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THE IRON SHOVEL

By A. C. E.

Shortly after one o'clock, one hot July afternoon, a large touring car sped away from the offices of the big chemical industry at one end of an Eastern Ontario town. On the left sat a young man, whose clean-cut, set face contrasted markedly with the gray beard and white, calm one of the owner.

"That is the cottage, Henry, that one on the right with the screen door," cried the young man, addressing the chauffeur, as they motored along between the two rows of cottages occupied by the factory employees at the farther end of the town. The car drew in to the curb.

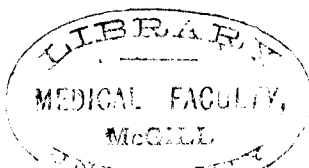
"I hope we're before them," said the older man, as he hurriedly stepped out on the concrete walk. The younger had already alighted.

The young foreman, Walter Hart by name, catching a glimpse of a collecting crowd of men and children from the other cottages, told the chauffeur to pull along down to the end of the narrow street and await orders. Then, seizing the arm of Mr. Mason, the manager, he hurried that gentleman to the cottage door.

Walter Hart threw back the screen door, which was unhasped, and gave a brisk knock.

The door opened; and instead of the expected ordinary factory hand's wife with two or three unkempt young children clinging to her skirts, the manager saw a decidedly attractive young woman, as neatly and tidily dressed as she was pretty.

"This is Mrs. Byrne, Mr. Mason, the widow of Amos Byrne, who took ill and died so suddenly when cleaning out one of the bleaching-powder 'stills' three weeks ago."



Mr. Mason, who was a most kindly man, took the hand of the relict of Amos Byrne, as the foreman closed the street door. He was surprised at its softness, surprised at the calm brown eyes and intelligent brow, surprised at the neat, tidy appearance of the young woman, surprised at the tasteful, if inferior, surroundings. He had not been given to visiting the cottages of his employees.

"I'm very sorry for your trouble, Mrs. Byrne," he murmured in a conventional voice and speech, as he surveyed the "Mona Lisa" expression of enigmatical resignation.

A sincere and truthful woman, she could not bring her lips to speak what her heart felt not.

"My trouble is not greater than I can bear, Mr. Mason," she replied, looking frankly into his eyes.

The answer was so unexpected, so unusual under the circumstances—circumstances of which he felt sure she did not know, that the manager sent an inquiring glance at the foreman.

"Come, Mary, you should not speak like that," spoke up Walter Hart; "you might be sorry for it hereafter."

"Walter Hart, you have known me for a long time. Perhaps he has told you," turning to Mr. Mason, "we are old friends, old schoolmates—and you know I always speak as I feel. My husband," she went on in explanation, "was very unkind to me during the three years of our married life; indeed, cruel, absolutely cruel. I lost all love for him long since; but when he was brought home ill five weeks ago, I nursed him as I knew how and followed out the doctor's orders as far as I was able. At first I thought he was shamming; and the doctor, too, thought he was shamming, malingering, I think it was, he called it."

"That is just what I have brought Mr. Mason to see you about now, Mary—you know, your husband was only at the works a few weeks—and I am practically the only friend you have in the town," and Walter placed a chair for her and also asked his manager to be seated.

"You have been very good, Walter, during all this trouble Mr. Mason speaks about, and you are yet very kind, but it is a great relief to me, I can assure you."

Mr. Mason held up his hands in protest at this plain speaking, and motioned Walter to proceed.

"I'm very sorry, Mary—but I've brought you—bad news," whispered Walter in a hesitating voice.

"Not from home, Walter—not from mother," as she folded her white hands resignedly in her lap, with a far-away, New England look.

"I'd best out with it," blurted Walter, looking across at Mr. Mason.

"Mary, you are to be arrested, charged with the murder of your husband. One of our men, a brother of the assistant constable of the town, told me so right after the noon hour. The chief and his assistant may be here almost any moment. That is why I brought Mr. Mason, our manager; for if anything can be done, I am sure we shall both be only too glad to aid you."

They were both bewildered at her calmness. Perhaps she did not realize the fearfulness of her situation.

"Walter Hart, would you believe me guilty of such a crime?" and the placid brown eyes seemed to penetrate into his very soul.

He hung his head as he breathed:

"If you say 'no,' Mary, I will believe you."

"I am entirely innocent," she murmured in a sweet, low voice; and as his eyes sought hers again, there was something of an understanding wafted between them.

He arose and took her hand.

"I believe you; I'll stand by you," he spoke firmly.

At that instant the two officers of the law came to the door, entered, and took their prisoner away.

Walter Hart went out and whistled for the chauffeur. The manager went on home to his luncheon. The foreman, pushing his way through the thronging little street, walked back to the works.

In looking after the workmen that afternoon under his charge it was almost impossible for Walter Hart to keep Mary Byrne, or Mary Matthews, as he had known her years before, out of his mind. He recalled that she was a daughter of respectable tradespeople in his old New England home; that she had always been a quiet, well-behaved, and generally well-liked schoolmate; that as she grew to womanhood she was a model of self-possession, never known to get angry, never boisterous, but always seeming in the best of good nature. He could now conceive of no reason why she should be charged with the murder of her husband. He had often wondered how she had come to marry Amos Byrne, whom almost every one in his New England home had disliked, for he was ever a bully. Walter Hart had been in Eastern Ontario a number of years before Byrne had come to the chemical works seeking employment; and it had been only on one or two occasions he had gone to their little cottage to renew acquaintance with Mary. What he had seen of the rough treatment of the wife had warned him to stay away. But he was to be enlightened as to the murder charge, together with the rest of the townspeople, the following morning.

The case was then to come up for preliminary hearing before the police magistrate.

In the forenoon of the following day all the town knew that Mary Byrne was charged with poisoning her late husband gradually with some preparation of arsenic.

This information had been laid before the authorities by the doctors who had made the post-mortem examination. The symptoms of Amos Byrne's illness had so baffled the skill of the regular factory medical attendant that, after securing Mrs. Byrne's consent, he had called in a brother practitioner, whom he had had in consultation, to assist in the autopsy. Even then it had been impossible to say exactly the cause of death, as all the organs of the man's body had been found in a healthy condition. It was only after careful and systematic scientific examination and analysis for days after the post-mortem that the true cause of death had been ascertained to have been arsenical poisoning. Hence the laying of the information and subsequent arrest of the pretty widow.

The afternoon of the preliminary hearing, Walter Hart sought the private office of his manager, Mr. Mason.

"Hart, this is a bad business," began the manager, as the foreman came in and closed the door.

"Yes, sir, it is, but I fully believe she is innocent," rejoined Walter, as he took the chair indicated at the side of the desk.

"Why, man, she is a most finished actress—there's a summons," pointing to a paper on the desk. "I've been served with a subpoena to give evidence as to what passed the other day between us at the cottage."

"But even supposing her capable of it, where do you suppose she got the poison?" argued the foreman, rather disturbed at the manager's reference.

"At one of our two drug stores, of course," confidently.

"I have been to both, and they positively state they have not sold any arsenic for a year, except in doctors' prescriptions; and not even any rat poison for two months—and certainly not to Mary."

"Why do you always call that woman Mary, Hart?"

"Well, she is an old friend—I always called her Mary—I couldn't go back on her at a time like this," and the foreman twirled the workman's cap in his hands.

"It's a bad case—there's the evidence of the two doctors," continued Mr. Mason.

"That's just what I came to see you about, Mr. Mason," explained Walter.

"What can I do?"

"I want to ask you, sir, to advance me a year's salary so that I can engage the best chemist in Montreal to come on here and make a thorough investigation of this whole business. I'm not satisfied. I know the case looks black against her, but she sha'n't want for aid if I can help her. I'll tell you, sir," the foreman went on, "I believe the man got that sickness from the bleaching-powder 'still.'"

"Utter nonsense, Hart! We don't use arsenic in the entire works."

"All I can say, sir, is this: I remember once when I first came here going into one of the 'stills' to clean it out, that I felt quite qualmish and had to get right out."

"Never heard of any one getting sick in one of the 'stills' or retorts all the time I have been at this business, and that is over thirty years, Hart," emphatically exclaimed Mr. Mason.

"Well, sir, it is either the 'still' or one of those doctors," just as emphatically declared the foreman.

"Hart, what do you mean" questioned Mr. Mason excitedly.

"I mean, Mr. Mason," and Walter Hart brought his fist down hard on the manager's desk, "I mean, first of all, that I love that woman and firmly believe in her innocence. I know she has had a miserable life with that dead brute of a husband. I wanted her to leave him long ago. Then I mean," and his chin shot out, "that there are two alternatives to this business: either the man got his death in that 'still,' or,"—he hesitated for an instant as if he were about to make a serious charge—"that doctor who attended Byrne gave him the arsenic himself," and the foreman held a steady gaze at the astonished manager.

"Hart, now you are going too far. Your heart is getting away with your usually level head," replied the perturbed manager.

"Not a bit of it. I'll tell you more, sir—but this is all in the utmost confidence. Do not breathe a word of it to any one, not even to the wife of your bosom, for the town is pretty well worked up over this affair, and I venture to say that as soon as Mary Byrne goes free they will cheer her."

The manager, now intensely interested, promised absolute secrecy.

"On the plea that I wanted to engage a lawyer for her, I was allowed to see Mary for a few minutes to-day. She told me the attending doctor had passed Byrne for \$5,000 for some life insurance company about a month before he was taken ill, but that she did not know anything about where the policy was, or in what company he was insured. She also said the doctor had tried to

make love to her on two or three occasions when her husband was nearing death's door, and that he had called on her twice since, and that she had forbidden him the house. He had even been to see her at the jail, gaining admittance to her presence on the plea that he was the medical adviser to the prisoner. Now, what do you think he said there? He told her that if she would agree to marry him he would get her off, and then they could leave for another field of practice. Nice man, isn't he, sir?" sneered the now relieved Walter, since he had taken some one into his full confidence.

Mr. Mason sat back in his chair. The factory doctor, he knew, was a widower, and somewhat off color with the other members of the faculty in town. He had got his position at the works on account of cutting under the rates of the other physicians. His consultant on the case, and assistant at the autopsy, was a young man recently established. The others had refused to consult with the factory doctor in this case. Mr. Mason was a man highly respected and beloved in the community, a just and upright man; and he valued his foreman highly and admired his manly qualities.

"Hart, I'll not advance you the money. I'll engage my own lawyer and engage the chemist myself. But you must be very discreet. If it got out you loved this pretty widow, but unfortunate woman, you might become entangled in the case more than either of us can now foresee," and Mr. Mason arose, indicating for the present there was no need for further confidences.

All that night Walter Hart pored over his "Remsen," which he resurrected from the bottom of his trunk. In his high school days he had had a particular fondness for chemistry. He brushed up on bleaching powder, sulphuric acid, hydrochloric acid, chlorine gas, manganese, iron, lime, carbon, arsenic, sulphur, and several other substances. The morning light found him pale, exhausted, but determined. He had gained nothing from his all night grind. He was thinking at his work in the forenoon that he had almost better have asked Mr. Mason to employ a detective when he was summoned to the manager's office. The one thing which stuck with him was his own personal experience. If the chemical expert failed him there was nothing left to do but put the detective on the trail of the doctor.

The celebrated chemist from Montreal had come up on the night train. Walter took him at once to the "still," conversing all the way on the manufacture of bleaching powder.

Arrived at their destination the expert asked:

"Has this retort been cleaned of the refuse since your workman was taken ill?"

"No, sir. To my knowledge it hasn't been used, and no one would interfere with it in any way."

"Before the man went into it, do you know if it had first been cooled?"

"Yes."

"Had it been properly ventilated at the bottom and at the manhole at the top before he entered it?"

"Yes," answered the foreman. "It had been opened for several hours."

"And steamed and cooled?" continued the expert.

"Yes. Steamed for four hours as usual and then cooled," affirmed Walter.

"Everything is just as he left it?"

"Yes, sir."

The expert picked up a "muzzle." He examined this carefully; then the wooden buckets for carrying out the debris; looked in at the small opening near the bottom; ascended the ladder and surveyed the interior from the manhole, returning to Walter's side.

"I do not see how I can help you. I cannot conceive how by any process or even chance arsenic could get into that 'still.' In fact, I can state positively there is no chance at all."

"But you will at least make a chemical analysis of the 'mud'?" demanded Walter, quite nettled.

"Where's the use? Even you must know arsenic does not enter into the manufacture of the ingredients."

For answer, Walter grabbed up a bucket and hurried up the ladder. When he was half through the manhole, the factory doctor drew up alongside the "still" on his way to an injured workman.

"What's up now, Hart?" he queried, as he reined in his horse.

"Oh, Mr. Mason has brought an expert up from Montreal to see if Byrne could have got any arsenic from the 'still,'" and Walter disappeared, as he did not want to have any words with the factory doctor.

"Never heard of such a thing in a bleaching-powder 'still,'" muttered the doctor in the direction of Walter, as he whipped up his horse and hurried to his call.

With the wooden bucket Walter scooped up some of the "mud" at the bottom. It was a semi-liquid or pulvaceous, greenish-colored deposit when brought to the light. The expert admitted he might have been hasty in his pronouncements. Walter was determined to have the expert analyze that "mud." He took him to the nearest drug store, where the chemical examination revealed arsenic in decided quantities. But how it got there was yet a puzzle. Walter knew as well as the expert that arsenic was in no way employed in

the manufacture of bleaching powder; but having forced the analysis, the result strengthened his determination to fight for the woman he loved. It was obvious to him that he would now have to take the expert to the chemical works to make a searching examination of the ingredients employed. He knew very well that bleaching powder was formed by the action of manganese dioxide upon hydrochloric acid in the presence of heat, liberating chlorine gas, which saturated the freshly-slaked lime. He jumped to the conclusion that one of the ingredients must be vitiated. His conclusion was corroborated as the chemist ascertained that the crude hydrochloric acid manufactured on the premises contained arsenic.

Walter was elated. He had satisfied himself of the presence of arsenic and the manner in which it became involved in the "mud." There remained the question: How did it get into the man's system, if it did? This baffled both Walter and the expert. His elation was of short duration, but though his face dropped, it assumed a fixed expression of resolution.

The trial came on the following morning. When Walter Hart came into the court-room he saw Mrs. Byrne sitting calmly in the prisoner's dock, unmindful of the many eyes upon her, for they were nearly all those of strangers. She had made no friends during her short life in that town. She had splendid control of herself, was fully conscious of her innocence. She trusted in her God that right was might and that justice would prevail. Walter could divine all this and see that her apparent unconcern occasioned much comment.

Both doctors gave their evidence, attesting to finding sufficient quantities of arsenic in one of the fluids of the body to cause death. They agreed that no disease had been diagnosed, that no diseased condition had been found at autopsy in any organ of the body, and that in their opinion death had not been due to natural causes, but was due to arsenical poisoning. How it had been administered they could not say.

The inference drawn from their testimony was that it had been surreptitiously administered by the defendant.

Mr. Mason was called to recite the conversation he had had with the defendant the day of the arrest. His lawyer vigorously protested that this was not evidence. The court deemed it essential and it was allowed. The manager's evidence added fuel to the blaze of indignation Walter felt in the atmosphere of the crowded room.

The foreman was next put in the witness box. He attempted to show that Mrs. Byrne's conversation to Mr. Mason was justified. He had known that the deceased had been cruel, even brutal, to

his wife. He was put through a long series of questions by the prisoner's counsel. Many of them seemed aimless and thoroughly irrelevant. The attorney was allowed wide scope by the court. He questioned the foreman very closely, carefully, and at great length, on all the processes in the manufacture of bleaching powder, the position of the "still" in relation to the other retorts, their structure, the workmen, their implements and habits, in fact, nearly everything he could think of about the chemical works. When about to finish with his apparently all but aimless inquiry, he asked the foreman another careless question. Like a great many of the lawyer's other questions, it had no apparent meaning to judge, jury, or to the majority of others in the room, probably to the lawyer himself, even; but to one it meant everything. Then he waved Walter down as it was answered. Despair showed plainly in the latter's face.

As Walter stepped down from the box, however, the significance of his reply clutched his consciousness. He turned deathly pale, gripped the railing of the box an instant, and then staggered blindly to his seat beside the chemical expert. He gasped a few words to that individual. A flood of light flashed swiftly across the latter's intelligence. The expert instantly sought the lawyer's side.

The young foreman quickly recovered himself and darted a reassuring and confident glance at the fair prisoner's inquiring gaze. Then his eyes rested fixedly upon the lawyer. Up to this time that person had no intention of calling the chemical expert. The information he had elicited about arsenic was to be locked up in three bosoms. It could only do his case harm. He was fumbling with his notes when he felt his gown plucked, and, turning, saw the chemical expert, asking to be put in the box. The man was evidently deeply moved, as if something unusual had stirred him, so the lawyer immediately complied. Walter's agitation and the expert's solicitation pointed the way for the first question. It was shot swift, straight and direct:

"What killed Amos Byrne?"

"An iron shovel," came the answer.

Judge, jury, spectators leaned forward, astounded. It was Walter Hart's answer, repeated, to the lawyer's last query to him.

It had always been the custom to clean out the "still" with two wooden buckets, two workmen being employed. One worked below scooping up the debris and carrying it to the top of the ladder and the other going down outside to empty it, exchanging pails at the top. It was a coincidence, but a fatal one, that, on the day Byrne had been sent below, he had used an iron shovel.

The crude hydrochloric acid at this time had been impregnated with arsenic. The chemical expert rapidly explained how arsenical fumes would thus be given off, and the man fall a victim to one form of industrial poisoning.

Mrs. Byrne stood free. As Walter Hart had predicted, the crowd cheered her in spite of the prompt call of the court for order. They were both roundly cheered when he passed quickly to her side, for the judge immediately dismissed the case.

THE USES OF PETROLEUM IN THE TREATMENT OF CONSTIPATION AND OTHER DISEASES IN INFANTS*

By ERIC PRITCHARD, M.A., M.D. (OXON.), M.R.C.P., ETC.

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The therapeutic uses of petroleum for internal administration are almost as old as history itself. Herodotus and Pliny both refer to it in their writings as a liquid with medicinal properties of considerable value. During the eighteenth and early nineteenth centuries, travellers in Russia, Roumania, Bavaria, South America and other countries where oil wells are situated refer in their writings to the consumption of liquid bitumen, white naphtha, or St. Quirinus's oil, by the natives as cures for various diseases. On the other hand, since the time that paraffin was introduced into Europe for lighting purposes, medical literature has abounded in references to cases of accidental poisoning and attempted suicide by swallowing of the crude oil. This fact explains the very natural prejudice many people at first evinced at taking the purified form of paraffin by the mouth for medicinal purposes.

My first acquaintance with the uses of the more refined and non-toxic varieties of paraffin dates from the year 1893, when petroleum in the form of an emulsion was brought to my notice as a substitute for cod liver oil in the treatment of consumption and wasting diseases. Under the late Dr. W. B. Cheadle's directions I gave this new emulsion a prolonged and careful trial in several cases of tuberculous disease in children who were warded in St. Mary's Hos-

* The American Practitioner.

pital, but with such disappointing results that we soon abandoned its use in favor of our old friends cod liver oil, maltine and steel wine.

If, at that time, I had known what I learned a few years later, namely, that Dr. N. A. Randolph,* of Philadelphia, had conclusively proved in the year 1884 that all paraffin when swallowed by the mouth passed through the alimentary tract in an unabsorbed and unchanged condition, I should probably have spared myself the trouble of making clinical experiments to prove its virtues as a food. When I entered into private practice a few years later I was surprised to observe that the psychological influence of persistent advertisement had already won for this petroleum emulsion a strong position in the affection of the medical profession as well as of the lay public as a cure for bronchitis and other pulmonary complaints. Knowing then that petroleum acted merely as an inert substance in the alimentary tract, and that none of it was absorbed into the system, I came to the conclusion that its reputation depended either on the same properties as those which belong to bread pills, or on the considerable doses of hypophosphites which were added, very wisely, on the principle that if the petroleum failed the added drugs might succeed.

In the year 1906 I began to alter my views with respect to the value of petroleum, for I came to the conclusion that it must possess therapeutic properties of a very rational character in the treatment of constipation, and that as a remedial agent in this condition it must be indirectly valuable in many other morbid conditions.

My enlightenment came in this way. I was at the time in great difficulties in respect to the treatment of constipation in infants, for I found that if the rational treatment of this condition by olive oil, a line of treatment which I greatly preferred to the irrational use of drugs, enemas, or glycerine suppositories—was pursued to its logical conclusion it led one to a most unfortunate *impasse*. An occasional teaspoonful of olive oil is an excellent corrective to constipation in infants when this condition is due to a deficiency of fat, but in those cases in which constipation supervenes in spite of the fact that fat is already supplied in adequate amount, the additional administration of olive oil only aggravates the symptom. In trying to discover some lubricant which could effect the required object without causing so-called "fat injuries," I called to mind certain observations which had been made some years previously by Dr. Robert Hutchison† in which he pointed out that, although the

* Proceedings, Academy of Natural Sciences, Philadelphia, 1884.

† British Medical Journal, March 24, 1909.

claims of the manufacturers that petroleum emulsion could serve as a substitute for cod liver oil could not be substantiated, it was possible that petroleum itself could act as an artificial substitute for mucus, and thus be of value in other directions. This idea of employing petroleum as an artificial substitute for mucus in cases of constipation appealed strongly to my imagination. I therefore decided to give it an immediate trial and made my first experiments on a number of infants who were attending at my infant consultations in Marylebone, and were suffering from constipation.

The success which attended my early experiences with petroleum as an intestinal lubricant for infants was so encouraging that in a very short time I practically abandoned all other forms of aperient medicine, and it is most gratifying to me at the present time to realize how widely this idea has been taken up in the treatment of constipation in older subjects. While giving Dr. Hutchison full credit for his suggestion that petroleum might play the part of an artificial mucus, I must claim some credit for having proved the practicability of the idea. I make this claim because I now hear it said that there is nothing new in this idea and that petroleum had always been used for this purpose. If this is so I cannot understand why in medical text books and in special works on constipation heretofore published, and in the special number of *The Practitioner*, published in May, 1910, which was devoted to the subject of constipation, there are no references to the use of petroleum in this connection. I have very carefully examined all the literature of the subject, and before 1906, when I first began to use petroleum in cases of constipation, I can find no reference to its use in such a connection—it was, however, largely used empirically in pulmonary affections and as a substitute for cod liver oil, under the mistaken belief that it could be absorbed from the alimentary tract, but it was for the very reason that it could not be absorbed and subserve these reputed objects that induced me to try it as an expedient in constipation. Although I had repeatedly pointed out, both in public and in private, the merits of petroleum in cases of intestinal stasis and constipation, it was not until I published a full account of its influence in such conditions in my book on the "Physiological Feeding of Infants," published July, 1909, and again in an article in the special constipation number of *The Practitioner*, May, 1910, that the petroleum method was given a trial by others. Now that the method has justified the claims I made for it I am told that there is nothing new about it and that it has been always used. Until, however, I am shown some reliable evidence that petroleum was deliberately and rationally prescribed as a cure for constipation prior to

1906, I shall continue to persist in my claim that I was the first to use it for this purpose.

Most of the paraffin which is now used for internal administration is of the liquid variety—"Petroleum liquidum purum"; it is, however, a body of very indefinite composition. The official standards, while authorizing certain limits as to the volatility and specific gravity do not fix definitely the chemical composition of the oil.

It thus comes about that no two samples are exactly alike either as regards taste or composition, and manufacturers have taken advantage of these inconsistencies to sell special brands under registered names at fancy prices. As long, however, as a liquid petroleum is tasteless and free from toxic compositions, one kind is as good as another, and it certainly is unwise to pay a fancy price for a fancy name.

When the idea first occurred to me in 1906 to treat the constipation of infants by petroleum I thought I would try my old friend the original petroleum emulsion which had been so largely advertised as a substitute for cod liver oil, but then I remembered that it was fortified with considerable quantities of mixed hypophosphites, which might introduce fresh and undesirable complications. I therefore took counsel with the dispenser at the St. Marylebone General Dispensary, and between us we devised the formulary of an emulsion which, under the name of "Marylebone Petroleum Emulsion," has acquired quite a local reputation. The emulsifying agent in this preparation is a decoction of Irish moss, a very much better medium than gum acacia or tragacanth, which is usually employed. It is much cheaper, and it contains a small quantity of iodine, which I believe has a really beneficial influence on most of the conditions for which the emulsion is usually given. The flavoring is quite pleasant, and the small addition of benzoic acid preserves the decoction of Irish moss from fermentative changes. The following is the formula of the Marylebone emulsion:—

Paraffini liquidi B. P.		33.0
Acidi Benzoici		
Glusidi	a a	0.05
Olei Cinnamomi		0.10
Decoctum Chondri Crispi	ad	100.00

The chief trouble in prescribing this emulsion is that it is practically impossible to make it in small quantities; it must be made in bulk if it is to be of good quality. Another objection to the use of an emulsion of petroleum instead of the plain oil is that larger

quantities of the emulsion must be taken than of the oil itself; in fact, three times as much. And further, it is more expensive. These disadvantages, however, are compensated for by the more efficient action of the emulsion. Emulsions of petroleum are now made on an improved principle, which allows them to contain so high a percentage of petroleum as 60. And in these the emulsification is so fine that it is claimed that the petroleum is actually absorbed into the system and excreted in the urine; even if these claims are true, I cannot see that the absorption of a mineral oil is of advantage to the system; indeed, I can quite conceive that it might be very much the reverse.

The liquid paraffins which are now used in such large quantities are very much purer oils than those originally obtainable; a few of them are colored and flavored, and sold under fancy names as proprietary articles. We experimented at the St. Marylebone General Dispensary for a long time in an endeavor to flavor liquid paraffin in such a manner as to make it really agreeable to take. The best, however, that we succeeded in making was colored with chlorophyll and flavored with menthol. We called this Marylebone Crème de Menthe, and it has been very well received by those patients for whom it has been prescribed; and it certainly has more than a colorable resemblance to the liqueur. The great difficulty in making liquid paraffin really palatable is that comparatively few flavoring substances are soluble in it, difficulties which do not arise in the case of the emulsion.

During the last two years the use of liquid paraffins has been largely replaced by the introduction of solid forms which can be flavored and colored in any required manner; these are eaten out of a spoon like a confection or preserve, and answer all the purposes of the ordinary liquid oil.

Although in their natural state these solid paraffins look exactly like vaseline, they are, as a matter of fact, very special kinds of emulsion, and as such can take up coloring and flavoring matters to the point of saturation of the emulsifying agent.

The whole history of the discovery of these solid or emulsified paraffins is extremely interesting, but into this matter I cannot here enter. I can only refer those of my readers who are interested in the question to a paper of Mr. S. U. Pickering,* which contains a full account of the whole matter. In a private letter to me, Mr. Pickering very kindly explains how it is that an emulsion of paraffin can be made so as to appear quite transparent, and at the same time

* Emulsions by Spencer Umfreville Pickering, M.A., F.R.S. Transactions of the Chemical Society, 1907, Vol. 91.

consist almost entirely of paraffin, with the merest trace of adventitious emulsifying agents. He says: "The explanation of the semi-solid or jelly emulsions is clearer to me now than it was then (i.e., in 1907, at the time he wrote the paper referred to above. E.P.). Globules of uniform size in a liquid medium require that medium to amount to about 25 per cent. of the volume of the whole mixture, for filling up the interspaces; if the globules are not uniform, the volume of liquid will be somewhat less; but a very large reduction in it involves the globules becoming distorted so as to fit closer, and ultimately they must assume such a form as a dodecahedron, being tightly packed, like bricks, together, with only a film of liquid of molecular thickness separating them. This accounts for the rigidity of the mass, its transparency, and its showing no visible structure under the microscope. Dry air causes it to demulsify by drying up the separating film, and when wetted it becomes opaque, as the films increase in thickness and the oil particles assume a globular form."

These solid paraffins are an immense improvement on the old vaselines which, until two years ago, were practically the only solid form in which petroleum could be administered by way of the mouth. It is difficult to imagine anything more nauseating than vaseline naked and undisguised as a medicament for oral administration. And yet, to my knowledge, it was largely prescribed in this form, at least at one hospital in London, and given to the patients in wooden pill boxes, with directions to be eaten with a spoon.

This inartistic method of dispensing solid paraffin has now been superseded by these solid emulsions, which can be colored and flavored in a great variety of ways. Many people much prefer these solid preparations to the liquid forms, or even to the simple emulsions such as I have described, but for infants there can be no doubt that the liquid emulsions are more appropriate.

The general claims of paraffin as an intestinal lubricant require no corroboration on my part, but in its special application in the treatment of those heterogeneous disorders of infancy which are often classified as indigestion, its great value is not yet fully appreciated by the medical profession. As I have elsewhere pointed out, most of the so-called troubles of indigestion in infancy are associated with disturbances of the motor functions; such as spasms of sphincters, enterospasms or dysperistalses of one kind or another. In these conditions it is obviously extremely useful to know of an efficient lubricant, such as petroleum, which can penetrate to the lower reaches of the bowels without absorption, and without chemical change. In severe cases of so-called colic, or windy spasm in

infants, I sometimes almost fill the intestines with petroleum emulsion; either alone or in combination with carbonate of bismuth. I learned the value of large doses of bismuth in such cases when I was investigating the causes of motor disturbances in infants, by means of the bismuth food and the X-rays. In many of these cases I noticed that the crying and pain subsided immediately after the administration of the bismuth. Since then I have given very large doses of this drug in combination with petroleum emulsion with the greatest confidence, and generally with the most gratifying results. The chief objection to the administration of bismuth in large doses is that its gritty properties make it distasteful to infants; this disadvantage is overcome by using the preparation known as "Glycerinum Bismuthi carbonatis," a most elegant preparation of milky softness, details for the making of which are given in *The Codex*. One drachm or even two drachms of this combined with an equal quantity of petroleum emulsion serves as a most efficient carminative for infants troubled with wind or colic. It may be given independently or combined with the contents of the infant's bottle. A mixture of this kind is a most efficient substitute for meconium to the important physiological functions of which I have repeatedly drawn attention. When this natural intestinal lubricant and antiseptic is by design or accident discharged from the bowel of the new born infant, disturbances of motor functions and enterospasms are very liable to supervene. In such cases the free exhibition of this artificial meconium has the most excellent effect in restoring comfort.

I am not prepared to support the statement that petroleum is a powerful antiseptic agent. Our experiences in attempting to discover an efficient preservative for our emulsions gave the lie to this belief, but all the same there can be no doubt that it does in some degree limit and retard the decomposition of those nutrient media in which it is combined in large proportion. It does so, I feel convinced, by coating either the bacteria, or the nutriment on which they thrive, with an impenetrable film of a substance which cannot mix with, or become incorporated in, the protoplasmic contents of the living cell. We know from experience that the stools of persons who regularly take paraffin are, if not exactly odorless, at any rate far less offensive than when the oil is not taken. This is, however, open to the interpretation that it is quite as much due to the rapidity of transit of food through the intestinal tract, as to the inhibitory influence of the petroleum on the growth of the bacteria themselves.

One of the most valuable uses of petroleum is in the treatment of thread worms in children. This subject, however, hardly comes within the compass of this paper, but I refer to it here because I believe that its almost specific action as a vermifuge in such cases, is dependent not so much on its lethal influence on the parasites or their eggs as upon its direct influence on the mucous membrane. Paraffin in its crude form has long enjoyed a high reputation as a local application in cases of catarrhal or diphtheritic inflammation of mucous membranes. It has been claimed* that pieces of diphtheritic membrane when immersed in crude paraffin soon become soft and disintegrated. On similar grounds it might be supposed that paraffin when applied to unhealthy mucous membranes has a health giving and cleaning up influence. In the treatment of chronic catarrhs of the nose and pharynx, the purer forms of petroleum in combination with menthol obtained a very considerable vogue a few years ago, and when applied to the affected mucous membranes in the form of a fine spray by means of B. and W.'s useful little paroline nasopharyngeal atomizer, it affords results which in my opinion, are not surpassed by any of the more recent methods.

Whether, however, petroleum owes its undoubted efficacy in cases of intestinal disorder to its therapeutic effect on the mucous membrane, or to its undoubted influence on the motor functions of the bowel, there can be no question that in cases of thread worm infection it acts by ironing out, and cleaning up the crypts or other lurking places of an unhealthy mucous membrane in which the eggs have an opportunity to incubate undisturbed.

Although petroleum is, in the great majority of cases, a most efficient lubricant and aperient, nevertheless in certain exceptional instances it undoubtedly predisposes to constipation. This paradoxical effect, which must be familiar to all those who have had much experience with the drug, is, I believe, to be explained on the following grounds. In some individuals a regular action of the bowels can only be maintained by the stimulating and provocative action of irritating particles, such as the seeds or husks of fruits or vegetables. In such cases petroleum may predispose to constipation by its emollient influence on the mucous membrane, thus depriving the rectum or its neuromuscular mechanisms of the required stimulation. Such constipation is, however, quite compatible with relief of intestinal stasis in the higher portions of the bowel.

In considering the alternative hypotheses on which the undoubted efficacy of petroleum in cases of intestinal disorders may be explained, it may not be altogether irrelevant to remember that par-

* Year Book of Treatment, 1895, page 1678.

affin may have the same influence in inhibiting absorption of food, as I have suggested it may have in the case of bacteria; that is to say, it may coat either the food or the mucous membrane with an impenetrable film of oil in such a way as to interfere with the absorption of the products of digestion. In my experience hypernutrition or the absorption of an excess of food far more frequently interferes with sound nutrition than does starvation, and especially is this true of infants and young children of the upper and middle classes.

If this belief is well founded, it may be that the reason why petroleum proves so beneficial in many cases is because it retards rather than promotes the absorption of nutritive material.

As far as the treatment of infants is concerned, I have been quite consistent in my adherence to the emulsion in preference to any of the other forms in which it may be administered, and this is chiefly for the reason that the emulsions mix more intimately with the ingested food than is possible with the pure oil. I think that the softening effects of paraffin on the contents of the descending colon and rectum must be more pronounced when the oil is evenly distributed with the food than when it is confined to special portions, and for this reason I think it far better to give a dose of the emulsion with every feeding than to give only one dose of the undiluted oil during the 24 hours. I admit, however, that in certain obstinate cases the mass effect of a large dose of the oil given once a day reinforces the milder but more sustained influence of repeated doses of the emulsion.

I find petroleum emulsion such a universally useful preparation in the treatment of infantile disorders that now I almost invariably use it as the vehicle in which to prescribe any particular drug I wish to administer. It is quite immaterial whether the drug be soluble, insoluble, acid, neutral or alkaline; they all combine well with it, and their taste is effectually disguised. In the case of insoluble drugs, such as sulphur or bismuth, it is important to see that the bottle is well shaken before pouring out a dose.

Before I conclude, one word as to dosage. As a rule I give infants one teaspoonful of the emulsion after or with each feeding, but I do not hesitate to give even as much as half an ounce 6 or 8 times a day. I have never noticed any untoward results of the pure oil, and generally prescribe doses of half to three drachms once a day.

SUMMARY.

1. The internal administration of crude petroleum for medicinal purposes dates from very early days, but the use of the more re-

finer oils is of recent origin. Toward the end of the last century, it was largely administered in the form of an emulsion combined with hypophosphites under the mistaken belief that it possessed nutritive properties and could serve as a substitute for cod liver oil.

2. In 1899 Dr. Robert Hutchison repeated the almost forgotten experiments of Dr. Randolph (1884), and proved that petroleum was not absorbed from the bowel, that it had no nutritive properties, and that the only imaginable therapeutic purpose it could serve was as a substitute for mucus.

3. Acting on this suggestion, in 1906 I began to use paraffin as a rational specific in the treatment of constipation in infants.

4. I found petroleum emulsion extremely useful in the treatment of all forms of indigestion in infants.

5. Its efficacy in these conditions may depend on:

- (a) its lubricating properties.
- (b) its antiseptic properties.
- (c) its cleaning up effect on the mucous membrane.

6. Petroleum emulsion is a most useful vehicle for all sorts of drugs, soluble as well as insoluble, which are prescribed for infants. It may be given with perfect safety in very large doses.



Reviews

The Physician's Visiting List for 1915. Sixty-fourth Year of its Publication. Philadelphia: P. Blakiston's Son & Co. Price, \$1.25.

These visiting lists are issued in styles suitable for twenty-five patients weekly; fifty patients weekly; fifty patients weekly in two volumes; seventy-five in two volumes; one hundred in two volumes; perpetual editions for twenty-five; and fifty patients and monthly editions. The prices range from \$1.00 to \$2.50. There is a calendar for 1915-16; a table for calculating the period of utero-gestation; a chapter on incompatibility; rules for immediate treatment of poisoning; metric system; dose-table; a chapter on apnoea and apnoea. It is a very useful book.

Chemistry and Toxicology for Nurses. By PHILIP ASHER, Ph.G., M.D., Dean and Professor of Chemistry at the New Orleans College of Pharmacy. 12mo of 190 pages. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$1.25 net. Sole Canadian Agents: The J. F. Hartz Co., Ltd., Toronto.

Nurses will find this small volume of much service in understanding many problems presenting to them in their daily vocations. The book will be found compact though instructive. Its practical import will be appreciated.

A Manual of Diseases of the Nose, Throat and Ear. By E. B. GLEASON, M.D., Professor of Otology in the Medico-Chirurgical College, Philadelphia. Third edition, thoroughly revised. 12mo of 590 pages; 223 illustrations. Philadelphia and London: W. B. Saunders Company, 1914. Cloth, \$2.50 net. Sole Canadian Agents: The J. F. Hartz Co., Ltd., Toronto.

This book is designed for the use of students and general practitioners, and as such must cover the subject concisely, clearly and briefly. Thus more space is given to diagnosis and treatment than to rare and difficult operations. The formulæ have been revised and careful attention given to the use of cocaine, adrenalin, etc., whilst much new material has been added. The illustrations are well selected.

The Pocket Formulary for the Treatment of Disease in Children. By LUDWIG FREYBERGER, J.P., M.D., Vienna; M.R.C.P., Lond.; M.R.C.S., Eng.; Barrister-at-Law; Toxicologist and Pathologist. Fourth Revised and Enlarged Edition, adapted to the British Pharmacopœia, with an Appendix on Poisons, their Symptoms and Treatment. New York: Rebman & Company.

The formulæ are arranged under drug headings, as, for instance, Acetanilidum. Then follow properties, use, therapeutics, dose, incompatibles, and a sample prescription. No doubt many useful prescriptions will be found. Where necessary correction of taste is set out, a very desirable piece of knowledge where prescribing for children is concerned.

A Laboratory Manual of Qualitative Chemical Analysis. By A. R. BLISS, Jr., M.D., Ph.G., Professor of Chemistry and Pharmacy in the Birmingham Medical College. Octavo of 214 pages, with working tables. Philadelphia and London: W. B. Saunders Company. 1914. Cloth, \$2.00 net. Sole Canadian Agents: The J. F. Hartz Company, Ltd., Toronto.

First year students in medicine and students in dentistry and pharmacy will find this small volume of decided value in their practical studies of the subject of chemistry. The object of the manual is to treat of the systematic procedure for the detection and separation of the most common bases and acids. Part I. deals with the metals or cations; Part II. the acids or anions.

The Salvarsan Treatment of Syphilis in Private Practice, with Some Account of the Modern Methods of Diagnosis. By GEORGE STOPFORD-TAYLOR, M.D., M.R.C.S., and ROBERT WILLIAM MACKENNA, M.A., M.D., B.Ch., Physicians to the Liverpool Skin Hospital. New York: Rebman Company.

In this book are set out all the work done and the conclusions arrived at by the authors in their private practice after three years' employment of salvarsan. They have come to the conclusion that Ehrlich's is a great discovery. The four chapters are as follows: (1) The Cause of Syphilis; (2) New Light on Parasyphilitic Disease; (3) The Treatment of Syphilis with Salvarsan; (4) Combined Treatment of Syphilis with Salvarsan and Mercury. There are several photo illustrations.

International Clinics. Volume III. Twenty-fourth series, 1914.

Edited by Henry W. Cattell, A.M., M.D., Philadelphia and London; J. B. Lippincott Company; Canadian Agent, Mr. Charles Roberts, Unity Building, Montreal.

In this volume there are six articles on Diagnosis and Treatment; eight on Medicine; three on Electro-Therapeutics; six on Surgery; one on Child Welfare; two on Medical Problems; one dealing with Big Fees; one on the Waste in Medical Education. There is one colored plate, and numerous illustrations. It is a work which keeps everyone abreast of the times. The articles in *International Clinics* are always timely, present the best reading, and, being generally contributed by men who know, add worthy and valuable knowledge to current medical literature. There is no better means of keeping posted on medical topics. Everyone should be a subscriber.

Catechism Series—Medicine. Part II., Second Edition. Revised and enlarged. One shilling each, net. Edinburgh: E. & S. Livingstone.

The diseases are taken up in separate form, questions are asked and the answers set forth in very concise reply. As an example, take gout. What is gout? What is its etiology? What is the pathology of gout? How is uric acid formed? How is its excess in the blood accounted for? Are there other theories of gout? What are the morbid changes? Describe an acute attack. What are the changes of chronic gout? What are the other forms of gout? Mention the complications. How would you treat an acute attack? What is the treatment of chronic gout? The *Catechism Series* are helpful aids to students.

The Backward Baby. By HERMAN B. SHEFFIELD, M.D., New York. New York: Rebman Company.

This book is a prize essay which was awarded the Alvarenga prize of the College of Physicians and Surgeons of Philadelphia, July 14, 1914. It is a treatise on Idiocy and the allied mental deficiencies in infancy and early childhood. There are twenty-two original illustrations.

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COMMENT FROM MONTH TO MONTH

The General Medical Council of Great Britain has a fine chance to show its magnanimity. Ontario physicians applying to the War Office to serve with the British forces on land or sea have been refused owing to their not having been registered with the G. M. C.—and all know there is no reciprocity with the Ontario Medical Council. Graduates from other provinces lacking this reciprocal status have been similarly refused. Of course there is nothing to prohibit Canadians practising with our own forces.

It is a most remarkable, even a most flippant, piece of impetuosity which rushes at the Ontario Medical Council to place the blame of the whole fatal heritage physicians in Canada are heir to upon that body; for it does seem a fatal heritage at the present time, when British subjects are debarred from serving the British Empire, either on land or at sea, simply because the home authorities, in the shape of the General Medical Council, block the way.

This war is at Great Britain's doors. Physicians' services are in demand—yes, urgently needed. Ontarioans and other Canadians are eager to serve. The right thing to do, under the circumstances, would be for the General Medical Council to suspend the particular regulation debarring Canadians for the time being. It seems so easy, right on the spot, is more business-like, magnanimous, Imperial.

To travel to Ontario at such a time as this seems fantastic display. It surely must have been some facetious person who suggested "reciprocity in five minutes," if the Ontario Medical Council would act. One can fairly see the facile smile of the General Medical Council, their eyes faintly twinkling.

Let our famous Canadian, Sir William Osler, put it up to the General Medical Council! Let the General Medical Council "take the bull by the horns"! That is the way they throw him in Canada. Let them cut the Gordian knot at one fell swipe by suspending their own regulation.

Editorial Notes

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ONTARIO MEDICAL ASSOCIATION

It has been decided that the meeting of the Ontario Medical Association will be held in Peterborough on May 25th, 26th, 27th and 28th next, and that the Provincial Health Officers Association, under the presidency of Dr. Hall, of Chatham, will hold its meeting in Peterborough also during the same week. The joint meetings of the two Associations will secure a very large attendance of the profession throughout the Province, and will probably result in single fares being obtained for the delegates.