"prospect" would become interested in the chemical subjects discussed; and consideration of this view and the results of its own inquiry convinced the committee that, to accomplish the purposes desired, the reading courses should have a very definite publicity plan behind them.

In carrying out its work, the committee has prepared the manuscripts for a series of circulars which, it is thought, will make men want to read chemical literature. In order to accomplish that result, the committee has written lively and appealing essays, of about 1,500 words each, on elementary chemistry, household chemistry, general and physical chemistry, inorganic and analytical chemistry, organic and biological chemistry, industrial inorganic chemistry, industrial organic chemistry, and techno-chemical analysis, all of which have been divided into appropriate paragraphs, worded so as to bring out the importance of the subject and so as to impress the reader with the national essentiality of the chemical profession. Carefully selected books are mentioned casually in the texts of the courses, usually to conclude the paragraphs.

These courses should now be made available for the use of librarians who wish to reach ambitious persons who have the intelligence to follow a course of chemical study. They should, to serve the intended purpose, be published in attractive booklet form for distribution at libraries to persons who are engaged in chemical work or interested in the specific subjects of the various courses, and to persons who are as yet only casually engaged or interested, but who may think of becoming well-informed on chemical subjects.

It is therefore recommended that the committee be authorized to furnish Mr. Joseph L. Wheeler with copies of the manuscripts, in order that he may endeavor to arrange for their publication *in toto*, and that the present committee be designated to cooperate with Mr. Wheeler in that undertaking and in stimulating interest in chemistry through the media of libraries. It is also recommended that the courses be published by the society in *The Journal of Industrial and Engineering Chemistry*.

The committee is grateful for the privilege of rendering this public service, for, as in Carlyle's time, "the true university is a collection of books," expertly selected and properly used.

W. A. Hamor

Mellon Institute,
Pittsburgh, Pa.,
August 29, 1919.

SPECIAL ARTICLES

AN UNEXCELLED MEDIUM FOR THE PRESERVATION OF CADAVERS

One can not contemplate the history of human dissection without a profound sense of gratitude for the discovery of three chemicals, the use of which in embalming has completely transformed the laboratory of gross anatomy. Could they have been introduced earlier, human dissection long since would have lost its forbidding aspect. Although Scheele discovered glycerin in 1779, it was not used for the preservation of anatomical material until 1868, almost a century later. This was not until a year after formaldehyde had been discovered by Hoffman and, although the antiseptic properties of the latter were not revealed till twenty years later. this event soon was followed by its introduction into histologic and gross anatomic technique in 1890 by Blum, junior and senior respectively. The earlier discovery of phenol by Runge in 1834, with the subsequent relation of its antiseptic properties by the revolutionary usage of it in surgery by Lister in 1867, and its application in the preservation of anatomic material by Laskowski in the same year, or even in 1864, completes the trinity of substances so largely responsible for freeing dissection of the human body from the noisome burden previously imposed by post mortem decay. An occasionally delayed necropsy still can suggest to present-day medical students just what this freedom meant to anatomists and students of anatomy of the past. Surely nothing has been a greater boon to human anatomy and anatomists than the miracle wrought by these and other chemicals, the proper use of which bids fair to make our anatomical laboratories practically odorless.

For unless the bodies can not be obtained soon enough after death to make proper preservation possible, the human anatomist or medical student no longer need labor in an atmosphere which announces their presence even to those who seek them not.

While we have been exceedingly fortunate in the matter of embalming the dead, and have improved upon the historic—or even geologic—method of cold storage by adapting current commercial equipments, much yet remains to be desired in this respect. Several years since, while reflecting upon the various methods now in use, it occurred to me that mineral oil ought to possess many advantages. Since various vegetable oils, notably turpentine, oil of cedar, benzol, etc., had been used, it seemed strange indeed that mineral oils also should not previously have been resorted to. This would seem particularly likely during the last decades in which oil played such a very prominent rôle in the industries. It semed all the more perplexing that mineral oils should not have been resorted to because resins, pitch, tar, etc., had been used centuries ago for the very purpose. Moreover, attempts also had then been made to imbed the dead in honey, resin and fats, after the manner of nature in imbedding insects in amber. It is true that nature also made such experiments with crude oil on a gigantic scale at La Brea, but that is a relatively recent discovery. Nevertheless, it seems strange that the finding of these beds with their rich booty, some years since did not suggest the use of mineral oils for the storage of anatomic material to me or, for that matter, to others. Indeed it is so inexpensive when contrasted with cold storage that it seems that it could not have been overlooked in the course of the development of modern methods for embalming and preserving material for dissection. However it is possible that the use of crude oil was considered and abandoned before the development of modern methods of distillation, because crude petroleum very plainly would seem to be quite unsuited for the purpose.

Cold storage, while excellent for the preservation of material for short periods of time, demands not only a considerable initial expense, but also imposes a relatively high cost of maintenance. With its use it also is difficult to prevent marked shrinkage of the material, in the course of months and years. The same thing applies to the storage of material in tanks over methyl alcohol. Immersion in a watery solution, on the other hand, while obviating this difficulty, introduces others. Since the water penetrates the bodies, it abstracts the preservatives from the tissues, and bodies so immersed dry quickly when exposed to an atmosphere of low humidity. While drying during storage is obviated by submersion in watery solutions the bodies often remain at or come to the surface and must then be depressed. Evaporation of the water also carries odors with it, besides reducing the total quantity of fluid. A room full of tanks containing oil on the other hand remains practically odorless and needs no further attention.

While most of the difficulties except drying experienced with other methods are obviated by storage of the cadavers on open racks after covering the material with a thick coating of vaseline, the application of the latter is time-consuming, relatively expensive, and does not make for tidiness. Moreover, portions of the skin easily become uncovered of vaseline and dry, and when the nose, mouth and eyes are not thickly coated, mold also can get a foothold, in spite of the extra wrapping required.

With the use of all these methods, except immersion in a water solution, inspection of the material is difficult, while it is exceptionally easy with the use of oil. Moreover, the oil extracts practically nothing from the material and softens and later protects the epidermis. Since its specific gravity is low, bodies easily sink by their own weight. Hence, as long as there is sufficient oil in the tanks, all material is hermetically sealed and no spontaneous subsequent exposure need be feared, for there is practically no loss through evaporation. Material stored in it for over two years appears to be in identically the same condition as when first immersed. Since bodies which have become decidedly œdematous during the process of embalming may be ex-

posed over methyl alcohol for varying periods of time before immersion in oil, one can always reduce, even if not totally remove, the inevitable distortion due to the injection of considerable quantities of preservative, and be assured that the material comes out of the oil unchanged. Since carbolic acid when warmed, easily and thoroughly mixes with oil, it can be added if desired, but so far I have not observed the least disadvantage from the use of unmixed oil alone.

Material immersed in oil need drain only a few minutes before it can be wrapped or covered and used for dissection. The wrapping quickly takes up the slight amount of adhering oil, and by being impregnated with it, greatly slows the drying out of the material. Except for the slight odor of the oil, bodies so stored are practically odorless, and quite in contrast to those kept in watery solutions, leave practically no evidence of external contact even when handled with bare hands. After being thoroughly impregnated with oil the epidermis resists drying very much better, and the eyelids, nose, lips, digits, ears and genitalia do not require such careful protection during dissection. But above all else the untidiness and soiling, unavoidable especially when vaseline is used, are wholly obviated.

Since any wooden tank can be used as a container, no expensive equipment is required. A galvanized iron lining no doubt will last indefinitely, and cement tanks have not been found too pervious. Exposure to cold can cause no difficulty, and, if introduced accidentally, water can be drawn off easily. The cost of the oil is low, especially when its practical permanence is considered, and since it is not easily ignited until it reaches a temperature of 80° C., underwriters have raised no objections to its use. Lighted matches can be thrown into open tanks without causing an explosion of gases or igniting the oil. Indeed some heating of the latter when contained in an open vessel is necessary before explosion of the liberated gases occurs. Consequently, ordinary care is all that is required to avoid accident when in its presence.

The particular grade of oil which I have used for several years is known as mineral seal oil. It has a slight yellowish tinge, and a specific gravity of 0.85 at room temperature. It has only a slight odor, which is wholly inoffensive, and, in fact, negligible. Since it can be obtained in large quantities and does not need renewal, it is extremely economical, and since it is almost colorless, it can be used to advantage also for preserving smaller specimens and even for museum preparations. It indeed seems to be an unexcelled medium for the storage of anatomical material. That this estimate of it is justified seems to be indicated also by the experience of friends who are using it. It would seem to be particularly advantageous when it is necessary to store material for long periods of time because of an intermittent or insufficient supply, or when, for some reason, it is desired to repeat measurements or to make volumetric determinations, at a later date.

Arthur William Myer
Stanford University

THE AMERICAN CHEMICAL SOCIETY. VI

RUBBER DIVISION

John B. Tuttle, *Chairman*

Arnold H. Smith, *Secretary*

Report of Executive Committee.

Report of Secretary.

Report of Fruit Jar Ring Committee. L. J. Plumb, chairman.

Report of Committee on Physical Testing. H. E. Simmons, *chairman.*

A new method for the determination of sulfur in rubber mixtures: G. D. Kratz, A. H. Flower and Cole Coolidge. Transfer the finely divided samples (0.5 gm.) to an Erlenmeyer, and add 10 c.c. of ZnO + HNO_3 solution (200 gms. ZnO in 1 liter HNO_3). Then add 15 c.c. fuming HNO_3, whirling the flask until the sample is decomposed. When solution of the rubber is complete, add 5 c.c. Br-H_2O and evaporate mixture to a foamy syrup. Cool flask and add a few crystals of $KClO_3$. Evaporate the mixture to dryness and bake at the highest temperature of a Tirrell burner until all nitrogen compounds are eliminated. When baking is