much of the adulterating business going on as formerly, but enough to make it necessary to keep our eyes open and other senses alert. Among the 1250 Notices of Judgment in food and drug cases, as published by the Secretary of Agriculture, covering a period of five years, 309 have to do with drug products. In most of these cases, technical charges of misbranding are brought, such as failure to declare the amount of the prescribed drug, like alcohol, acetanilide, etc., false therapeutic claims and the like. In only fifty-five of the cases could charges of adulteration be made. This is bad enough, to be sure, but it does show, to my mind, a wholesome condition of the American drug market. The explanation of this remarkable state of affairs, I believe, is to be found in the manner of enforcement of Section 11 of the Food and Drugs Act, pertaining to the inspection of imported foods and drugs. You are all aware that most of the crude drugs, the raw materials for medicines, are not home-grown (as many of them could and should be), but are imported from Europe and the other three corners of the earth. Mountainous piles of herbs and roots, barks and leaves, flowers and seeds, oils and gums, resins and waxes, crude drugs all, are unloaded daily on the wharves of New York. Smaller mountainous piles come in bond by rail to Chicago, while other smaller ports receive their proportionate shares. At each of these places are stationed men, employees of the Bureau of Chemistry, whose duty it is to inspect every invoice of drug products and determine whether the material is fit to enter into the commerce of the country. That which is unfit is either destroyed or deported, or else it is purified before being released by the custom officers. The Department of Agriculture employees coöperate with the customs authorities in the enforcement of this section of the law. At New York, where the major portion of the drug imports are entered, Dr. H. H. Rusby holds forth as expert pharmacognosist, and Dr. Seil as pharmaceutical chemist. He is a clever smuggler indeed who can escape these two men and succeed in entering spurious or adulterated drugs. The reports of the findings of these drug laboratories make interesting reading, and show the trend of the

practice of drug adulteration. I have noted here a few of the more striking cases of adulteration that may be of interest to you:

Belladonna and henbane leaves, aloes, jalap, sage, cubebs, ergot, hydrogen dioxide, calcined magnesia, and many others have been found to differ widely from U. S. P. requirements.

Some of the most serious forms of adulteration and substitution are as follows:

Codeine, morphine and aspirin in the form of pastilles and confections, condemned as being dangerous to health. Digitalis leaves, decayed; cumin seed, broken and full of dust; gum tragacanth, mixed with other gums, dirt and foreign matter, all unfit for medicinal use; iron by hydrogen, containing an excess of arsenic; oil of cajuput, with copper; oil of cassia, with lead, copper and rosin, are examples of another type of adulteration.

Anise, fennel and quince seeds, cubeb berries, gum myrrh and benzoin, uva ursi, buchu and senna leaves, etc., have been repeatedly found with excessive amounts of dirt and foreign matter, sometimes as high as 40 to 50 per cent.

Scopola has frequently been found substituted for belladonna root, pokeberry leaves for belladonna, long buchu for buchu, and artificial camphor for the natural gum. Such substitution is nearly always intentional and is the more pernicious and more to be condemned on that account.

The number of such cases, as I have here enumerated, is becoming smaller and smaller every month, showing the wholesome effect of the law. Of course, it is not to be inferred for a moment, even if the drugs are pure when they are passed by the customs officials, that such high quality will be maintained until they reach the consumers. A single illustration, cited by Dr. Rusby, will emphasize the point. A New York jobber in crude drugs nearly fainted on being told that his ground belladonna root contained 50 per cent. of olive pits, but soon learned from his own investigations that the miller, to whom he sent his fine drugs to be ground, was systematically abstracting a portion and substituting adulterants. Rascals there are in this country, as well as in Europe and elsewhere.

Then, too, it must be borne in mind that not all drugs are imported, though a large proportion of the crude and powdered ones are. In working toward the ideal of a pure drug and medicine market, wherein no adulterator can gain a foothold, we must not overlook this fact. We must keep as careful a watch over state and interstate traffic as we do of the foreign.

Most of the cases of adulteration observed in the inspection of interstate samples are in the same category with those noted for imported products, viz., failures to conform to Pharmacopœia specifications, substitution of cheap, inferior material for the more expensive or high grade; for example, senna siftings for leaves, acetanilide for phenacetin, mixing the product with dirt and inert vegetable debris. This is an exceedingly raw, offensive sort of adulteration. When one buys drugs that are as "cheap as dirt," he usually gets what he pays for.

The U. S. Government has been seeking for a long time to control the quality of drugs that enter into the commerce of this country. Reviewing the history of drug adulteration, Dr. L. F. Kebler has pointed out that as early as 1840, federal officials were investigating the extent of adulteration of drugs, medicines and chemicals offered for entry at the various ports. Due largely to the efforts of Dr. M. J. Bailey, then examiner of drugs at the port of New York, a federal law

was passed governing the importation of adulterated and spurious drugs. The law became effective in 1848. In his testimony before the Congressional Committee, Dr. Bailey stated that at least one-half of the drugs imported through the customs house at New York were adulterated or had deteriorated in value so that they were not only worthless for medicinal use, but were often dangerous. Plainly, we are making progress against the practice of adulterating drugs.

That section of the law which pertains to the branding of drugs, undoubtedly was intended by the enactors to define clearly and positively the term "misbranded" in its relations to medicines and was aimed to destroy that flagrant and growing evil, which you gentlemen know has been the curse of the pharmacist's business. That the clause of the act relating to misbranding is not comprehensive enough to secure much needed reforms has been shown by recent adverse decisions of the courts. The effect of the decision of the Supreme Court in the Johnson Cancer Cure case has been seen and keenly felt by us. It was promptly and painfully retroactive. The liberty to lie was plainly given in this sweeping decision and was quickly taken advantage of by the unscrupulous compounder of drugs and the medicine fakir. I trust I shall not be misunderstood in what I have said directly and by inference about proprietary mixtures. There is no doubt a legitimate place in the drug business for many of them, providing, as Nelson says, they do not contain any actively potent ingredients, or, containing these, state clearly their names and amounts, with a suitable caution to the consumer.

It is not the fellow who is making and marketing an honest, meritorious medicine, and who conforms to the ethics established by your association, who arouses my wrath and deserves and gets the curses of his fellowmen and the condemnation of the courts. But the rascal who puts a little worthless, highly colored, foul smelling, vile tasting fluid in a bottle and sells it for a dollar or more, by dint of extravagant language, forceful suggestion and plausible lies, merits all that blind, outraged justice can hand out to him. It is not the rich who are robbed by such fakirs, but the poor who seek to avoid the physician's fee and the prescription clerk's charges. Therefore more is the pity!

I appreciate that I do not need to harangue to you gentlemen about the evils of adulteration and misbranding of drugs. You recognize much more fully than I the effect of these frauds, and are just as anxious to have them stopped. I am not a pessimist. The Food and Drugs Act is a good law, and has done much good. During the last five years in which it has been enforced, a whole lot of cleaning up has been accomplished. The weak spots in the law have been found out, and an effort is now being made to strengthen it and make it "fraud" proof. The Post Office Department has helped us greatly to put an end to many a bad medicine business by issuing "fraud orders." Your association, too, collectively, and individual members personally, has been immensely helpful to the Bureau of Chemistry in its work of enforcing the Food and Drugs Act. Your friendship, your encouragement and advice and the whole effect of your policy, standards and ethics, as shown in your publication, the National Formulary, are all deeply appreciated by the Bureau, especially by Dr. Wiley and Dr. Kebler. I trust this cordial coöperation may continue, and I believe it will.