is the price. It is a laudable ambition for teachers to want degrees and what they stand for, but there is no degree which guarantees ability to teach. Teachers should be men and women with good red blood in their veins, not just "semi-vitalized text-books."

LIQUID PETROLATUM, RUSSIAN AND AMERICAN.

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Liquid Petrolatum is destined to be, if it be not already, the most extensively used medicinal substance at our disposal.

In the crude form, petroleum has been more or less in use for many centuries, references to it being found as far back as 600 B. C. The use of the highly refined product known as Liquid Petrolatum is, however, of very recent origin, dating back only to the early eighties of the last century. Since that time in one form or another it has been recommended as a cure for almost every ill that flesh is heir to. In addition, it has also been used as a substitute for or as an adulterant of lard, butter and vegetable oils used for culinary purposes and it was investigations into its value as a food that led ultimately to its present enormous vogue in internal medicine.

It was early determined that Liquid Petrolatum had no food value, but passed unchanged through the intestinal tract. Nevertheless, petroleum emulsions, plain or combined with other medicaments, have been largely prescribed for some years and usually with very good results, despite the dogmatic assertions from test-tube investigators to the effect that these preparations were valueless or fraudulent. We know now that, while the claims made for these products were inaccurate, the preparations had real value due to the corrigent action of the petroleum on the intestinal tract.

Liquid Petrolatum as an internal remedy is distinctly an American idea. Little attention was paid to the work of earlier investigators by physicians until a series of papers presented to medical societies in Ohio and Indiana between the years 1900 and 1903 led to its continued use in that part of the country as a remedy for chronic constipation and intestinal obstructions. Since that time its use has been developed enormously, being especially aided by the strong recommendation of the great English surgeon, Sir William Arbuthnot Lane, given at the Congress of Surgeons held in New York in 1912. Much of the credit for its discovery as a therapeutic remedy has gone to Mr. Lane, though many American physicians antedated him in using it.

It is not necessary to do more than mention that the value of Liquid Petrolatum for medicinal purposes lies in the fact that it is inert. It is possibly the only medicine that has no medicinal action, but works purely mechanically. It is

simply a lubricant and its action is similar to that of oil on rusty machinery. It lubricates a defective drainage canal and its value appears unquestioned.

What we are particularly concerned with is the quality of the oil that should be used for medicinal purposes. This is especially important just now in view of commercial conditions in the petroleum industry. The U. S. P. requirements are exceedingly lax and admit of a wide range of products being used. Up to the outbreak of the war Russian petroleum was mainly used as a source of Liquid Petrolatum, and during the last two years enormous quantities of "Russian Oil" have been consumed. The quality was not always all that could be desired.

Russian and American petroleums are different in composition. American oil consists mainly of methane hydrocarbons with some olefines, while Russian oil is composed of naphthene hydrocarbons. The Russian oil can be refined more easily and more cheaply, so that it has held the market to the exclusion of American oil, the only medicinal oils on the market of American origin being oils that had been treated by filtration and decolorization with bone black. These oils did not hold their color and had also a strong fluorescence so that on esthetic grounds alone they were not popular.

The European war, however, cut off supplies of Russian oil completely so that we have been forced to look to American refineries for supplies of "White Oil." Owing to uncertainty as to how long the war would last refiners were not at first anxious to put up a plant that would have to be scrapped as soon as the war was over, but when it was evident that the war would last some time, several plants were started, and so rapid has been the progress made by our chemists in refining American oil that today one or two refineries are turning out preparations that compare favorably with the best Russian oils. This is no small achievement to have accomplished in so short a period of time.

The quality of the oil used as a basis for Liquid Petrolatum is of the highest importance and too little attention has been paid to this point. Oils of all grades have been sold for medicinal purposes and some of the largest houses have supplied and are supplying products that were far from being what we might expect from such sources. The only requirements insisted on in many cases were that the oil should be colorless, tasteless and odorless. But these requirements are by no means adequate. Many Russian oils that met these requirements were still not fit for the uses to which Liquid Petrolatum is put and the same is even more true of American oils.

Being used solely as a mechanical aid, Liquid Petrolatum must be taken for long periods and often in large doses, and, therefore, extra precautions must be used in obtaining an oil that is *inert*. Despite its chemical properties, petroleum is by no means inert physiologically. For a long time it has been known that workers in petroleum refineries were especially liable to skin affections of a serious and even malignant character. The recent researches in England of Ross and his co-workers have demonstrated that petroleum, among other products, contains a substance that possesses the property of causing increased cell growth. The importance of this discovery cannot be over emphasized for it is easy to see

how important a factor it may be in connection with the internal consumption of Liquid Petrolatum. Were the oil only taken for short periods the presence of this substance might not be very material, but it can readily be seen that the constant presence in the intestinal tract of a substance possessing the above mentioned property might result in most serious consequences especially in cases where there is a lesion of some sort. Every precaution should be taken to insure the elimination of this substance from petroleum for internal administration.

It is also important that Liquid Petrolatum be free from any other substances that might be active physiologically. This is especially necessary with American oil which contains varying proportions of olefines or unsaturated compounds. These hydrocarbons may enter into combination with bodies of an acid nature, with acetones, aldehydes and compounds having an hydroxyl group. They may enter into combination with substances in the alimentary tract, and while little is at present known of their behavior in this connection, care should be taken to exclude them from Liquid Petrolatum the use of which is based on the idea of its inert character.

In addition to these possible impurities, Liquid Petrolatum may contain sulphur compounds which are frequently present in oils of a certain character. Sulphur compounds are objectionable for many reasons, in particular because they tend to prevent absorption of iron which is so necessary to proper functioning of the system. They should be eliminated from Liquid Petrolatum. Lastly the oil should be absolutely neutral.

Fortunately there are a series of very simple tests by which Liquid Petrolatum can be controlled and no oil should be used for internal administration that does not pass, first of all, the following tests which are those laid down in the 1914 edition of the British Pharmacopœia, and which will probably be followed in the ninth revision of the U. S. P.

(1) When 3 millilitres are heated with an equal volume of sulphuric acid in a test tube placed in boiling water for ten minutes and frequently shaken, the acid layer, after separation, is not darker than pale brown.

(2) A mixture of 4 millilitres of Liquid Petrolatum, 2 millilitres of absolute alcohol and 2 drops of a clear saturated solution of lead oxide in solution of sodium hydroxide (20 per cent.), remains colorless when kept at 70° C. for ten minutes.

(3) 10 millilitres of alcohol (90 per cent.) boiled with 5 millilitres of Liquid Petrolatum are not acid to litmus.

These tests insure absence of olefines and other organic impurities, sulphur compounds and acids used in purifying the oil but they do not insure absence of the substance which promotes cell growth. The researches of Ross have shown, however, that this substance, the exact nature of which is not at present known, is soluble in water and can be eliminated by washing the oil with hot water. This additional precaution should, therefore, be taken in refining petrolatum for medicinal use.

A word may be said in reference to the question of density. One of the objections to the continued administration of Liquid Petrolatum was that after a

time it had a tendency to exude involuntarily from the rectum. For this reason physicians have been demanding heavy oils, some even prescribing solid petrolatum with a view to avoiding this trouble. It has been found, however, that this involuntary evacuation was due wholly to too large dosage and occurs with heavy as well as light oils. It can readily be corrected by diminishing the dose and, therefore, as the lighter oils are more easy to take and require a smaller dose they are now used to as quite a large extent as the heavier oil. The question of dosage is one that each patient must determine for himself or herself. No hard and fast quantities can be set down. Some patients require large doses frequently, while others can obtain satisfactory results by as little as a teaspoonful two or three times a day. The usual starting dose is one to two tablespoonfuls at bedtime gradually reducing the dose as conditions improve.

Another debatable question is the time at which Liquid Petrolatum should be administered. Many physicians advise that it be given only on an empty stomach the claim being made that administering with food is liable to cause digestive disturbances as the "oil coats the particles of food and prevents action of the gastric juices."

Anyone with an elementary knowledge of physics will recognize the fallacy of this argument and the impossibility of coating moist food particles with oil. The statement that has also been made to the effect that prolonged use of the oil will coat the intestinal canal with oil and prevent absorption can be characterized as equally absurd being opposed to all known physical laws. Furthermore, the fact that the amount of oil ingested can be obtained in toto from the feces also disposes of this argument. It is axiomatic that oil and water will not mix.

Finally the question that naturally comes up just now is which oil is the best, American or Russian? The answer is that to all intents and purposes one is as good as the other for internal administration, provided it is properly refined and stands the tests before given. The American oil in general is of lighter gravity than the Russian, but is, however, of greater viscosity. American oil of a gravity of .845 can be prepared of as great a viscosity as the Russian oil of .885 gravity. This is due to the presence of higher paraffines in solution and is the reason why American oil, as at present manufactured, has no "cold tests." Russian oil remains clear at 0° C, while American oil, even the less viscous product, becomes turbid at that temperature. This does not, however, affect its medicinal properties.

In conclusion, attention is invited to the accompanying table giving the results of an examination of a series of samples obtained from manufacturing houses and from retail stores which shows that there is a great deal of oil being sold that does not come up to the requirements of a pure inert oil for medicinal purposes.

A word of advice to the retailer may not be out of place and that is to buy your oil from a drug house that has been identified with the preparation and sale of medicinal products rather than from those concerns that cater to lubricating and automobile supply houses.

SAMPLES OF MINERAL OIL OFFERED FOR SALE BY VARIOUS CONCERNS.

No. of Sample Source	S. G.	Lead Oxide Test	H_2SO_4	Color and Odor
1—Wholesale Drug House.	.840	No Color	Very Faint Color	Colorless Odorless
2—Oil Supply House.....	.851	No Color	Yellow	Fluorescent Petrol Taste
3—Mfg. Pharm. House...	.858	No Color	Dark Brown	Fluorescent Petrol Taste
4—Jobbing House.....	.847	No Color	Slight Yellow	Colorless Odorless
5—Oil House.....	.850	No Color	Reddish Brown	Strong Fluorescence
6—Retail Association.....	.857	Brown Color	Dark Brown	Yellow Fluorescent
7—Oil Refinery.....	.850	No Color	Brown, Nearly Black	Fluorescent
8—Mfg. Pharm. House....	.854	Brown Color	Dark Brown	Colorless Sl. Fluorescence
9—Wholesale Drug House.	.844	No Color	Slight Yellow	Colorless Odorless
10—Wholesale Drug House.	.848	No Color	Faint Color	Colorless Odorless
11—Oil Refinery.....	.841	Brown Color	Black	Fluorescent Petrol Taste
12—Oil Refinery.....	.847	No Color	Slight Yellow	Colorless Odorless Petrol Taste

All these samples were American oil. Sample No. 10 was an "extra heavy" oil and was almost solid at a temperature of —5° C. At +5° C. it was quite cloudy, and while the oil was very viscous, the gravity was little above that of the ordinary light oil. The viscosity was due to dissolved paraffine. Of the above 12 samples only numbers 1, 4, 9 and 10 can be considered really fit for medicinal use. Sample No. 5 is a filtered oil that has been freely sold to the retail trade.