it down. This I have demonstrated to be erroneous. The operator may strip the iliac colon from the iliac fossa and may cut one or all of the sigmoid arteries, or even the inferior mesenteric itself; and will thus in all cases, as I believe, be able to bring the upper end to the anus without tension. Under these circumstances the blood supply will be maintained by the superior mesenteric. Having mobilized the bowel sufficiently, it is simply brought down, telescoped through the everted lower fragment, reopened by removing the temporary purse-string suture, the ends sutured and the whole reinvaginated.

I believe that the method by which the upper segment is telescoped through the lower and is held in that position permanently by stay sutures to the anal margin, whether the mucosa of the lower segment be removed or not, is inadvisable, for the reason that the broad flange of fatty mesentery purposely left on the upper segment will always be apt to interfere with proper union and so favor the development of a fecal leak when the bowel retracts somewhat, as it must always do. End-to-end union outside the anus, imitating Maunsell's method; great care not to include in the suture much of the mesentery behind the line of union for fear of interference with the blood supply at the edge; and, finally, absolute lack of tension so that the bowel brought down lies loosely in the sacral hollow and is not pulled across it like the string of a bow—allowing for a subsequent retraction of one to two inches—these ought to be the essentials in guarding against the failures of circulation or of asepsis.

Drainage of the pelvis had best be employed for a few days through an incision between anus and coccyx. In the pelvis the cut edges of the peritoneum may be united to the sides of the bowel brought down in order to prevent hernia of the coils of small bowel under the latter, and to close off the peritoneal cavity. The abdomen is finally closed without drainage.

CONCLUSION.

This purely abdominal operation I would propose as the normal procedure for cancers situated within the limits mentioned, the chief arguments being that by judicious mobilization the upper segment can in all cases be brought down and joined to an intact sphincter. The great advantage would be the avoidance of the distressing artificial anus in all cases save the inoperable and obstructed ones. Further, inasmuch as the sphincter and levator have not been cut through at all, nor the coccyx and sacrum removed, the pelvic floor is intact and one may expect normal sphincteric action in all cases. Such a gain would be enormous. In addition to this, there are the advantages: first, of a thorough removal as a routine procedure, no matter how long or how short the sigmoid bowel, of the entire gland-bearing district, from which we may hope for better permanent results; second, of a greater economy of blood, and less cutting of sensory nerves, than when the sacral or perineal operation is added, and consequently less shock with, presumably, a lower immediate mortality; and third, of a preservation of the pelvic floor and the sacrum, intact, which will add to the comfort of the patient.

THE MAGNESITE SPLINT. A NEW PERMANENT SURGICAL DRESSING.

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Some ten months ago I began a series of experiments with the object of improving our present methods of surgical dressing by obtaining a hard, durable, coaptative dressing which would be easily penetrable by the Roentgen ray. My studies have taken me into the literature of various processes of a purely mechanical nature, and my adaptation of a reaction employed in the arts and but slightly known to general chemists to the usages of surgery has been a difficult matter. My work

Fig. 6.—Skiagram. Bowel viewed from behind. Outlines of arteries heightened with india ink for reason given. Resection of bowel from just above the promontory (about middle of pelvic colon) to within two inches of the anus. Mobilization of sigmoid and whole descending colon, with ligation of the superior hemorrhoidal and the sigmoid vessels (save one which is either sigmoid or a branch of the left colic). Injection from the thoracic aorta after bowel had been brought down and pulled through the anal portion, projecting to the extent of two inches. Note the richness of the anastomosing loops along the mesenteric border and the complete preservation of the blood supply to the very end. Compare this with the poor blood supply to the first portion of the rectum when the superior hemorrhoidal has been cut, as is frequently done in the Kraske operation, in which the attempt is usually made to save this part of the rectum.

has at least given me a wholesome regard for the existing method, for the use of plaster-of-Paris as a permanent surgical dressing has so many points of superiority that it has replaced all others.

The general employment of this compound in surgery has been a slow and gradual process. It also was borrowed from the mechanic arts and, while its present application seems very simple, nevertheless it has taken years to develop the technic. Certainly its universal use has marked an important advance in the treatment of fractures. The advantages of an accurate coaptative dressing in fractures of the limbs are so great that one who has once learned to handle plaster will certainly prefer it to padded splints of wood or tin and the badly-fitting manufactured splints of the same materials. Plaster-of-Paris, however, is far from being an ideal material, and the general use of the x-ray has but added to its faults.

THE X-RAY IN DETERMINING RESULTS.

The Roentgen ray penetrates plaster-of-Paris with difficulty, and while in some cases it is possible to secure a satisfactory radiogram or make a good fluoro-

a well-taken radiogram has given me in instances in which I believed I had achieved a brilliant result by digital manipulation. While poor approximation may give good functional union in fractures of the middle third of the humerus, a fracture of the ulna and radius at the same point, with improper reduction, will generally result in a partial loss of function. Careful reduction is not only necessary, but the maintenance of this reduction is most essential. Hence a fluoroscopic examination after the cast has been applied is a source of great satisfaction, the surgeon being able to assure himself that slipping of the fragments has not taken place.

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. I found them all unsatisfactory. Plaster-of-Paris is far superior in that hardening consists in a definite chemical reaction, a crystalline salt being formed.

PLASTER-OF-PARIS.

In order to appreciate the subject more fully it will be necessary to consider briefly the preparation of plas-

Figure 1.

Figure 3.

Fig. 1.—Rigid magnesite splint for adult foot, leg and thigh. Weight, 2 pounds.

Fig. 3.—Magnesite splint for adult foot and leg. Weight, 1 pound.

scopic examination, the method is far from being advantageous as a routine measure. The benefits to be derived from the Roentgen ray, not only in the diagnosis of bone lesion but in the accurate reduction of bone fragments, can not be overestimated. In oblique fractures, and where palpation is interfered with by thick muscle, the surgeon is only too glad to avail himself of this help, either by direct manipulation of the fractured limb before the ray, after the manner advocated by Bickham and others, or in checking his result after a permanent dressing has been applied.

The poor results obtained by those surgeons who rely on digital sense and measurements in the reduction of fractures are known to every radiographer. I have several times been much chagrined at the evidence which

Fig. 2.—Elbow radiographed through heavy magnesite splint.

Fig. 4.—Very strong magnesite splint for hand, forearm and elbow; made from 5½ yards of 3-inch bandage. Weight, 12 ounces.

ter-of-Paris. In making this product gypsum is ground to a fine powder and then calcined in kilns. The industry is carried on extensively in several Parisian suburbs, hence the name. At a temperature of 80 C. (176 F.) gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) begins to part with its combined water. An increase of temperature causes desiccation to proceed with greater rapidity, and for manufacturing purposes the best results are obtained at a temperature of 110 to 121.5 C. (230 to 250 F.), desiccation being carried on until about three-fourths of the water has been expelled ($2\text{CaSO}_4 \cdot \text{H}_2\text{O}$). If the temperature be raised to 249.8 C. (480 F.) the time of hardening of the plaster is greatly prolonged, and at a still higher temperature it loses all power of again absorbing water. The setting of plaster-of-Paris is due to its uniting again with water to form gypsum, which becomes a crystalline mass. This setting can be facilitated by heat

or by the use of salt or alum. It is accompanied by slight expansion and the evolution of heat. Unfortunately there are few substances which possess this power of recrystallization; analogous reactions are afforded by the oxichlorids 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 non-metallic substances with which the 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. For this reason one could conclude that the penetrability of magnesium compounds would be much greater than that of calcium.

MAGNESIUM OXICHLORID.

It was Sorel who in 1869 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 ordinary plaster, 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 ($\text{MgCl}_2 \cdot 5\text{MgO}$) 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 practical value of the reaction was quickly appreciated and numerous companies were formed for its manufacture. The first patents on the process soon followed 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 dioxide begins to be given off at 600° and this is apparent by a slight ebullition on the surface. Practically the work is done in a rough way and no attempt is made at uniform temperature. Heating is continued from eighteen to twenty-four hours, the carbon dioxide being thrown off slowly. 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, a strength of 22 Beaumé being generally employed.

ADAPTATION TO SURGICAL USE.

The adaptation of this reaction to surgical use has not been easy; some portions of the process are protected by patents, while others are trade secrets. Information has been meager and hard to obtain and my knowledge has been derived piecemeal from many sources. It is not necessary for me to tabulate my various experiments, but it will suffice to give simply the practical results of the method. It must be remembered that we are dealing with a reaction quite different from plaster-of-Paris. For instance, in the latter we use table salt or alum to hasten the reaction, while with the magnesium prepara-

tion salt is practically inert and alum slows the setting instead of hastening it. It has been found 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 must, therefore, not be present in excess.

The magnesia of the drug stores, both the magnesia usta and the magnesia ponderosa, can not 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 plaster 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. Chemical combination is also accompanied by the evolution of a small amount of heat.

The term magnesite as applied to this method is a misnomer, but I have used it for lack of a better. Its chemical name is too long, and I have found that my confrères prefer to call the product the magnesite dressing or magnesite splint. I have employed both the California and the imported magnesite and my results are equally good with either. The California magnesite is calcined by the Magnesia Products Company, West Berkeley, Cal. The imported variety is manufactured by the Concordia Chemische Fabrik auf Actien, Stassfurt, Germany, and is obtained through a local firm. Inquiry will disclose commercial houses employing the reaction in every large city, so there should be no difficulty in obtaining the material.

APPLICATION.

Bandages of crinoline are impregnated with the calcined magnesite by means of a plaster-of-Paris bandage machine. I prefer a width of three or 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 Beaumé) and is made by dissolving 20.44 parts by weight of magnesium chlorid in 16 parts of water. In my 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 small 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; the finished cast will "weep" if magnesium chlorid is present in excess. If this occurs it can readily be 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.

SETTING.

The setting of all cements is divided into two portions, a 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 materials of equal volumes and under the same conditions. It is in its rapid superficial setting that plaster-of-Paris greatly excels. I have felt that if as rapid a superficial setting could be obtained with the magnesium compound we would have an ideal material, and I have devoted much time in endeavoring to obtain such a result. My labors have thus far been futile. Experiments with an electric furnace have been conducted, varying degrees of temperature in the calcination of the magnesite being employed but without success. Combinations with other ingredients have been tried, but where a quick superficial setting was obtainable it was at a great loss of tensile strength.

A fairly rapid superficial setting may be obtained by the use of 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 bandages are torn off, leaving a hard, permanent cast. The magnesium oxichlorid reaction has been regarded, commercially, as a very tricky one. Bad results generally are due to low degrees of temperature and the experimenter will soon find that he gets much better results at body heat than at temperatures below that point.

ADVANTAGES.

It remains but to sum up the advantages of this magnesite dressing over that of plaster-of-Paris when used alone.

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 we can procure the same rigidity with casts of from one-half to one-third the thickness, we may say that the penetrability of the magnesium preparation is from four to six times that of plaster-of-Paris. Not only in fracture work is this of great advantage, but also in the treatment of bone tuberculosis. In this condition, progress may be watched by radiographing through the dressing, thus avoiding disturbing the healing parts by removal of the splint.

Hardness.—We have no means of estimating hardness accurately; deductions can only be made by a careful comparison of the magnesite and plaster-of-Paris dressings. In equal thicknesses the magnesite splint is much harder and firmer, and it is only necessary to repeat that magnesium oxichlorid is used in constructing flooring to emphasize this point. 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.—This compound is extremely tenacious, as is indicated by 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 certainly a great advantage. It is not brittle and does not chip and break along its edges as does hard plaster.

Weight.—Volume for volume, the 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 my 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 the 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 the magnesium compound.

In conclusion, I wish to express my thanks to Dr. Harry M. Sherman, head of my department in the university, for many suggestions derived from his long experience in handling plaster; also to the members of the faculty of the College of Chemistry at Berkeley who have given help in the chemical questions involved.

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THE VALUE OF AN ABSOLUTELY VEGETARIAN DIET IN PSORIASIS.*

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Although psoriasis is one of the most clearly defined and well recognized of all diseases of the skin, and has been the subject of much study, clinically and microscopically, we are still in the dark as to its true nature and etiology; moreover, good observers are by no means all agreed as to whether it is a local disease of the skin or one of internal origin. Certain it is that no definite cause has yet been established.

The appearance and character of the individual lesions have time and again suggested a parasitic origin, but as yet no micro-organism has been demonstrated by which the eruption can be produced artificially; nor, on the other hand, has any one constitutional state been shown to be always productive of the eruption. Certain observers have, therefore, characterized it as a local affection of the skin itself, a misbehavior of its cellular elements, even as epithelioma is recognized as such.

But there are many facts and features of the disease which point to its not being a purely local disease of the skin, but show that it is due to some underlying constitutional state or condition which at one time or another favors the development of the lesions on the skin. Not to lay too much stress on the clinical observations of many in regard to the connection of psoriasis with rheumatism and gout, hereditary or acquired, or the appearance of the eruption after vaccination, the exanthemata, debilitating illnesses, prolonged lactation, etc., there are some peculiar features which can not be ignored. Thus, the intermittent character of the eruption, often without treatment, shows some change in the individual which, even on the theory of a microbic origin of the separate lesions, causes the omnipresent micro-organisms to have effect. Also the well-known proclivity of the eruption to appear at certain seasons of the year, at which we know that the diet and mode of life vary greatly, points to a systemic change or modification of the metabolic processes favoring the eruption.

One of the most striking facts in regard to the production of the eruption of psoriasis is that relating to

* Read before the Sixth International Dermatological Congress, New York, Sept. 9, 1907.