the iodoform bone plug of von Mosetig-Moorhoof. Dr. James E. Moore of Minneapolis was the first advocate of the iodoform bone plug in this country. I believe that my own case was the first in which it was tried in this section.

The mass was said to have the following characteristic:

(1) It remained solid at body temperatures.

(2) It dissolved at a temperature of 120° F., 50° C., without losing its character.

(3) It was locally non-irritating when introduced into the body.

(4) It was absorbed so slowly as to be non-toxic.

(5) As it was absorbed, its place was taken by organized tissue.

(6) This new tissue either was or very soon became infiltrated with the salts of lime.

In a recent communication von Mosetig-Moorhoof says, "Gradually I arrived at the conclusion that the organism would tolerate only a complete hermetic closure of an aseptic cavity with an antiseptic filling." He prepared such a filling in the following way: Under the strictest asepsis equal parts of spermaceti and sesamoil are melted in an evaporating dish, filtered into a Florence flask and sterilized in a water bath. Next 40 grams of powdered iodoform are put into a sterile flask and 60 grams of the hot mixture added under constant agitation. The flask should not be more than ¾ full, and shaken constantly till the mass solidifies It is then closed with a sterile rubber stopper. The melting point of the plug is 45-48° Celsius. To use the plug, heat the flask again on the hot water bath, never allowing it to get above 55° C., and after shaking well, pour directly from the flask into the wound.

The preparation of the bone cavity comes next. A flap of soft parts and periosteum is turned back, and then all diseased tissue down *into* sound bone is carefully removed. In order that the mass may run into all the canaliculi and bone crevices, the latter must be absolutely dry. If the liquid mass is run in along the sides of the cavity first, its greater specific gravity will cause the little drops of blood at the bottom of bone crevices to be floated upward upon it; so that when the mass has hardened they can be wiped off its surface with a sponge. While filling the cavity such posturing of the part is required as shall enable advantage to be taken of the laws of gravity.

J. S., aged 14, was referred to me from Ferndale, Humboldt County, by Dr. E. Hammond on January 13th, 1903. He had several discharging sinuses in the lower end of his right tibia, following an acute osteomyelitis dating from March in the preceding year.

February 9th, the tibia was opened through a 5-inch incision on its antero-internal aspect, and a sequestrum 2½ inches long removed. A great deal of porous bone was curetted out as far down as the epiphyseal line. Sinuses leading to the surface were curetted and enlarged. The whole wound was drenched with pure carbolic acid for a minute and a half, washed with alcohol and packed with alcohol gauze.

April 6th, the wound in the tibia was thought to have decreased to about one-half its original size; sinuses had closed; granulations looked healthy. The boy was sent home with instructions to occasionally touch the wound with carbolic, to pack with alcohol gauze, and to report in 6 months.

As a matter of fact, it was two years before I saw him again.

June 5th, 1905, he entered St. Luke's Hospital. The boy had grown several inches since I last saw him. A tremendous depressed scar now appeared at the site of the old operation, and in its center a sinus, which discharged a very little watery pus.

June 6th, the scar was laid open by free incision and the entire old wound cavity, which was full of fibrous tissue, curetted out. It was thought subsequently that the remnant of a sequestrum at the bottom of the sinus might have been located by means of the X-ray. The oozing was stopped by hot water compresses and adrenalin and dried with alcohol, and, I think, ether. The cavity was next filled with Morhoff's mass, which had been heating on the hot water bath. The soft parts were then brought together over the mass with sutures of silkworm gut. To release the tension on the sutures, an incision was made on each side of the primary wound, parallel to it and an inch away from it. These lateral incisions were packed. The wound did not heal by first intention, so on. July 1st, it was again curetted and again filled with the mass. About this time Dr. Moore visited San Francisco. He advised me not to disturb the mass, even though the wound should not heal per primum. Again I failed to get union in the old scar tissue, but this time the mass was not interfered with. The wound was simply dusted with a dessicating powder, and covered with sterile gauze.

September 28th, the patient went home.

In May last, Dr. Delamere wrote me that the soft parts had closed over the mass, and the leg appeared to be perfectly well.

In January of this year, through Dr. Delamere's kindness, the accompanying X-rays were taken, and at the same time the boy's mother sent me the picture here presented.

In the letter which accompanied the photo she said: "The new scar is much smaller in every way than the old one, and the depression still present seems to be filling up slowly Jule and I think the second operation was worth while, and were we in the same place again, we would have it done just the same."

This case is not reported as an ideal result of its kind, but to show how much better is even a partial result by this method than what one may expect in all but the very exceptional cases submitted to the older procedures.

The late Professor von Mosetig-Moorhoof performed this operation successfully more than one thousand times For this reason it would seem fair to ascribe failures with the method to technical defects rather than to the procedure itself.

PRELIMINARY REPORT ON A NEW PLASTER COMPOUND FOR PERMANENT SURGICAL DRESSINGS.

By RAYMOND RUSS, M. D., San Francisco.

It is with some hesitation that I venture to make a report on this subject. It has occupied my attention for the past six months, and, while I can appreciate the value of this new plaster compound and can see many ways in which it is an improvement on our old method, at the same time I have not com-

pleted my labors, as I will later point out to you. The adptation of a reaction employed in the mechanical arts and slightly known to general chemists, as it has been protected by many patents, to the usages of surgery, has been a matter of extreme difficulty. Information has been meager and hard to obtain, and the subject has taken me into the literature of various processes of a purely mechanical nature. My studies have given me a great regard for those compounds which, also borrowed from the mechanical arts, have been used with such facility in surgery.

The most conspicuous of these substances is plaster of paris, the general employment of which has marked an important advance in the treatment of fractures. The advantages of an accurate coaptative dressing in the treatment of fractures of the limbs are so great that one who has once learned to handle plaster will certainly prefer it to all other splint materials. Nevertheless there are some objections to the use of plaster and I will endeavor to bring these out in the discussion of the compound which forms the subject of this paper. I would call your attention to one fault, to overcome which was the primary object for undertaking this investigation.

The Roentgen ray penetrates plaster of paris with difficulty, and while it is sometimes possible to secure a good radiograph or make a satisfactory fluorscopic examination, the method is far from being satisfactory as a routine measure. The advantages of the Roentgen ray in the diagnosis of fractures and in the accurate reduction of bone fragments can not be denied. The surgeon is only too glad to avail himself frequently of this help, and as time passes we will rely more and more on this most efficient aid. To obtain, then, a coaptative dressing which would be easily penetrable to the X-ray was the first requisite.

In the search for a compound which would answer my purpose I conducted experiments with water-glass, starch, dextrin and the many substances which have been recommended in the past, but which are now not usually employed. These substances all harden very slowly, and even when the process is ended their use is not very satisfactory. Plaster of paris is far their superior in that hardening consists in a definite chemical reaction, a crystalline salt being formed. This setting can be facilitated by the use of heat or by the addition of salt or alum. It is accompanied by slight expansion and the evolution of heat. There are few substances which, like plaster, possess this power of recrystallization; analogous reactions are afforded by the oxichlorides of zinc and of magnesium.

It is generally recognized by physicists that the penetrability of the Roentgen ray for metals is in inverse proportion to their atomic weights. The nonmetallic substances with which metals are combined do not seem to influence this proposition. The atomic weight of calcium is 40, that of zinc 65, and of magnesium 24. One could, therefore, conclude that the penetrability of magnesium compounds would be much greater than that of calcium.

In 1869 Sorel first called attention to the fact that the oxichlorid of magnesium had the remarkable power of setting like plaster-of-Paris when mixed with water. He found that the reaction produced a material much harder and more durable than plaster-of-Paris, so hard in fact that it was capable of taking a polish. The resulting compound showed great tenacity; it could be mixed with fifteen or twenty times its weight of other dry powders without losing this power of setting when water was added. Practically the reaction is accomplished by making a strong solution of magnesium chlorid into a thick paste with magnesium oxid. The mass soon hardens and sets and is found to contain an oxichlorid of magnesium ($MgCl_2 . 5MgO$) associated with a varying quantity of water of crystallization, the amount of water depending on the temperature at which the reaction has taken place. The value of the reaction was quickly appreciated and numerous companies for manufacturing the material were soon formed. The first patents on the process followed quickly on its discovery. At the present day it is used considerably, under a great variety of trade names, for the manufacture of flooring, wainscoting, etc.

For this purpose magnesite, native magnesium carbonate, is employed. It occurs in Austria and Greece in extensive deposits and is also found in California. The magnesium carbonate is first crushed and then calcined at a temperature of 800° to 900°C in rotary pans. Carbon dioxid begins to be given off at a temperature of 600°C and this is apparent by a slight ebullition on the surface. If the temperature is carried too high the power of setting with magnesium chlorid is lost. This substance is mixed for commercial use with about six parts of sawdust or sand and then made into a thick paste with a strong magnesium chlorid solution.

It is hardly necessary to tabulate my various experiments in the adaptation of this reaction to surgical usage, but it will suffice to give simply the practical results of the method. It must be remembered that we are dealing with a reaction which is wholly unlike that of plaster-of-Paris. For instance, in the latter, we use table salt or alum to hasten the reaction, while with the magnesium preparation salt is practically inert and alum slows the reaction instead of hastening it. It has been found, however, that the stronger the solution of magnesium chlorid the quicker the reaction, but here again caution must be observed, for this is a deliquescent salt and its presence in excess will cause our finished cast to "weep." If such deliquescence does occur it can be readily stopped by rubbing on a little dry magnesite.

The magnesia of the drug stores, both the magnesia usta and the magnesia ponderosa, cannot be employed. They are prepared by thorough ignition of the magnesium carbonate and do not set when magnesium chlorid solution is added. Dry heat is a most efficient aid in promoting the rapidity of the reaction. In a general way we may say, the greater the degree of heat employed the quicker the final result, although at very high temperatures the plas-

ter will sometimes crack. It does not become brittle by heating as is the case with plaster-of-Paris. Like plaster-of-Paris a slight expansion occurs in the setting of this magnesium compound and chemical combination is also accompanied by the evolution of a small amount of heat.

I have employed both the California and the imported magnesite, and my results are equally good. The imported material is made by the Concordia Chemische Fabrik auf Actien, Stassfurt, Germany, and the local product manufactured by the Magnesia Products Company, of West Berkeley, Cal. For the making of splints the following technic is employed. Bandages of crinoline are impregnated with calcined magnesite by means of a plaster-of-Paris bandage machine. I prefer a width of three to four inches and a length of three yards. A stock solution of commercial magnesium chlorid is prepared. This should have a specific gravity of 1.250 (28.8 Beaume) and is obtained by dissolving 20.44 parts by weight of magnesium chlorid in 16 parts of water. In our work the best results have been obtained in this strength. If any sulphates are present in the solution they should be precipitated by barium chlorid, as the reaction is rendered slower by their presence. A little of this solution is poured into a container and the bandage immersed in it until bubbles cease to rise. The surplus solution is then squeezed out and the roller applied smoothly, directly on the skin or over sheet wadding as the surgeon may prefer; the magnesite cream is worked in with the hands, avoiding if possible the use of any additional solution. Dry calcined magnesite is then added and rubbed about until the moisture is well taken up, for the finished cast will "weep" if magnesium chlorid is present in excess. If this occurs it can be readily remedied by rubbing on a little dry magnesite. For ordinary work two layers of bandage will be all that is required. The beginner is almost certain to make his splints of this material too thick. A little practice will suffice to show what great rigidity may be obtained in a very thin layer.

There remains but to sum up the advantages of this new magnesium compound:

Penetrability.—The Roentgen ray penetrability as compared with plaster-of-Paris has been estimated by taking equal thicknesses of the set plasters, placing them side by side and radiographing them. As near as can be judged by color, the penetrability of the magnesium compound is about twice as great as that of the calcium. As I can procure the same rigidity with casts of from one-half to one-third the thickness, we may say that the penetrability of our preparation is from four to six times that of plaster-of-Paris.

Hardness.—We have no means of estimating hardness accurately and so I show specimens of the material and of plaster-of-Paris also, that you may make your own deductions. It is only necessary to repeat that our magnesium compound is used in making flooring and is capable of taking a polish. By employing a knife with a file edge I find no difficulty in cutting it. As an aid in cutting hydrochloric acid may be used, but I have not found this often necessary.

Tenacity.—Our compound is extremely tenacious and it will be only necessary in proof of this to repeat Sorel's statement that it may be mixed with twenty times its weight of inert substance without losing its setting qualities. In thin layers it is also quite elastic, which is an advantage in its favor. It is not brittle and does not chip and break along its edges as does hard plaster.

Weight.—Volume for volume our magnesium compound weighs 1.3 to 1 of set plaster-of-Paris; yet the same strength can be obtained in so much thinner layers that our casts are much lighter. In Colles' fracture in adults I have used magnesite splints, extending from the fingers to the elbow, which weighed but three ounces. This great decrease in weight over our old method is much to the advantage of the patient.

Moisture.—Plaster-of-Paris casts break down and become soggy when exposed to moisture, as about a fenestrum where an open wound is being treated, for plaster is somewhat soluble in water. Moisture has apparently no effect on our magnesium compound.

Setting.—The setting of all cements is divided into two portions, the superficial setting, which may be defined as that state in which the compound is of sufficient hardness to maintain its shape, and the final setting, which marks the end of the reaction. I have found the final setting of magnesium oxichlorid to be a little more rapid than that of plaster-of-Paris. My observations have been made on blocks of the materials of equal volumes and under the same conditions. It is in its rapid superficial setting that plaster-of-Paris greatly excels. It should be borne in mind, however, that these excellent results have been achieved by a careful study of the temperature of calcination and the degree to which it should be carried.

While the casts I here show were made with commercial magnesite, I am obliged to use heat in order to obtain a quick superficial setting. A quick action is not wanted commercially and there has previously been no demand for such a product. I am now conducting experiments with this end in view. A constant high temperature is maintained by an electric furnace and I am testing the reaction after varying degrees of temperature and various lengths of time.

Note.—I regret to add at this time that my labors have thus far proved futile. Variations in the temperature of calcination have made no difference with the time of setting. Combinations with other ingredients have been tried, but where a quick superficial setting was obtainable it was at a great loss of tensile strength. As I have noted above, a fairly rapid superficial setting may be obtained by heat, but when it is imperative to secure a quick setting, as in some fractures, I prefer to cover my

magnesite dressing with a muslin bandage and then apply over this a thin layer of rapidly setting plaster-of-Paris. On the next day this superficial plaster and the muslin bandage are torn off, leaving a hard, permanent cast.

SOCIETY OF EYE, EAR, NOSE AND THROAT SURGEONS OF SAN FRANCISCO.

Dr. Pischel presented the following case: Case of Iris Cyst. A boy 13½ years old. About five years ago somebody struck the patient's right eye with his head, tearing the eye ball, where there is now a white spot in the cornea. Two months ago a black spot was noticed on the brown of the eye, which since then has somewhat increased in size. Status presens: fundus of both eyes normal:

Vision left eye < 5/3 D = E Javal 0.5 horiz

Vision right eye < 5/7 < 5/8; + 0.75 < 5/6 D= Javal > 0.25 horiz.

The lower half of the iris is occupied by an oblong tumor nearly touching the cornea, pushing the pupil upwards.

Dr. Pischel then showed to the members how the translucent tumor is covered with a thin layer of pigment.

Second case presented by Dr. Pischel. Piece of steel in eyeball.

This man came to me five weeks ago with the following history: Three days before while in a standing position chiseling off an iron bolt, something flew into the left eye. It was painful for a while but is rapidly getting better.

Right eye, fundus normal. Vision of right eye: 5/3 D = E Javal 0.5 horiz. Vision of left eye 2/60 at daylight, (eye too sensitive to artificial light). Javal 0.75 horiz, slightly irregular. Slight ciliary injection. Just above the center of the cornea a gray scar; a tear in upper part of iris which is bulging at that point. In posterior cortical of lens a few gray radii; near pole seems to be an opening. Just below and behind this latter, slightly swinging at movement of the eye, was seen a glittering foreign body, horizontal, apparently about 1x2½ mm. Disc not quite clearly to be seen.

This was one of the cases in which one may discuss whether it is better to remove the foreign body through the anterior chamber and cornea, or through a fresh opening in the globe through the sclera. For a number of years I have contended that the latter method is preferable, that a clean opening in the sclera with a Graeffe knife and the introduction of a clean magnet tip is less injurious than to pull the foreign body forward into the anterior chamber and through a wound in the cornea, especially when the foreign body has been in the eye long enough for the entrance to be firmly closed. By the latter method the foreign body is liable to pull a large part of the iris with it.

Outward and downward, about 8 mm. from the limous a cut was made in the conjunctiva and afterwards with a Graeffe knife in the sclera. A fine point of Haab's magnet was now introduced into the cut about 5 mm. deep. When withdrawn the foreign body was on it. It was a thin glittering piece of steel 1 mm. x 3. The wound of the conjunctiva was closed with a rattail suture.

The irritation soon passed off. The opacities of the lens may have cleared up a little. The vision four days after the operation 2/60. One month after the operation 2/60: + 6 2/22.

Discussion on first case:

Dr. Nagel: I saw this case about two months ago. I was told that he had been to various men and that the majority had agreed that it was a case of sarcoma of the ciliary body. I looked upon it as a cyst for various reasons, which I will enumerate, but I agree that there was an element of doubt about the nature of the tumor-like formation. To my mind it is a settled question now that it is a cyst. There is a grayish part toward the center and we now get the choroidal reflex through there with the ophthalmoscope from the front distinctly. My reasons for considering it a cyst are, firstly that Fontana's space is not occupied by this protuberance. Secondly the iris is not as we would expect in sarcoma, grown through. Rather than that, it gives the appearance of being pushed aside. Thirdly, it is ago. I was told that he had been to various men a uniform protuberance giving the impression as if there were watery contents behind. Further, I failed, in spite of the most painstaking examination with the Zeiss-binocular loop to discover any blood vessels, which would be most unusual in sarcoma. Somewhat paradoxical, since the protuberance has grown, I find the tension is less than it was at that time, which would also rather confirm the idea that it is a cyst. Apart from the growing through Fontana's space, another mode of sarcoma of the ciliary body, or maybe of the posterior surface of the iris, is to grow through the pupil. If it were possible that it were purely sarcoma of the iris, then I must say it would be very hard to understand why it should not have involved the iris instead of pushing it aside. There is some difficulty about the history. As we all know we usually think of cyst being due to a perforating injury of the eye ball. According to the history the child received a blow six years ago, but I believe he never found reason to complain to the mother about it, and it was about two weeks later when the mother noticed a slight speck and thought it must be connected with the injury, and she took him to an oculist. It therefore seems unlikely to have been a perforating injury. The child did not complain of pain. It is either a congenital cyst or it is that other formation of cyst first described by Schmidt Rimpler, due to obstruction of a crypt and pushing aside the anterior (and posterior) layers of the iris. I am inclined to think that it is of the latter kind. I do not think that it is due to the injury. With regard to the therapy, I would excise the cyst, i. e., would endeavor to excise as much as possible. It is not necessary that there should be recurrence even if some of it is left behind. It is not due to implantation of epithelial cells, as in post-traumatic cysts. A partial excision might suffice. If one fears of going too far it would be necessary to desist and repeat it again later. An operation would decide the true nature of the formation absolutely. Left to itself a growing cyst will eventually become detrimental to the eye.

Dr. Cohn: I saw this case five or six weeks ago. I stated then that no absolute diagnosis could be made at the time. It was smaller then and as yet not translucent. I stated that it was a cyst or a growth, and I advised that they have the attending physician observe the case carefully until a positive diagnosis could be made. After looking at it tonight, I think it is unquestionably a cyst, but I do not think one could have formed a definite opinion five or six weeks ago.

Dr. Pischel, closing the discussion: I thank Dr. Nagel for having so carefully gone over the case. The diagnosis seems to me beyond a doubt. The transillumination of the tumor especially with Wurdemann's transilluminator excludes a solid tumor like sarcoma.

Discussion on second case presented by Dr. Pischel of foreign body in eye:—

Dr. Sewall: The most interesting point to me in