demonstration is complete, that immunity to a degree hitherto unexpected, and even now with difficulty realized, has already been induced. To him, earnest workers in the physiological and bacteriological laboratories of this and of other countries, present in their carefully-drawn conclusions, arguments of great weight and power, competent to convince the most sceptical, to the effect that preventive medicine has entered upon a new era, a reign of control over disease, wider, deeper and more beneficent in its influence for good, abounding in larger promise of blessing for the sick and suffering than at any period in the history of mankind.

COMPOUND FRACTURES.¹

A STUDY OF THREE HUNDRED CASES.

BY J. G. MUMFORD, M.D.

IN reading the articles on compound fractures published during the past five years I have been impressed by the fact that the writers have striven to demonstrate the advantages of certain methods of treatment, and that their short and favorable lists have furnished no proper data for the general consideration of such formidable injuries. To cite a single instance: Mr. Treves, in the *Annals of Surgery* for February, 1893, gives a list of 61 cases, with one death. As this article fails to define the character of the fractures, further than to state that they are of the leg, and aims only at lauding a particular method of treatment, but little can be concluded from it. Other authors deal with the subject in connection only with their treatment of some special fracture or group of fractures, so that the practitioner or student must be often in the dark as to the general characteristics of these lesions.

A year ago I published a paper classifying and analyzing fractures of the skull. In the present essay, therefore, I shall omit the consideration of head injuries, excepting only fractures of the maxillary bones.

It is difficult in an article of this kind to properly limit one's self. A serious railway crush of both femora or of the pelvis, should be ruled out as essentially fatal. A similar crush of one arm or leg should be ruled out when it calls unquestionably for amputation. I shall not consider fractures in the feet and hands, as they are too complicated in their nature, do not in these days seriously endanger life, and nearly always heal up soundly, or call for immediate amputation.

There is a variety of fractures of which I have attempted to treat as conservatively as possible, but which is often hard to classify. Thus, twenty years ago a badly comminuted and lacerated leg would have been amputated. It would not then have come under the head of the injuries I am dealing with. Ten years ago a similar leg would have been amputated by some surgeons and saved by others. To-day we should all save it. To-day, therefore, it is a compound fracture in the sense in which I use the term. But there are fractures seen to-day as to which the question, to amputate or not to amputate, rises. If we amputate, we do not count this case in our list as a compound fracture. If we save the limb by a miracle, we consider the case a clever piece of conservative surgery.

In making up this list, therefore, I have not been able to take into account differences or errors in judg-

ment, and have had to divide this class into cases essentially hopeless and those presumably hopeful. It is under the head of those presumably hopeful that we come subsequently upon our cases of secondary amputation. I shall deal with fractures of the long bones of the extremities, the jaws, the scapula, and the patella, omitting all such cases as are, in the light of to-day, essentially fatal or which call obviously for immediate amputation.

The mortality from compound fractures is high; that of certain bones very high. The general mortality is higher than that from typhoid, pneumonia and certain other acute infectious diseases. The public, certainly, and many physicians, I think, underestimate the gravity of these lesions.

To get at a fair, and, at the same time, a favorable estimate on the subject I have analyzed 300 consecutive cases taken from the Massachusetts General Hospital records for the past eight years.

Out of a total of 300, 270 recovered and 30 died, a mortality of 10 per cent. There were but 9 women and 291 men. One woman died. The following table gives the relative frequency of the fractures:

	Cases.	Died.	Mortality.
Tibia and fibula (both)	111	10	9.009%
Tibia	53	7	13.2
Humerus	33	1	3.33
Femur	25	7	28
Radius and ulna (both)	20	2	10
Inferior maxilla	14	0	0
Patella	9	0	0
Humerus, radius and ulna (elbow joint)	8	1	12.5
Radius	8	1	12.5
Fibula	7	1	14.28
Olecranon (distinguished from ulna)	4	0	0
Ulna	3	0	0
Humerus and ulna (both)	2	0	0
Femur and tibia	1	0	0
Scapula	1	0	0
Superior maxilla	1	0	0
Totals	300	30	10%

From this list it will be seen that 37 per cent. of all the fractures are those of the tibia and fibula together; 17.6 per cent. are of the tibia alone, and 2.33 per cent. of the fibula alone. Practically, fractures of the leg constitute 57 per cent. of all the compound fractures in this list. The forearm comes next with 11.6 per cent., the humerus with 11 per cent., and the femur with 8.33 per cent., the lower jaw with 4.66 per cent., and the patella with three per cent. The other fractures — those of the scapula, upper jaw and unusual joint complications — are so rare that they may be classed as surgical curiosities, and together make up less than 5 per cent. of all the compound fractures. I have purposely omitted from the list fractures of the nose, as they were seen only in the out-patient department and could not be properly followed up.

Since these cases are taken as they occur in routine practice and are not selected for purposes of treatment demonstration, as they are seen by a number of different surgeons, but follow a regular routine of treatment, I will sketch out briefly the method of the management, when uncomplicated.

With rare exceptions ether is given in all cases of compound fracture.

In the reduction of fractures of the leg no unusual plan is followed. Some years ago division of the tendo-Achillis was thought to be of advantage when there was great over-riding of fragments; but experience showed this manœuvre to be of questionable advantage. The usual shaving, scrubbing, syringing and

¹ Read before the Boston Society for Medical Improvement, February 26, 1894.

general disinfecting of the limb have been thoroughly carried out for many years. Chlorinated soda, sulpho-naphthol and bichloride are the favorite washes used. The leg is then put upon a Cabot splint and dressed. This splint is a simple wire frame, made from a single piece and bent so as to fit the ankle and knee. The wound is dressed, simple wooden side-splints are put on to prevent lateral bowing, and the apparatus is bandaged above and below the site of the fracture. An unenclosed area is left open for the renewal of the dressings.

The only variation in this style of treatment for many years has been in the first dressing of the compound opening. Up to 1891 it was the almost invariable custom to establish the freest kind of drainage. If necessary, to enlarge the wound; usually to make counter-openings, as dependent as possible. Stitches were rarely taken, and a primary union was seldom expected. Within the past three years drainage has become much more infrequent, for reasons which I shall subsequently discuss; and stitching, with primary union, has been common. Plaster as a first dressing has been rare. After the wound has become simple, however, the limb has been put up in a plaster splint and the patient given crutches. The method of treatment by these posterior wire- and side-splints has long been deservedly popular with those accustomed to their use. The splints are light, simple, easily kept clean, readily applied, quickly changed, and provide most conveniently for secondary dressings without disturbing the limb.

Fractures of the thigh are put up in an extension apparatus of some kind—the long Dessault or the Bucks—with a posterior and long outside splint, conveniently arranged for proper dressing of the wound.

The patella fracture is put on a posterior splint, with coaptation splints to control the quadriceps femoris.

Fractures of the upper extremities are put up in a variety of apparatus, consisting usually of shoulder cap, coaptation splints, internal angular at the elbow, and anterior and posterior splints for the forearm.

It is not my object in such a paper as this to discuss the relative merits of the various apparatus devised for these injuries. So long as the fragments of a bone are securely immobilized, with due regard to the patient's comfort, it is of small moment what the style of apparatus may be. I am most decidedly of opinion, however, that proper provision should always be made for subsequent dressings and care of the wound *in situ*.

Fifty per cent. of these 300 fractures were due to crushes, and a large majority of these crushes were sustained in railway accidents. I have previously called attention to the extremely serious nature of these accidents. A description of the results of such crushes and of the pathological conditions ensuing is given by Dr. Alexander Ogston, of Aberdeen, in the *Medical Chronicle* for November, 1888. The bones in these cases are nearly always comminuted, the soft parts are severely lacerated, and there is frequently a resulting bone necrosis. Of these 151 cases of crush, 102 were comminuted and lacerated, with a resulting necrosis in 26. Twenty-one of the total 30 deaths followed crushes; so that we may say that the mortality after crushed fractures is 13.9 per cent. I do not, of course, include those cases which are essentially fatal.

Fractures from horse-kicks I have put in a special class. This may be fanciful, but I find that in

these cases comminution is very common, primary union rare and long suppuration frequent. There were 24 of these cases, with a mortality of 4.16 per cent. Of other fractures, from blows there were 27, with a mortality of 7.4 per cent.

Next to crushing accidents the most common cause of a compound fracture is a fall. Of these there were 100, with a mortality of 6 per cent. It would appear from a study of the tables that fractures from this cause are the least severe of all, and the prognosis good. The violence is indirect, comminution uncommon and laceration slight. Here we may stitch with a good prospect of primary union, and usually without drainage.

Four cases of bone necrosis and 13 of comminutions are divided between the classes of blows and falls.

In the whole list, though, I found bone necrosis recorded less often than I should have expected. It occurred 30 times, a proportion of 1 in 10. One of these died of prolonged suppuration, after two operations for the removal of sequestra. Twenty-one cases in all required these secondary operations. The longest in healing after the primary accident was twenty-four months, the shortest was three months.

In a carefully treated hospital case *ununited fracture* is a great rarity. The reason probably is that the rigid hospital discipline, the admirable dietary and good hygienic surroundings, favor proper and rapid union. Many cases of non-union which I have seen in private practice were directly traceable to the negligence of the patient himself.

In my hospital list there are records of but seven ununited fractures: Four of the humerus, two of the radius and ulna, and one of the femur, all were eventually wired, and recovery ensued.

Fractures with joint complications were found to be quite common in the list, but the mortality during the past three years has been surprisingly low, and useful joints have frequently resulted.

Joint.	Totals.	Excised.	Ankyloid.	Died.	Motion.
Knee	13	0	9	1	3
Shoulder	1	1	0	0	1
Ankle	9	1	5	1	3
Elbow	26	7	6	0	20
Wrist	1 (gangrene, amp. 3d day)			1	0
Totals	50	9	20	3	27

The total number of joints involved is seen to be 50, with 3 deaths, a mortality in joint fractures of 6 per cent., a lower mortality than the total average of 10 per cent. The fact that prompt and thorough excisions were done in nearly all desperate elbow fractures, which include a majority of all the joint fractures, accounts partially for this low mortality. In the elbow fractures which are amenable to more conservative treatment it is gratifying to see how, in recent years, a recovery of function has followed thorough antiseptic treatment without excision. There were 19 elbow fractures not excised, 13 of these cases recovered with good movable joints. Several of the 6 ankylosed cases were directed to return for subsequent resection, but their records I have been unable to trace. Most of them probably preferred to remain as they were, with the elbow at a right angle.

That 9 out of 13 knee-joint fractures remained ankylosed must be considered a good result relatively. Three recovered with motion, and but one died. It is a fair presumption that more of the cases would have recovered with motion, had they persisted in the use

of passive movements—a manœuvre so difficult to properly carry out with hospital patients.

Of the 7 elbow resections it should be said that 3 were primary and 4 were secondary, or after the third day, when it became evident that a useful joint could not be saved. They all recovered well, the average length of convalescence being six weeks.

The one ankle-joint excision was secondary, in a middle-aged alcoholic subject, after two months of suppurative. He recovered with a fairly useful false joint.

There was one primary excision of the head of the humerus, with a satisfactory joint resulting.

Aside from the joint excisions the humerus was resected twice, and the bones of the forearm once. A total of 12 resections with excellent results in all.

Primary wiring of bone was done 27 times. Twenty of the cases got good union, and 7 had necrosis. It is noticeable that these 7 cases of necrosis were treated by the open method, that is, the wound was left unsutured and the wires extruding.

One of the cases of compound ankle-joint was complicated by laceration of tendons. The tendon of the extensor proprius pollicis was sutured, and good union followed. The man recovered with a movable joint.

As was said at the beginning of this paper, those cases of compound fracture are excluded which are essentially fatal. The question immediately rises, What cases are these? I admit at once that such a question cannot be accurately answered, but that the decision must be left to the individual surgeon. A vast number of very serious injuries are in these days survived, in a manner which would have astonished our fathers, so that we have come to regard hopefully the most grave and extensive lesions. Prosperous looking cases do occasionally die, however. I have found in this list six causes of death. They are: sepsis, shock, delirium tremens, fat embolism, gangrene (as distinguished from the ordinary suppurative processes), and nephritis.

Sepsis does not appear to have decreased materially within the past eight years. There were 20 cases with 10 deaths; a total mortality from sepsis of 3.33 per cent. In 1885 there were 4 cases; in 1886, 2 cases; in 1887, 2 cases; in 1888, 2 cases; in 1889, 3 cases; in 1890, 3 cases; in 1891, 1 case; in 1892, 1 case; in 1893, 2 cases. Secondary amputation was done in 3 of these with 1 fatal result; 7 died of septicæmia, and 3 of pyæmia. There were 3 cases of erysipelas, all of which recovered.

Of course, all of these septic cases received the most thorough antiseptic treatment; the favorite local application being baths or constant irrigation with bichloride or sulpho-naphthol.

The age of the patient in sepsis seems to have had no bearing on the result. Those who died ranged from nineteen years to sixty-five years. There were among them 3 fractured femora, 6 fractures of the leg and 1 of the radius.

The nature of shock and collapse is still so uncertain that it is difficult to distinguish them always from other conditions, notably embolism. Those cases which entered the hospital and died within twelve hours I have included in the list of essentially fatal cases. There were 15 cases besides these which fell into a condition of shock subsequently, the effect of operation, ether or secondary hæmorrhage; 8 such cases survived and 7 died.

There were not many recorded cases of delirium

tremens: 9 in all, and 6 of these died. The deaths were obviously due to delirium tremens. It happened that none of the injuries were especially severe. The injuries of the three survivors were as bad as any, but the men averaged much younger. It is recorded of one that he was cured of drinking, and a year after his discharge was a total abstainer. Contrasted with him was an individual who gave his name as Yale College. He was a negro. His injuries were comparatively trivial; but he died on the tenth day, after a week of delirium.

There are 3 recorded cases of fat embolism, with death and autopsy. All of them were due to extensive crushing of the leg.

One man died of an acute, presumably septic, nephritis, which certainly was not present when he entered the hospital; and three died of gangrene for which secondary amputations had been done fruitlessly.

	Recov'd.	Died.	Mortality of Total Fracts.	Totals.
Sepsis	10	10	3.33%	20
Shock	8	7	2.33	15
Delirium tremens	3	6	2	9
Fat embolism	0	3	1	3
Gangrene	7	3	1	10
Nephritis	11	1	33	12
Deaths 30 (10%).				

Some of the cases of gangrene were most unexpected. One boy with a simple crack through the tibia, no apparent complications and excellent circulation in the foot on entrance, developed gangrene, and died three days after an amputation.

Secondary amputations were not common, however. There were but 20 in all: 7 of the humerus, 5 of the forearm and 8 of the leg.

One young man with a compound elbow eloped on the first day. He returned for amputation on the seventh day. Extensive gangrene had set in.

Of all fractures of the humerus, 21 per cent. required secondary amputation, of forearms 16 per cent., and of legs 7 per cent.

Though the figures would show that acute general sepsis is about as common now as it has been at any time within the past eight years the records prove, without question, that the general results obtained in the treatment of compound fractures are vastly better than they were eight years ago, and that within the past three years, especially, there has been most marked improvement. Local suppuration is much less common. Five years ago a certain amount of suppuration was expected; but since January, 1891, there are but 15 recorded cases. In the five previous years there were 89. In the suppurating cases recorded the mortality takes a decided jump upwards, as we should expect; 34 per cent. died.

There were a few remarkably good results as far back as 1885, when a case of fractured leg was recorded well in two months. Last year a comminuted leg was simple in one day and sound in two months, without exciting especial comment. In the same year a compound forearm became sound in six weeks.

A study of the modes of treatment employed in the last decade and in this, convinces me that the improvement in results is not due to any radical change in method. Indeed, the methods are the same so far as the sterilizing of the wound and its dressing are concerned.

Why is it then that to-day we can so frequently dis-

pense with drainage, especially with the former numerous counter-openings? In the old days that omission would have been thought madness, and when tried led almost invariably to extensive suppuration. As it is, the older charts show regularly a temperature elevated for ten days or a fortnight. Stitching the wound up tight was seldom practised five years ago. It is frequently done to-day, with a resulting primary union. Very often now, after the first dressing, the wound is left sealed for two or three weeks, when the dressing is removed and the fracture found simple. The result is that to-day a permanent plaster splint is put on within a month of the accident, and that a great many of these cases give no more trouble than do simple fractures.

The reason for this gratifying advance lies in the fact, I believe, that the environments of our surgery are clean. It has taken many years to accomplish this in an old hospital like the Massachusetts General; but the results in all branches of surgery seem to bear out the statement. Patients used to be carried into an accident-room which must have been septic, and in spite of the most scrupulous care in the management of the wound it very often became contaminated. To-day I believe that the accident-room is as clean as the abdominal ward.

In this list it will be seen that the average time of healing is rather less than stated in the standard books. Excluding such complications as humerus, radius and ulna (elbow-joint), humerus and ulna (elbow), and femur and tibia (knee), the order of the bones, arranged according to their rate of healing, is as follows:

	<i>Longest.</i>	<i>Shortest.</i>	<i>Average.</i>
Superior maxilla	1 mo.	1 mo.	1 mo.
Scapula (body)	2	2	2
Inferior maxilla	6	1	2.4
Ulna	4	2	2.5
Radius	12	1.5	3
Radius and ulna	12	1.5	3.5
Humerus	8	2	3.5
Olecranon	8	3	4.7
Tibia	24	2	4.7
Fibula	12	2	4.8
Tibia and fibula	28	2	5.6
Patella	12	4	6.6
Femur	24	3	8

Some of these averages, such as upper jaw and scapula are of little value, as they are taken from too few recorded cases. The number of these cases is significant, however, as indicating their rarity.

All the fractures of the lower jaw did well. Even with extensive comminutions there were but few necroses. Methods of treatment were diverse; but it is worthy of note that by far the best results were obtained from the use of inter-dental splints, furnished and fitted by the Dental School.

Of course, it is almost impossible to keep these fractures aseptic, and sinuses often persist until the bone is sound.

There were but 3 fractures of the ulna alone, all of which united well without any complications. The infrequency of fracture of this bone, alone, excluding fractures of the olecranon, is due to its deep position. Its fracture is almost always accompanied by fracture of the radius.

Compound fracture of the radius alone is not very common. There were 12 out of the total 300. The radius is usually fractured by falls on the wrist, and this is an unusual seat of compound fracture unless from a crush or blow. If compound, the wrist-joint is

liable to be opened. In one of the cases this resulted in death.

Both bones of the forearm are frequently the seat of compound fracture, and non-union is not uncommon. Out of 20 cases, 10 per cent. died. In treating fractures in the forearm it is not very easy to obtain immobilization except with plaster splints. As in fractures of the leg, however, primary union of the soft parts is more common than it was, and the bony unions are more rapid than they once were, the resulting callous less and good rotation more certain.

Perhaps the most difficult to treat of the ordinary compound fractures are those of the humerus. It is almost impossible to immobilize this bone in any apparatus which will admit of easy access to the wound for dressings. The practice of fastening the arm to the side and fixing the shoulder- and elbow-joints is the most practicable and common, but necessitates some movement of the arm for dressings.

From the surgeon's point of view an extension apparatus, similar to that used in thigh fractures, with the patient in bed and the arm extended at right angles is very satisfactory, but it is almost impossible to get patients to submit to such confinement.

Owing to these difficulties we find a majority of our cases of ununited fracture to be of the humerus. Secondary amputation of this bone is likewise most common. Out of 33 fractures of the humerus four resulted in non-union, as against 3 non-unions in 267 of all other fractures. Secondary amputation was done in 7 cases of the remaining 29, which leaves us but 22 cases in which good early union took place. Hence it appears that our prognosis in all these humerus cases should be very guarded. It is positively good in but 66.6 per cent., according to these statistics.

Fractures of the olecranon are interesting mainly on account of its relation to the elbow-joint, and its inefficient blood-supply. When compound, its treatment is subordinated to the question of saving the joint. It unites more slowly than the humerus, but has a lower mortality.

There is little to add to what has been already said in regard to compound fractures of the leg, except in regard to the rate of healing. As would be expected, fractures of both bones heal more slowly than those of one. The difference in rate being one month. The tibia, when fractured alone, is sound in about four and one-half months, both bones in about five and one-half months.

There is an average and fairly definite relation between the time a fracture becomes simple and the time it may be pronounced healed. If the fracture does absolutely well and there is no necrosis this relation is as one to five. If a leg is simple in one month the bones will be sound in five months. This is true, too, of the very short cases. Two cases which were simple in ten days were sound in two months. If there is necrosis and long suppuration, the ratio may be as four to five, or the bone may become sound before the wound is simple, and the figures be reversed.

It seems that certain fractures of the leg are especially liable to suppuration. All the compound Pott's fractures suppurred; and as this is the common fracture of the fibula, it will be seen that this bone when fractured alone heals more slowly than the tibia alone.

None of the patellar fractures died. Most of these were wired. Three recovered with good motion in the knee and in six there was resulting ankylosis.

As would be expected, by far the highest mortality was in fractures of the femur: 28 per cent. of the 25 cases. The great difficulty in rendering lacerations of the thigh aseptic, and the shock in these injuries, were the causes of death. Some of the cases, however, recovered with remarkable rapidity. The shortest convalescence was that of a young man of twenty-four, who walked safely after three months. Eight months, however, was the average length of convalescence.

In collecting data for these conclusions my difficulties have been very great. Fortunately many of the ultimate results appeared in the hospital records, and a great number of the patients answered my notes of inquiry. The results, as regards deformity, were especially gratifying to note. The worst deformities were from crushes and horse-kicks; but after the lapse of years they have frequently become less noticeable, and very rarely have the functions of limbs been impaired after permanent bony union.

It seems fair to briefly conclude from this hasty review of so extensive a subject that, though the mortality is relatively high, still we have made within recent years a decided advance in our treatment of this class of cases; and that our success is not so much due to any special variety of apparatus or method of treatment, as to our perfection of technique in working on the broad lines of aseptic surgery.

Clinical Department.

SATURATED SOLUTION OF POTASSIUM PERMANGANATE IN THE TREATMENT OF CHRONIC ULCER.

BY P. R. WAUGHOP, M.D.,
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LAST summer, in the surgical out-patient department of the Boston City Hospital there were a number of very obstinate cases of chronic ulcer. Poultices of corrosive sublimate (1-1000), creoline (1-1000) and of Labarraque's solution were faithfully employed; as also strapping and the tin-plate method; but without success. Iodoform, aristol and calomel powders were also unavailing.

Permission was then obtained to try the saturated solution of potassium permanganate on these cases. The results were extremely gratifying. One typical case is herewith submitted in full and a summary given of twenty-four others—ulcers, abscesses, old sinuses, etc.

CASE VIII. Ulcer just above left internal malleolus. Size of a quarter-dollar and one-quarter of an inch deep, the bottom being covered with a greenish slough.

This ulcer had been present for four years, with very little variation. It had been treated at various times with poultices of corrosive sublimate (1-1000), the last time once every two days for three weeks. The poultices served merely to stop the sloughing without showing a tendency to heal.

Permanganate Treatment.—The slough was swabbed out, and the ulcer flooded for ten minutes with the permanganate solution (severe smarting being produced the first two minutes). It was next sponged dry and loosely packed with narrow strips of gauze soaked in the fluid. A heavy permanganate poultice (gauze three inches square, dripping-wet with the solu-

tion) was then applied, covered in with oiled paper, and bandaged as lightly as possible with cheese-cloth. This method was repeated every day for a week. On the eighth day the granulations were flush with the surface. Two days of subsequent treatment with eucalyptus vaseline was followed by the formation of a pellicle over the granulations. (Patient disappeared.)

CASE I. Gangrenous ulcer of leg. Size of dollar, and three-quarters of an inch deep. Corrosive three weeks, without effect. Permanganate heals in ten days.

CASE III. Old ulcer of leg. Superficial, two inches by one and one-half inches. Corrosive creoline, flaxseed, and boric acid ointment five weeks, without effect. Permanganate applied every other day, heals in ten days, that is, five applications were made.

CASE X. Ulcer of leg, two years' duration. Three inches in diameter by one-quarter of an inch deep. Bread-and-milk poultice two months, without effect. Permanganate, in three weeks, reduces ulcer to one-half the size. (Patient disappears.)

CASE XI. Ulcer of leg, twelve years' duration. Size of quarter-dollar, one-half inch deep. Corrosive four months, without effect. Permanganate heals in six weeks. (Patient came only twice a week, and was on his feet constantly, doing heavy work.)

CASE XII. Ulcer of leg. Three inches by one and one-quarter of an inch deep. Corrosive one week, without effect. Permanganate every other day for three weeks reduces to a superficial ulcer the size of a dime. (Patient disappears.)

CASE XIII. Ulcer of leg. Size of dollar, and three-quarters of an inch deep. Very foul. Tar ointment six weeks, without effect. Permanganate heals in fourteen days.

CASE XV. Ulcer of leg. Two inches in diameter and one-eighth of an inch deep. Corrosive two months, without effect. Permanganate heals in seventeen days.

CASE XX. Ulcer of leg. One inch in diameter by half an inch deep. Linseed poultices, carbolyzed ointment five days. Action too sluggish. Hastened to a cure by permanganate in eleven days.

CASE XXIV. Ulcer of leg. Size of a half-dollar; one-quarter of an inch deep. Permanganate produces severe dermatitis. Heals slowly under iodoform ointment in nine weeks.

CASE XXVI. Ulcer of leg. Size of dollar, three-eighths of an inch deep. Corrosive two weeks, without effect. Permanganate, used every other day, heals in fifteen days.

CASE XXVII. Ulcer of leg. Tuberculous? Two and one-half by one and one-half by one and one-quarter inches. Corrosive seventeen days, without effect. Permanganate, at irregular intervals, heals in a month.

CASE XXXI. Ulcer of leg. Three by two by one and one-half inches. Corrosive two months, without effect. Permanganate heals in two months. (Patient came only twice a week and was constantly doing heavy work.)

CASE XXXIII. Ulcer of leg. Two and one-half inches in diameter and three-fourths of an inch deep. Permanganate in fifteen days reduces to about one-half the original size. Then twenty days of flaxseed poultice. Ulcer remains stationary, and sloughs a few times. Then healed by permanganate in seventeen days.

CASE IV. Abscess of arm. Size of quarter-dollar, and one-quarter of an inch deep. Packed one week with iodoform gauze. Remains sluggish. Packed