

A bloody one?

"It is blood mixed with matter."

Is there anything else that you complain of?

"I am subject to diarrhœa."

How long have you had it?

"For four or five years."

What else?

"I have a pain sometimes in my right the hip."

Anything else?

"No."

With regard to the tendency to diarrhœa mentioned we need not now concern ourselves; but we desire to pay special attention to the repeated miscarriages, on account of which the patient has come here to consult us. In the first place, I would remark, then, that the only possible way to put a stop to habitual miscarrying like this is to discover the *cause* of the trouble, and treat that. What, we next ask, are the most prominent causes of this? Some of them are entirely local, while others are general. Some, I may mention, do not concern the mother, nor yet the fœtus itself, but the secundines alone. Of all the causes of habitual miscarriages, however, syphilis (either in the mother or father, or both, and either in the secondary or tertiary form) is perhaps the most frequent. In every case where a patient has aborted a number of times in succession you must make a very careful examination to see whether this disease may be present. When this is the cause of the miscarriages the fœtus dies early.

Among the other more common causes of abortion are affections of the chorion, like hydatids, and dropsy of the amnion. When the latter exists, the serous cavities of the child, as well as the placenta, are apt to be affected in the same manner. Not infrequently the cause is associated with the uterus itself. Thus, the organ may remain in its normal position until the third or fourth month, and then retroflexion, for instance, may take place. When this is the case it will usually be found that the displacement existed before the pregnancy commenced. None of the above causes are found in the present case, but an examination per vaginam reveals the existence of quite a prominent cause of habitual miscarriages, which has not as yet been mentioned. This is extensive laceration of the cervix uteri, with eversion of its lips. It is not difficult to see why this should be so when we remember that in this condition the nerves of the part are completely exposed to every sort of irritation. It is an undoubted fact, however, that many women go to full term, notwithstanding an aggravated laceration and eversion of the cervix.

Having found this condition of affairs present here, and there being apparently no other cause for the miscarriages that have been noted, I would advise that an operation for the repair of the cervix should be undertaken as soon as possible. If this should not put a stop to the constantly recurring miscarriages, we would be forced to look for some other cause of the trouble; but, at all events, such an operation would undoubtedly relieve the bloody leucorrhœa, as well as others of the symptoms of which the patient complains. It is never safe to promise too much in cases of this kind, as disappointment is so common; and all that you can tell your patient is that you will give her the best possible chance that you can of giving birth to children at full term.

## Original Articles.

### ON SUBSTITUTES FOR ADHESIVE PLASTER.<sup>1</sup>

BY ADDINELL HEWSON, A. M., M. D.

I HAVE the authority of one of the most zealous and truthful recorders of facts in his day and generation for the assertion, which he had heard made at the beginning of this century by the greatest American authority on surgery at that time, which assertion was that "one might as well attempt to improve on the Bible as to attempt to improve on the machine-spread adhesive plaster then made." This plaster was the emp. resina (of the London and United States Pharmacopœias), the empl. lethargynæ resina (of the Dublin), and the empl. resinosum (of the Edinburgh), either of which was well spread on linen cloth ready for use, requiring mere cutting into strips of the desired length and width and heating by the contact of its free surface with that of a heated body,—a bottle or tin can filled with boiling water. The basis of all these plaster compounds was that of the official lead plaster of all the pharmacopœias, with the addition in each of resin in varying proportions: thus, of one to five (Edinburgh), of one to six (United States and London), and of one to seven (Dublin). The resin used is the residuum after the distillation of the volatile oil of turpentine from various species of pinus and abies, and the purpose of its addition is to make the emp. plumbi more adhesive. It at the same time makes a more brittle plaster, which, in cold weather, is not desirable; hence another addition of the emp. saponis compos. in the Dublin Pharmacopœia was made, consisting of equal parts of soap plaster, letharge plaster, and resin. The frequent occurrence of erythema and erysipelas as well as suppurative inflammation with the use of any one of these plasters led many to recognize long since the presence of the resin as a source of such mischiefs. Thus Boynton, who has immortalized himself by his method of treating varicose and other forms of ulceration of the limbs by strapping, early abandoned the use of any one of these plasters, and had one made containing six drachms of resin to the pound of lead, the smallest amount of resin which he found could be used to make a sufficiently adhesive plaster. Yet with such a composition unfavorable cases did occur even in Boynton's hands, and it would seem that even he was compelled to accede to Physic's dictum, at least as to the essential ingredients of the sticking-plaster. Indeed, it would seem that the ingredients considered essential for such a plaster were always the same, not only in Physic's day, but as long a time before as since, for I find them in the formulæ of all the old thesauri of the last century as well as in those of the modern pharmacopœia. The defect was nevertheless recognized, and some attempts were made, unsuccessfully, to remedy it; and yet at the present time it is not recognized by the majority, by such even as Professor Lister himself, for he uses seven parts of resin to five of paraffine and one of carbolic acid for impregnating the cotton cloth with which he envelops a wound in his antiseptic dressing.

It is hardly necessary for me to cite any facts to sustain the assertion that all forms of products from turpentine are capable of exciting erythema and erysipelas in the skins of some individuals. I do not sup-

<sup>1</sup> Read before the Academy of Surgery, Philadelphia.

pose there is a gentleman here who is not familiar with such. Yet all are probably likely to accept the fact that no good sticking-plaster has been made without the resin, and to accept of Physic's dictum that there is no use in trying to improve on what we have so long been using. Nevertheless, if the attempts and experiences of so long a period should forbid any more efforts to improve our adhesive plaster, they do not forbid our searching for *substitutes* for the article. You may all be willing to admit that any improvement in the article is impossible, and yet be glad to get another article which will do better in being free from its defects.

Those of us here to-night who were in the profession or engaged in its study at the time can readily recall the excitement with which the announcement came from Boston that Dr. J. Parkers Maynard had then (in 1848) discovered a most admirable substitute for adhesive plaster. It was a solution of gun-cotton in sulphuric ether, to which he gave the name of collodion. The announcement of the discovery was no sooner made, however, than we had the declaration of its complete failure for its original purpose, and of its application to a branch of science which could never have been developed to its present state of perfection without its existence, namely, photography.

About that time the late Dr. Paul B. Goddard called me, one day, into his office, which adjoined my father's, on Walnut Street, above Ninth, and said, with great zest, "I have got the way of using collodion for sticking-plaster." This, as he then showed me, consisted of strips of Donna Maria gauze, a silk texture, cut lengthwise of the cloth, of the desired width, and of a length some two or more inches in excess of what would be needed to cover the part; this latter expedient was to facilitate traction in making the applications. The application was made by painting some collodion on a part of the skin surface near to the wound, and in the remotest direction from which the traction was to be made; the gauze was then laid on this layer of collodion, and held gently in that position until the collodion had dried; then such traction could be made with the free portion of the gauze across the wound, the edges of which were held well adjusted by an assistant; in this position the collodion was painted through the meshes of the gauze, at the near end, beginning where the surgeon's fingers pressed it on the surface, and carrying the painting as near as was desirable to the wound; this expedient not only effected neat coaptation of the lips of the wound, but also allowed such to be visible, and at the same time secured the inner surfaces of the wound in thorough contact with each other. Nothing, it seemed to me, could be more desirable than this application, then made in the neat and dexterous manner of its inventor, and I confess boldly that I have never since then been without a bottle of collodion and some gauze to use as emergency might arise, never varying Goddard's dressing other than to substitute tarlatan for the more expensive silk gauze. With it I have been able to make most thorough coaptations of extensive scalp wounds and of stumps of major amputations, and that, too, without sutures.

I was not fully satisfied by the collodion employed by Goddard's dressing when I first saw it. What gave me very great satisfaction was his mode of using the collodion. I was conscious of the brittleness of the collodion when dry, and that it contracted too

much, and so readily peeled off. To meet these objections to collodion as an adhesive agent, we had soon, however, the first thing proposed, namely, the addition of a few drops of volatile or terebinthinate oils. Then we had cases of erysipelas occurring from its use, and found our last state no better than our first. On learning that this addition was being made to the collodion of our market I took the precaution ever afterwards to get an article entirely free from such an ingredient, and so have had my collodion clean, and have used it without fear. My enthusiasm for Goddard's method was, however, such as not to let me be satisfied here. I have, indeed, for the last thirty years been in search of something that could be applied by the gauze, and be free from all the defects of adhesive plaster, varnishes, and collodion.<sup>1</sup> During part of that time I had the assistance of the practical skill of our famous pharmacist, Mr. O. S. Hubbell, but I never got anything better than collodion as the adhesive agent until quite recently, when the frames on the sidewalks of our chief thoroughfares, suspending a piece of mended china, with heavy weights attached, arrested my attention: first, by the frame resembling somewhat that used in surgery for making traction and extension with, and then, secondly, to learn what such an agent might be, and whether such might not suit all our wants for a sticking-plaster. I was then not long in learning that the chief ingredients of such compound were probably acetic acid or nitric acid and common glue. Experiments with these, as well as some with mixtures of aldehyde, dilute acetic acid, and isinglass or fish glue, soon satisfied me that we had in these the long-sought-for material. Of all of them I have found the simple mixture of common glue one part and officinal (twenty-five per cent.) acetic acid four parts to be the best in every respect.<sup>2</sup> It dries with quickness, not requiring more than three minutes, and has a tenacity equal to two pounds to every square inch, so that in illustration of its value I may refer to an application of it to maintain the long strips of the extension dressing for fracture of the thigh. This can be made by securing only seven inches on each side of the knee of the material (linen or cotton, cut two inches wide). This will, when dry, resist the weight of over fifty pounds attached to the extending cord, and such weight can be applied as soon as the dressing is completely adjusted. (A demonstration of this was then made by Dr. Hewson.) I have also had ample proof of the persistency with which the article can hold its place in other instances; thus, I have applied strips of gauze and of cotton cloth with it to my fore-arm, and they have been retained for four or more days in their places. The glue not being soluble under a temperature of hot water, and softening and swelling only after exposure to cold water for some length of time, my daily plunge bath in cold water did not disturb them in the least. This and demonstrating their tenacity by strong traction, frequently made before friends

<sup>1</sup> Various preparations were then exhibited by Dr. Hewson, namely, solutions of silicate of soda and of sulphate of alumina, twenty years old, showing a remarkable state of preservation, solution of sandrac in ether and of rubber in benzine. Then there were preparations of more recent date, those of salicylic acid in collodion of various strengths, and of shellac and nitric acid.

<sup>2</sup> Numbers of these preparations were here shown, and Dr. Hewson demonstrated the reasons for his preference, and amongst the latter for the strength (full) of the acid and its proportion (four to one) of the glue, the full strength allowing of most rapid drying, and the proportion, four to one, of glue making the most fluid solution which would dry the quickest. There were eight of these which he had been using since August.

in the course of these days, have tested it as severely as any fair questioner might require. The facility and quickness of this drying is easily to be demonstrated as being dependent on the thinness of its application, as I have frequently tried; hence I apply it by a thin strip of light wood or a feather to the part; or on other occasions, by saturating the bandage by drawing it through a cup of the liquid, and then straining off all excess, we have it in readiness to be laid on the part. Where there would be no necessity for the injured part to be exposed, as we would have by the gauze, and in others where there would be no traction needed, I have merely used tissue paper on the glued parts.

In applying this glue preparation for constructing permanent dressings I have used a good feather from a chicken wing, and spread a thin layer by it over each layer of the bandage, and had it very complete and firm by the time I had three layers of bandage applied.

After some discussion of my communication to the American Medical Association meeting in 1876 on Pirogoff's amputation, there was a renewal of the subject of discussion of several days previous, namely, that of applying fixed dressing for fractures and deformities. Dr. R. I. Levis then exhibited some dressings made with the ordinary carpenter's glue mixed with oxide of zinc and smeared over well applied bandages. He stated the facts that "there is no plastic material that can be used as strong as ordinary glue," and in connection with that he had taken advantage of the fact, with which he had become familiar, that it can be made to harden with very great rapidity by the simple addition of oxide of zinc.<sup>1</sup> It must form a particularly nice means of coaptation after operations for hernia or the abdominal section, in neither of which, however, should it be relied on without wire stitches, for the latter are always necessary to effect the deep coaptation of the sections of the abdominal walls. [A case of fracture of the fore-arm was here presented on which the application had been made three days previous. It was then ununited, and had had the plaster of Paris without success for seven weeks.]

As to the making of this preparation, all that is required is to make the glue perfectly liquid by melting it in a pot set in boiling water, care being taken not to let any water get into it. When the glue is thus made liquid four parts of officinal acetic acid (twenty-five per cent.) is to be slowly mixed in one part of it. This done, the preparation is complete, saving the addition of a few drops of otto of roses to destroy the smell of the acid as also of the glue.

It should be put into a wide mouthed bottle and well stoppered by a long cork, which can always be removed by heating the neck of the bottle. Care should be taken to keep the mouth of the bottle clean by wiping it well with a cloth dipped in hot water; this is for the purpose of preventing the adhesion of any particles of dust there. It is the cleanest method always, when using any liquid preparation, to pour some into a glass, so as not to unfit all of it for use by impregnating it with blood, or the like, with which the instrument of application may be contaminated.

Some have raised an objection that the acetic acid must be a source of irritation; but this is far from being the case, for acetic acid is a preservative, and prevents any animal matter from decaying. The mixtures made with it, which I have here to-night, have been in use in my office over two months, and are now as good as

the first day I began to use them there. This acid mixture, if not applied after Goddard's method, but on the contrary painted in a wound, will excite a burning sensation, which is not diminished by dilution of the acid or the substitution for it of aldehyde (vinegar of alcohol), which is slower in drying. Where the precaution is taken to keep the liquid from the lips of the wound there is no sensation whatever from its drying on the skin. Its contact is soothing when applied to some eruptions of the skin and a means of retaining applications (as of zinc) to the parts. It is, I have found, particularly serviceable in the latter cases.

My preferences for acetic over nitric acid were that it was less irritating, dried quicker, and preserved the glue most effectually from the slightest indications of decay for a long time after its application.

The mixture of one part of glue to four of acetic acid, which I have said I have found the best for surgical purposes, has these advantages: it dries far quicker than the same in different proportions, or than different proportions of shellac, isinglass, or white glue with different proportions of acetic or nitric acid; in fact, those with nitric acid were caustic, whereas, those with acetic were not.

The thinness of the film by which the cohesion of broken parts is to be effected having long since been demonstrated to be essential for such perfection of the result, I have not only sought for the best means of application, as I stated, by using a feather or thin strip of wood, but have tried to determine what was the best quantity and how long such required to dry. As to the quantity, I have found all that was necessary was to saturate the material — varying, therefore, as to the bulk of the latter. Here I got some interesting and indeed curious results: thus, some pieces of paper four inches square, which weighed on an average, before being wet through, two and a half grains, and after a full coating, which required three minutes to dry, had gained on an average half a grain, that is, only an eighth to each square inch. Testing these points with pieces of muslin I got a gain of two and a half grains in a piece which weighed originally 5.3 grains. This gain was determined after the acid was all evaporated and the glue all dry; this we may therefore infer was the actual addition of glue. Another piece of bandage cloth four inches square, which in its natural state weighed 4.8 grains, increased in weight immediately after being saturated with the liquid by means of the feather to 12.2 grains. Here was an increase of it to three times its weight; it took ten minutes to lose the addition due to the acetic acid, when it was again dry, and was found to have only what the glue gave it; that is, about one half of its original weight, as shown by the previous experiment.

This preparation has the advantages of being easily prepared and at very short notice. If not on hand it can be made in a few minutes, simply by having water in a tin cup on the fire so that it boils, and putting a bottle containing one part of glue to four, by measure, of the acid, and letting the bottle remain in this bath until the glue is fully dissolved and mixed with the acid. All that is then wanted is the addition of a few drops of the otto of roses to make its odor acceptable to all.

— The *Union médicale* gives the history of one Guillaume Granié, who died in prison in Toulouse after fasting sixty-three days.

<sup>1</sup> Transactions Medical Association, page 321.