What a field of research lies here before us! The scientific pharmacy of the future will be in a position to determine in advance what the action of certain remedies will be or, how certain remedies must be modified, to exert certain actions, or to make them more stable and presentable. Professor Thoms, of the University of Berlin, in a lecture delivered before the German Pharmaceutical Association, pleaded for more active participation of the pharmacists in researches of biologic standardization. Without wishing to detract one iota from his arguments, I want to call to your attention that in colloid-chemistry there is a field of research for the pharmacist which is not alone of interest and value, but also full of promise of reward.

The lecturer carried out the following experiments to illustrate his remarks:

Preparation of colloidal gold and of colloidal silver by the electric spark under water.

Preparation of colloidal gold and silver in different colors by chemical means.

The Tyndall phenomenon in gold "sols," in cigar smoke and other colloidal systems.

Different forms of dialysers—sausage—thimble—filters—parchment—collodion, etc.

A number of Liesegang's rings and LeDuc's figures.

Preparation of coagulated colloidal Ferric Hydroxide.

Preparation of gelatinous Barium Sulphate, gelatinous charcoal, etc.

LIQUID PETROLEUM OR "RUSSIAN MINERAL OIL."*

Petroleum has been in use as a medicine from time immemorial. It was known to Herodotus 400 years before Christ and is mentioned by Plutarch, Dioscorides, Pliny and other early writers. It was extensively used by the Arabians and evidently played an important part in the practice of medicine in India, being known to the Bengalese as "Muthe Katel." The raw product was the substance used in earlier times and differed much in character and composition, as obtained from different sources.

As an internal remedy it was early employed in chronic pulmonary affections, in obstinate skin diseases, in rheumatism, and for the expelling of tapeworms. It was extensively used for these several purposes in France under the name "Oleum Gabianum" and in North America as "Seneka oil." The internal use of the refined product may be traced to a patent granted to Robert A. Chesebrough of New York, in June, 1872, for the manufacture of a "new and useful product from petroleum, named vaseline." This name was originally applied only to a semi-solid preparation, but later a liquid products known as liquid vaseline was marketed and for a time exploited as a cure for coughs, colds, consumption and a number of other diseases and conditions.

The liquid petrolatum has since become known under a variety of names, proprietary and otherwise, in addition to being used as a substitute or an adulter-

*From the Journal of the A. M. A., May 30, 1914.

ant for other, more costly, fats and oils. Some of the names applied to the product are:

Adepsine oil
Amilee
Atoleine
Atolin
Blandine
Crysmalin
Deeline
Glyco
Glycoline
Glymol
Heavy Petroleum Oil
Liquid Albolene
Liquid Cosmoline
Liquid Fossiline
Liquid Geoline
Liquid Paraffin
Liquid Petrolatum
Liquid Saxoline
Liquid Vaseline
Mineral Glycerin
Mineral Oil
Neutralol
Olo
Paraffin Oil
Paroline
Petralol
Petro
Petrolax
Petrolia
Petronol
Petrosio
Rock Oil
Russian Liquid Petrolatum
Russian Mineral Oil
Russian Paraffin Oil
Russol
Saxol
Terraline
Terralbolia
Usoline
Waterwhite-Mineral Oil
White Paraffin Oil

A preparation similar to that official in the Pharmacopœia of the United States as liquid petrolatum has been included in many, if not all, of the foreign pharmacopœias, the official title under which this preparation is recognized being as follows:

Petrolatum liquidum, U. S. Pharmacopœia; Paraffinum liquidum, pharmacopœias of Great Britain, Germany, the Netherlands, Japan, Belgium, Austria, Denmark, Switzerland, Sweden, Servia, Italy, Hungary and Russia; Oleum Paraffinæ, Spanish Pharmacopœia; Vaselinum liquidum, French Pharmacopœia, and Oleum Vaselini (as a synonym) pharmacopœias of Denmark and Russia.

The requirements of the several pharmacopœias differ somewhat and the specific gravity as given is as follows:

U. S. P. VIII, 1905	0.870	to	0.940	at	25°
Ph. Brit. IV, 1895	0.885	to	0.890	at	15.5°
B. P. C. II, 1911, usually	0.875	or	lower	at	15°
Ph. Germ. V, 1910, at least	0.885			at	15°
Ph. Ross. VI, 1910	0.880	to	0.885	at	15°
Ph. Hung. III, 1909	0.88	to	0.89	at	15°
Ph. Ital. III, 1909	0.875	to	0.890	at	15°
Ph. Fr. V, 1908, about	0.875			at	15°
Ph. Serb. II, 1908, about	0.880			at	15°
Ph. Svec. IX, 1908	0.88	to	0.90	at	15°
Ph. Helv. IV, 1907	0.880	to	0.885	at	15°
Ph. Dan. VII, 1907, at least	0.880			at	15°
Ph. Austr. VIII, 1906, at least	0.880			at	15°
Ph. Belg. III, 1906, not below	0.880			at	15°
Ph. Japon. III, 1906	0.875	to	0.945	at	15°
Ph. Ndl. IV, 1905, not below	0.860			at	15°
Ph. Hisp. VII, 1905	0.840			at	15°

For pharmaceutical purposes, liquid petroleum may be divided into two grades, the lighter or more limpid oil, used extensively as a vehicle for oil sprays, and the heavier, more viscid oil generally recognized in European pharmacopœias and used as an ingredient of ointments and more recently as a remedy in the treatment of intestinal stasis.

Under petrolatum liquidum the U. S. P. recognizes a mixture of hydrocarbons, chiefly of the methane series, which occurs as a colorless or very slightly yellowish, oily, transparent liquid without odor or taste and having a specific gravity of about 0.870 to 0.940 at 25 C. For the U. S. P. IX, it is proposed to change this requirement somewhat so as to have it apply to a transparent liquid free from fluorescence, without odor or taste and having a specific gravity of from 0.845 to 0.940 at 25 C.

Such a requirement would include all of the available paraffin oils irrespective of origin. The now commonly available commercial liquid petrolatum, used for pharmaceutical purposes, is practically colorless and all of the better grade are free from odor or taste. The specific gravity varies from 0.855 to 0.895. The lighter oils, having a specific gravity of from 0.860 to 0.870, are usually preferred in the making of oil sprays or solutions of substances to be used as local applications. The product having a specific gravity above 0.875 evidently contains a considerable amount of dissolved solid paraffin which separates out at temperatures at or below 0 C., but readily dissolves again at temperatures above 10 C.

There is considerable difference in the chemical composition of the paraffin oils obtained from various sources. The American oil consists largely of hydrocarbons of the methane series, while the Russian oil contains naphthenes or hydrocarbons of the benzene series, having the empirical composition of ethylene (CnH_2n) which may be considered as hydrogenated aromatic hydrocarbons, though they behave with reagents very much in the same way as do the hydrocarbons of the methane series.

Mineral oils with a naphthene base are best suited for making white petrolatum, and at the present time the production of the colorless water-white liquid petrolatum appears to be confined largely or almost exclusively to the crude product of the Baku district of Russia, though it is asserted that it is now also made from the Hanover (Germany) crude oil and that some is being produced by "cracking" the white solid paraffin.

It is also said that the American oil can be made water-white but that it is not being so produced at present for economic reasons; the yellowish oil, free from fluorescence, having a very wide sale, both as a lubricant and as a substitute for lard oil and other of the more costly lubricating oils.

From a pharmaceutical point of view it would appear important to note the physical characteristics of the oil and to insist on absence of color, absence of odor and taste, absence of acid and of alkali and a specific gravity in harmony with the purposes for which the oil is to be used.

During the past year or two liquid petrolatum has attracted considerable attention as a remedy in the treatment of intestinal stasis or chronic constipation, the practice of using it having been developed largely through its recommendation by Sir W. Arbuthnot Lane and his associates. This use of liquid petrolatum and of petrolatum products generally is by no means novel. N. A. Randolph,[1] of Philadelphia, was among the first to suggest its use for this purpose in an article published in 1885. Randolph also appears to have been the first to experiment with petrolatum and to determine its non-absorbability from the intestinal tract.

[1]Randolph, N. A.: Therap. Gaz., 1885, ix, 732.

In an article[2] in 1884 he concludes that "pure petrolatum while entirely unirritating to the digestive tract is valueless as a foodstuff."

The experiments recorded by Randolph were evidently prompted by the fact that vaseline and a number of imitation products then on the market were being sold as substitutes for lard and butter, and opinions regarding the food value of petroleum products appear to have differed very materially. Following the experiments of Randolph, Robert Hutchison in 1899 made a series of experiments to demonstrate that petroleum, petrolatum, paraffin and related products were absolutely unassailable by any of the digestive fluids, despite the "large vogue that had of late years been given to various petroleum emulsions, chiefly by ingenious and unterrified advertising." He came to practically the same conclusions arrived at by Randolph fifteen years earlier and pointed out that "liquid paraffin in one sense may be regarded as an artificial intestinal mucus and might in that way have some value on certain forms of constipation."

William Duffield Robinson[3] reports on the use of a perfectly refined colorless and odorless petrolatum, supposedly of American origin. He was able to show that all of the product passed unchanged through the intestinal tract and could be regained from the feces. In his conclusions he expressed the belief that the effect of the administration of these petroleum products is far more than as a simple intestinal lubricant. In over fifty selected cases in which nutrition, digestion and body-weight were impaired, and the purest oil administered in 1- or 2-dram doses each day for a period of from four to six months, there was in every instance an improvement of weight, health and feeling of well-being. The administration of refined paraffin oil gave no discomfort in any instance, even in cases in which nearly a pint was given in a few hours.

William Ewart[4] suggests liquid paraffin as a safe agent for the local treatment of the lesions in typhoid fever. He says in part: "Mineral oil, such as petrolatum or paraffin, is neither absorbed nor dissolved; therefore, after all absorbable ingestions are taken up by the lacteals, it will still remain in the bowel. In this way pure liquid paraffin is valuable, precisely because it is inert; moreover, it might some day, perhaps, be made the vehicle for effective topical remedies."

A. D. Schmidt[5] quotes Stubenrath as having given liquid paraffin in the treatment of chronic constipation, and he himself gave as much as 20 gm. of liquid paraffin to adults without observing any injurious effect whatever. He says, "As a result of the administration of liquid paraffin, the feces are softened considerably and are found under the microscope to contain numerous minute globules of paraffin." He was, however, unable to recover from the feces the entire quantity of paraffin administered and believes that a certain portion of it, probably the fractions with a low boiling-point, are absorbed or possibly oxidized in the organism.

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[2]Randolph, N. A.: Proc. Acad. Nat. Sc., Philadelphia, 1884, p. 281.

[3]Robinson, William Duffield: Med. News, 1900, lxxvii, 56.

[4]Ewart, William: Brit. Med. Jour., 1902, ii, 1505.

[5]Schmidt, A. D.: München. med. Wchnschr., 1905, lii, 1970.

Maurice Vejux Tyrode[6] also refers to the use of liquid petroleum in the treatment of constipation.

Sir W. Arbuthnot Lane in his recommendations of liquid petrolatum calls it an ideal remedy for stasis, but cautions against the use of the lighter oil as extensively prescribed in this country as a vehicle for sprays in nose and throat work.

Paraffin oil is not absorbed from the alimentary tract and so far as known exerts no deleterious influence. It is usually given in quantities of from 10 to 20 cc. half an hour or an hour before meals or in larger doses, from 30 to 50 cc., at one time on retiring. From available evidence it appears that comparatively huge doses may be administered without the production of any untoward results. According to many observers, liquid paraffin should not be given with or after meals because of the inhibiting influence that it may have on the digestion of food. It is not soluble in water or the ordinary solvents and therefore cannot be diluted. The denser oils are preferably slightly warmed or drunk with warm water so as to obviate the disagreeable slimy sensation that persists when taken cold.

Volatile oils may be used in moderate amounts to give a distinctive taste to the otherwise rather insipidly tasteless paraffin oil. Among the more desirable oils to be used for this purpose would be oil of peppermint, oil of cinnamon, oil of betula or methyl salicylate and oil of cloves. From 2 to 10 drops of any of these oils can be added to a pint of the oil. When larger doses of the oil are to be given at one time, it would, of course, be advisable to use a comparatively smaller quantity of the volatile oil as a flavor.[7]

From the foregoing it would appear that apart from the Pharmacopœia of the United States, practically all other known pharmacopœias describe a water-white mineral oil under the title "Paraffinum Liquidum" or "Liquid Paraffin" as a colorless, odorless, tasteless, non-fluorescent, oily liquid, free from acids, alkalies and organic impurities. As explained before, the specific gravity of the preparation as recognized in other countries and as offered on the American market at the present time varies considerably, and there appears to be some difference of opinion as to the exact nature of the product that is preferable for use for different purposes. This matter requires further investigation.

Since the definition of liquid petrolatum in the U. S. Pharmacopœia permits the use of fluorescent products of widely varying specific gravities, it is recommended that physicians who desire the water-white non-fluorescent (Russian)

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[6]Tyrode, Maurice Vejux: Boston Med. and Surg. Jour., 1910, clxii, 673.

[7]In addition to the articles referred to in the preceding footnotes, the following are of interest in connection with this subject:

Editorial, Therap. Gaz., 1885, ix, 353.
Junker, F. A.: Med. Record, London, 1885, xiii, 506.
Editorial, Med. News, 1886, xlviii, 105.
Dunbar: Deutsch. med. Wchnschr., 1896, xxii, 33.
Stubenrath, Franz Casimir: München. med. Wchnschr., 1897, xliv, 639.
London Letter, Med. News, 1899, lxxiv, 504.
Hutchison, Robert: Brit. Med. Jour., 1899, i, 724.
Schlesinger, E. G.: Boston Med. and Surg. Jour., 1913, clxix, 14.
Lane, W. Arbuthnot: Brit. Med. Jour., 1913, ii, 1126; Proc. Roy. Soc. Med., 1913, vi, 49; Surg. Gynec. and Obst., 1913, xvi, No. 6.
Jordan, Alfred C.: Practitioner, London, February, 1913.
Chrysospathes, J. G.: Zentralbl. f. Chir., 1913, No. 45; abstr., The Journal A. M. A., Dec., 13, 1913, p. 2201.

mineral oil should use the term "Petrolatum Liquidum, Grave," or "Paraffin Liquidum, B. P.," if the heavy product recommended by Lane is desired, and "Petrolatum Liquidum, Leve" if the light varieties are required. It is further recommended that under the foregoing names, manufacturers and pharmacists be requested to dispense the products, in accordance with the following descriptions:

Petrolatum Liquidum, Grave.—Heavy (Russian) Liquid Petrolatum.—Paraffinum Liquidum, B. P., liquid paraffin.—A transparent, colorless, tasteless, non-fluorescent, oily liquid, odorless when cold but giving off a faint petroleum odor on heating. This preparation should correspond to the requirements of the British Pharmacopœia for liquid paraffin and have a specific gravity of about 0.885 to 0.890 at 15 C. It is insoluble in water or alcohol, but soluble in boiling absolute alcohol and readily soluble in ether, chloroform, carbon disulphide, petroleum benzin, benzene and fixed and volatile oils. It serves as a solvent for volatile oils and related substances like camphor, menthol and thymol.

This is the type of preparation used by Sir W. Arbuthnot Lane, and his associates for internal administration. It is also used as a basis for ointments and salves and as a local application to wounds, ulcers and in certain forms of skin diseases in which a simple protective is desired.

Petrolatum Liquidum, Leve.—Light (Russian)—Liquid Petrolatum.—A transparent, colorless, tasteless, non-fluorescent, oily liquid, odorless when cold, but giving off a faint petroleum odor on heating. In other respects this preparation should correspond to the pharmacopœial tests for liquid petrolatum and have a specific gravity of about 0.860 to 0.875, at 15 C. Like the heavy variety of liquid petrolatum, it is insoluble in water and alcohol, but soluble in boiling absolute alcohol and readily soluble in ether, chloroform, carbon disulphide, petroleum benzin, benzene and fixed and volatile oils. It serves as a solvent for volatile oils and related substances like camphor, menthol and thymol.

This is a type of preparation extensively used as a vehicle for the oily sprays in nose and throat work. It is also being used as one of the constituents in the now popular paraffin oil cold cream and has been used to some extent for internal administration in the treatment of chronic stasis. Being more limpid than the preparation preferred by Lane, it is more readily taken, though greater care must be exercised in securing a sample devoid of the lighter fractions of petroleum distillates.

The mystic chords of memory, stretching from every battle-field and patriot-grave to every living heart and hearth-stone all over this broad land, will yet swell the chorus of the Union, when again touched, as surely they will be by the better angels of our nature.—*Abraham Lincoln.*