

On skin grafting / by Thomas Bryant.

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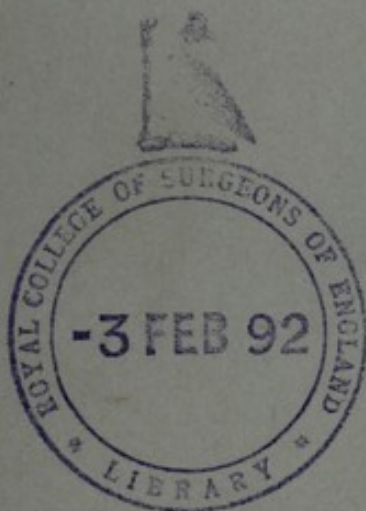
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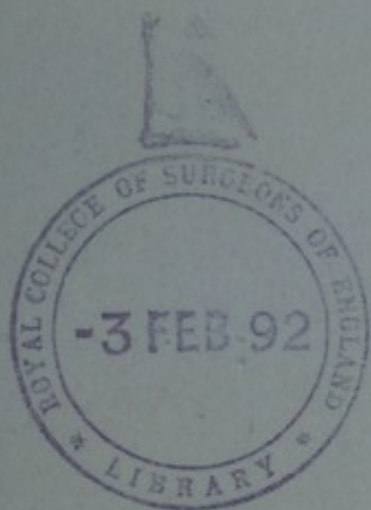


Plate II

Fig 3.

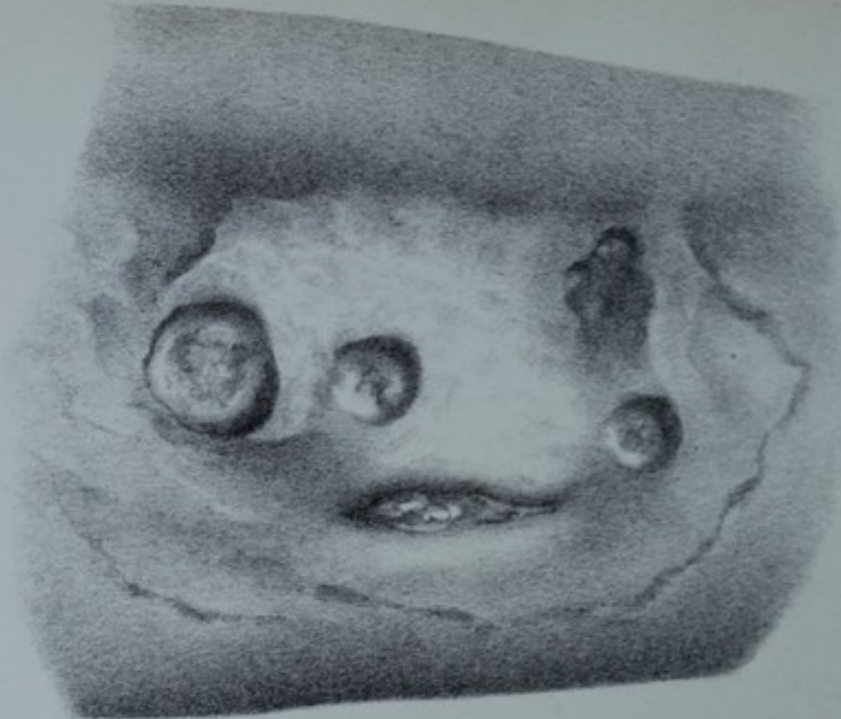
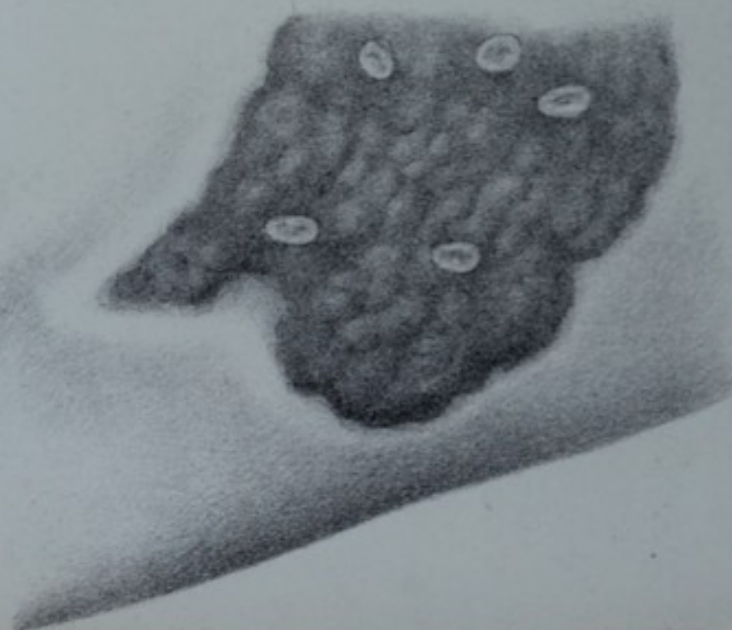


Fig 2.



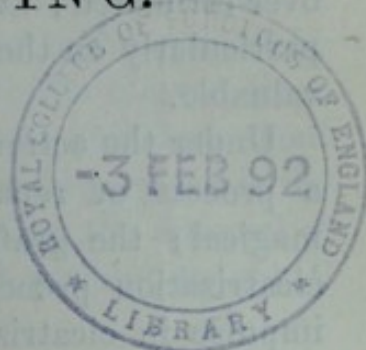
Fig. 1.



Gray & Rep
1872

ON SKIN GRAFTING.

BY THOMAS BRYANT.



WHEN John Hunter a century ago succeeded in transplanting the spur of a young chicken from its leg to its comb, as well as into the comb of a second bird, and found that it not only lived, but grew, he probably never dreamt in any flight of his genius that the fact he then established would be so applied in the practice of surgery as to mark an era in its progress, and to bring a class of cases which surgeons were apt to look upon with little interest amongst the most curable and tractable of local affections. And yet this has come to pass; M. Reverdin, of Paris, having on October 16th, 1869, succeeded in transplanting small portions of skin taken from one part of a man's body to the granulating surface of a large sore, under which treatment the ulcer healed. He read the case before the Surgical Society of Paris on December 15th, 1869, and asked, "Is the growth of skin due to the effect of contact or neighbourhood, or is it due to proliferation of the transplanted elements?"

Mr. G. D. Pollock, of St. George's Hospital, encouraged by M. Reverdin's success, followed up the practice, and the good results he and his colleagues obtained soon induced all other surgeons to follow in their wake. They are to be read in the 'Transactions of the Clinical Society' for 1871, and at the present day it may be said that the practice is established.

For more than one year I have very extensively carried it out, and in most instances with success. I look upon the suggestion as a very valuable one, its adoption rendering many cases curable that were not so previously, facilitating the cure of as many more, and giving interest to a class of cases

that had formerly but little. In the management of ulcers it is a great boon, and in the treatment of the large granulating surfaces so common after extensive burns its value cannot be over-estimated; as an adjuvant to many plastic operations, more particularly on the face, and in the case of deformities, it is invaluable.

Under the action originated by the transplanted skin centres, a process of repair goes on which at first appears almost magical; the grafts soon become islets of skin, round which cicatrization proceeds; the margin of the sore receives an impulse in cicatrization, which rapidly extends; and between the grafts themselves and margin of the sore connecting links of new skin rapidly form, which divide the sore into sections. (Plate II, fig. 2.) By these means large surfaces speedily cicatrize that under former circumstances would have required many months, and that, too, without the contractions and subsequent deformities that under other conditions were too well known to follow in such cases.

The practice seems applicable wherever a large granulating surface exists, and the only essential point to observe is that the *surface of the sore should be healthy*; this clinical fact including another, that the patient's health is good, for there is no better barometer of health than a sore, its surface assuming a healthy or unhealthy appearance with every alteration in the general condition of the body. I have attempted, by way of experiment, to graft skin upon sores that were not quite healthy, and have sometimes succeeded; in an indolent sore, in which a small patch of healthy granulations sprang up, I have succeeded in securing, by transplanting, a new centre of "cutification," that proved of great value in aiding the healing process, but in a larger number I have failed in securing such an end. It may, therefore, be accepted as a truth *that a healthy granulating surface is an important requisite for success*.

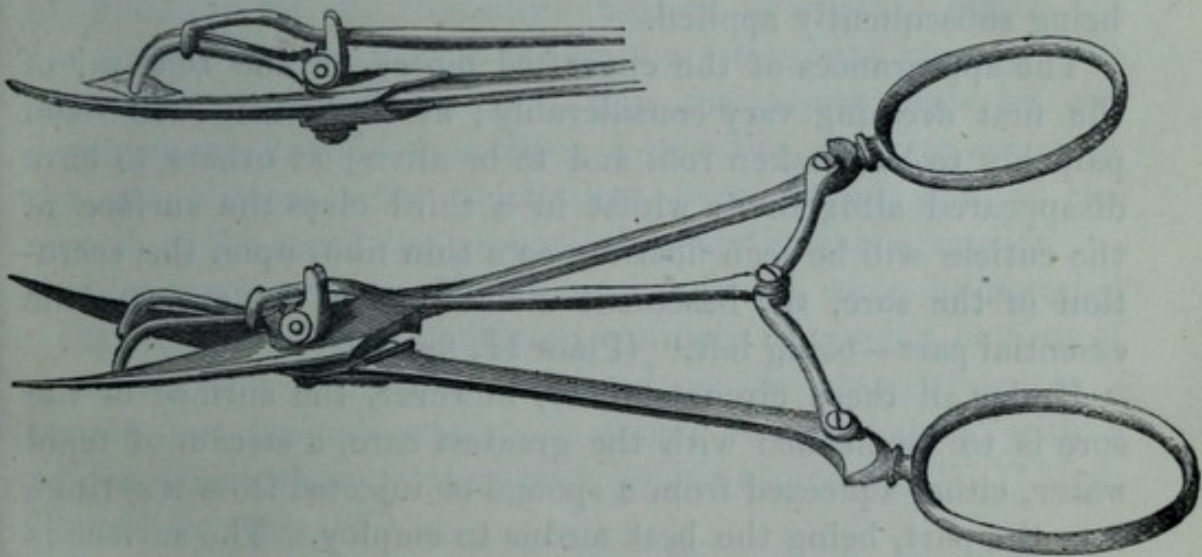
Upon this basis I will now proceed to consider how the operation is to be performed.

Pollock tells us that Reverdin's method is to remove a very minute portion of the skin, and to replace it on the surface of the granulations, and there retain it with a strip of plaster. "I," he writes, "have usually removed the skin by nipping up a very small portion with a fine pair of forceps, and cutting it

off close with sharp scissors. At first I made a slight cut in the surface of the granulations, and then imbedded the piece of skin; but of late I have only laid it on the surface of the ulcer. I cannot say that I have found any difference in the result. I do not think there is great, if any, advantage to be gained by the transplantation of a large piece, but where the ulcer is large I think much is gained by the transplantation of numerous small pieces. The disadvantage of transplanting a large piece is the sore it creates; while the small sores formed by the removal of the minute pieces heal in a short time, and without trouble." ('Clin. Soc. Trans.,' vol. iv.)

My own experience confirms in every point that of Pollock.

I employ for the removal of the sound skin a pair of scissors (figured below) which Messrs. Krohne made for me after



Macleod's suggestion in a medical journal, and find they answer far better than anything else, for they take away a portion of skin that will cut into three or four pieces, and the section includes only the upper layer of the true skin, with the rete mucosum; they do not cut into the fat beneath the skin, or divide the papillæ sufficiently far to draw blood or give pain. Patients never object, with this instrument, for a second or third piece to be taken away, should it be deemed necessary. I generally take the skin from the forepart of the arm or the side of the thorax.

Having taken away the skin, the fragment should be cut into

three, four, or more pieces, and then placed about *half an inch or three quarters of an inch from the margin of the sore, and about one inch apart*. There is no doubt that the engrafted centre has a stronger influence in exciting a healing action in the margin of the sore when placed near it, than when isolated in the centre of a granulating surface away from the margin.

These pieces should be placed upon the granulations, and gently pressed in. There is no necessity to wound the granulating surface. They should be covered with a piece of oiled gutta-percha skin, and the whole supported with cotton wool; a bandage being subsequently applied, so as to press moderately upon the part, and keep the dressing in position. On the third day, but not before, the dressings may be removed, the greatest care being needed; a fresh piece of oiled gutta-percha skin being subsequently applied.

The appearances of the engrafted pieces on the removal of the first dressing vary considerably; at times they will seem palpably to have taken root and to be alive; at others to have disappeared altogether; whilst in a third class the surface of the cuticle will be seen floating, as a thin film, upon the secretion of the sore, the basement membrane of the cuticle—the essential part—being left. (Plate II, fig. 1.)

Under all these circumstances, however, the surface of the sore is to be cleaned with the greatest care, a stream of tepid water, either squeezed from a sponge or injected from a syringe over the part, being the best means to employ. The surface is on no account to be wiped, for the grafted portions of skin are easily uprooted, whilst those that appear to have died or that have disappeared often reappear at a later period as “cutifying centres.” As soon as the new centres are established in large sores, other pieces should be engrafted, at about the same distance from the new pieces as these were originally inserted from the margin of the sore; and in this way the whole granulating surface may be speedily covered with new skin, and a rapid recovery take place.

How the engrafted pieces act in the healing process is not yet satisfactorily settled, and Reverdin's questions, as already quoted, have not yet been completely answered. That they act as direct stimulants to the sore itself, and more particularly to

the margin of the sore, there can be little doubt, for as soon as the "grafts" have taken, the margin of the sore nearest to them is seen to cicatrize and to send out prolongations of new cicatrizing tissue to meet similar prolongations from the new cutifying centres; the sore in this way becoming subdivided by bands into smaller sores, and then rapidly healing. (Plate II, fig 2.)

That the engrafted portions grow by the proliferation of their own cells is likewise proved by the fact that in the case of a white man upon whose ulcerated leg I engrafted four small pieces of black skin, the whole being no larger than a barley-corn (Plate I, fig. 4), the black skin grew twentyfold in ten weeks, to the extent illustrated in Plate I, fig. 1, the black portions gradually enlarging and sending out prolongations, which joined, till one patch of black skin had formed, as seen in Plate I, fig. 2, the ulcer healing as rapidly where the black skin was grafted, as where the white was placed. The engrafted pieces of new skin thus themselves grow by cell development, as well as exciting a new skin-forming power in the granulations near which they were placed, and at the margin of the sore; the process of repair by this operation including far more than Mr. Dobson believed when he asserted "that the act of transplantation is simply to insert a pattern of skin, and this pattern is impressed on the granulations to a certain but limited extent; it simply supplies them with a proper model whereby they may fashion themselves." ('*Med. Times*,' Oct. 29, 1870.)

That the new pieces of inserted skin may do this is highly probable, but that they do what has been already described is undoubtedly true. They grow themselves, they stimulate the skin-forming powers of the margin of the sore, and exert at the same time a like action on the granulations around.

The same result may likewise take place when large pieces of skin are transplanted, whether removed from the patient or from the amputated limb of a second; the dressers at Guy's have frequently engrafted large pieces of skin, half an inch square, removed from amputated limbs, the pieces on removal being dropped into warm water in their passage to the wards where they are applied. But there seems to be no advantage in adopting this practice in the majority of cases, a large propor-

tion of cases failing. In one case, which is figured in Plate II, fig. 3, the grafts took root and excited a healthy action in the margins of the sore; they, however, grew but little; they remained, on the cicatrization of the sore, as bosses of skin with well-marked borders; they were grafted, it was true, but the grafts seemed to have no power of assimilating themselves with the tissues on which they were placed.

To take large pieces of skin from the patient's own body is an objectionable practice, on account of the large wound it creates; it is, moreover, unnecessary in the majority of cases, as small pieces appear to do better. To take them from another subject is also objectionable for like reasons; but still more so on account of the difficulty that sometimes accrues from a want of power in the new graft to assimilate itself to the tissues on which it is placed, and from the risk that is necessarily run of introducing into the blood of the living subject some new or poisonous element; a risk that I believe it to be wrong and unjustifiable to run, and that I would not allow on my own person. On that account I have forbidden my dressers adopting the practice.

In the case where black skin was transplanted I did it with the full concurrence of both patients; indeed, both were rather disappointed that the operation could not be repeated. They were firm friends, and the link I formed bound them closer.

There seems, however, no objection to mincing the portion of integument which is to be employed into minute fragments, that is, into pieces the size of millet-seeds; the thumb-nail of the surgeon being the best table for the purpose; in children, where it is unadvisable to remove much healthy skin, and the surface to be covered is large, the plan is a good one; I prefer, however, pieces the size of half a hemp-seed, when they can be obtained. Recently, the practice of applying "skin dust," or the products obtained by scraping the skin, has found favour, and met with some success. In the few cases in which I have tried it I cannot say I have been successful; the ulcers healed, it was true, but I have no evidence to show that any new cutifying centres were established by the proceeding. In the hands of Mr. Poland it has, however, been of value. I believe the idea originated with M. Marc Sée, of Paris, who called it "epidermic grafting." I might add, as an objection to the

practice, that the scraping of healthy skin is far from painless, and to take dead cuticle is useless.

The clinical points alluded to in this paper are well seen in the drawings annexed. They have been carefully and ably taken by Mr. Clarke, my reporter, from the living patient, and from some excellent models lately made by our well-known artist, Mr. Towne, from patients under my care in the wards of Guy's Hospital.

They pretend, however, to show only the most striking features in this process of repair, the endless variations in the process requiring the close inspection of many cases.

Whether this newly engrafted skin possesses the same power of resisting disintegrating changes as the old skin is not yet proved. Some observations I have made lead me to suspect that it is somewhat prone to break down and ulcerate, on the patient walking, after the sore has completely healed, particularly when the subject is past middle age; they are enough to show the necessity of observing as much care in the after treatment of the case as ought always to be observed after the cure of any other sore; that moderate support and protection are most valuable; and for this purpose there is nothing better than the binding on of a piece of sheet lead over the cicatrix when the seat of mischief is on the leg, as by it equal pressure is supplied to the seat of the original sore, as well as protection.

The new skin soon becomes as sensitive as the old; indeed, the sensibility of the cicatrix, under these circumstances, seems to be greater than it is when unaided cicatrization is allowed to take place.

CASE 1.—Ulcer on leg; skin grafting of black and white skin; rapid healing of the sore, with growth of black skin. Cases extracted from the note book by Mr. Clarke.

John D—, æt. 37, was admitted into Guy's Hospital June 28th, 1871, under Mr. Bryant, with a large ulcer on the leg.

The patient states that he has always enjoyed good health, and that he has been accustomed to take stimulants freely. About ten years ago, when a groom, he fell from his horse, and knocked the left tibia over its lower fourth. He soon

recovered from the injury, and was able to walk about, but fifteen months afterwards the leg began to ulcerate, and he has been under medical treatment since. It has been better at times, but the sore has never quite healed up during the eight and a half years.

On admission, the lower half of the left leg has an indolent ulcer extending all round the limb, and about eight and a half inches in length. The edges are smooth, and level with the surrounding parts; the skin is inflamed for some distance round. At different parts of the ulcer itself may be seen round patches of granulations, covered with a yellowish puriform fluid; at others no signs of granulations exist. The lower part of the leg is wasted.

Ordered water dressing to leg, the elevation of the limb, *Mist. Quiniæ* ʒj t. d., and full diet.

18th.—The back part of the ulcer has all healed, except one inch superiorly. The portion over the tibia is still open, but healing.

20th.—The ulcer having assumed a healthy character, a piece of skin was removed from the man's arm by Mr. Bryant's scissors, and divided into six; and a piece from the arm of a coloured man in No. 1 bed, which was divided into five (Plate I, fig. 4), and the eleven pieces were placed in different positions on that part of the ulcer which was on the outer side of the leg. The pieces of black skin were placed together on the anterior part, the sore was dressed with oiled gutta percha and covered with cotton wool; the foot and leg being subsequently banded.

23rd.—The dressing was removed; considerable discharge existing; all the pieces, as far as could be seen, have taken. Fresh dressing was applied.

August 3rd.—One of the black pieces has been "grabbed," as the patient expressed it, by the margin of the sore; another, which has been accidentally moved in the dressing, has joined with a third to form one piece.

7th.—Two pieces of the black skin are joined by a thin line. All the pieces taken from the coloured man are beginning to regain their dark colour, which they had partly lost.

11th.—Eight fresh pieces of white skin were grafted on to the ulcer on the inner side of the leg.

14th.—All the eight pieces transplanted on the 11th are visible, and growing well.

26th.—Twelve more pieces of skin were grafted; eight were placed on the ulcer on the inner side of the leg, and four on the outer. Dressing as before.

28th.—Dressing removed. All the pieces transplanted on the 26th have taken.

September 4th.—The wound was ordered to be dressed with lead lotion.

9th.—Eight pieces of skin were grafted on the inner and four on the outer side of the leg. Oiled gutta percha and bandage to be applied.

12th.—All the pieces transplanted on the 9th have taken.

20th.—The three upper pieces of black skin have grown and united together, and with the skin around. The sore has all cicatrized, except one narrow piece of granulations.

October 4th.—Sore on the outer side of the leg has entirely healed; the black pieces have considerably enlarged; three fresh pieces of skin have been transplanted on the inner side of the leg.

13th.—The three pieces transplanted on the 4th are growing; the black patch has increased in size very considerably (Plate I, fig. 2).

18th.—The whole of the sore has completely healed.

November 2nd.—Left the hospital well.

This report has been copied as taken by the reporter; but in the figures depicted the amount of increase in the black patches will be well seen. In ten weeks the four or five pieces of black skin, which together were not larger than a grain of barley, had grown twentyfold, and in another month the black patch was more than one inch long by half an inch broad, the black centres of cutification having clearly grown very rapidly by the proliferation of their own black cells. This case clearly answers one of Reverdin's questions, "Is the process of healing due to proliferation of the transplanted elements?" in the affirmative.

CASE 2.—*Ulcer on leg ; skin from amputated limbs grafted ; recovery ; grafted skin remaining as distinct portions.*

(Reported by Mr. REED.)

Charles W—, æt. 24, a bootmaker, was admitted into Guy's Hospital, under the care of Mr. Bryant, on May 10th, 1871, with an ulcer on his leg.

Patient states that in 1858, when thirteen years of age, he met with an accident—a piece of iron, upwards of 70 lb. weight, falling on his right leg, grazing the skin and spraining the ankle. Two or three years after this a small sore appeared on the site of the accident, and spread. He attended at St. Bartholomew's Hospital for four months, where the wound was dressed with carbolic acid, and he was given tonics. He was discharged with his wound not completely cured, and six months afterwards it again broke out, and he attended for six months as an out-patient at the same hospital, where he had the same treatment. The wound breaking out a third time, he came to Guy's.

On admission there is a large open sore on the right leg in the line of the shin, $2\frac{1}{2}$ in. above the ankle-joint; longest measurement $2\frac{1}{2}$ in.; transverse 2 in.; there is extensive discoloration round its edges.

May 13th.—Edges healing; only slight discharge; surface granulating, and slightly raised above surrounding parts; water dressing; Mist. Quiniæ, t. d.

18th.—The sore appearing to be healthy, four pieces of skin, together about the size of a sixpence, taken from an amputated forearm, were grafted on the sore by Mr. Peacock, the dresser.

19th.—One of the pieces came away with the dressing.

20th.—Sore to be dressed with wet lint twice a day.

26th.—Three pieces of skin from an amputated leg were transplanted on to the sore.

June 5th.—Transplanted pieces rapidly increasing in size; lint and oil dressing.

12th.—Wound nearly cicatrized over; the pieces of transplanted skin present a peculiar island-like appearance, standing out above the surface of the neighbouring skin.

20th.—Wound healing; slight discharge around transplanted

pieces of skin ; new skin of a white colour has appeared, which has been thrown out from the new pieces ; skin of a pinkish tint around. Patient can feel when some of the spots are touched, but does not know which one. No feeling in other pieces.

26th.—Leg bandaged.

28th.—Wound healing.

July 10th.—At one spot the sore is not healing as rapidly as was wished ; the edges were scarified.

15th.—Two pieces of skin taken from the patient's right arm were transplanted into the sore, entirely filling it up.

20th.—The pieces of skin transplanted on 15th appear to have sloughed off. The sore is spreading downwards.

26th.—Transplanted pieces have reappeared, cuticle only having sloughed off ; the sore is rapidly healing.

Ordered : Tinct. Ferri Perchlor. \mathfrak{mxx} , ex Mist. Quiniæ \mathfrak{zj} , t. d.

31st.—Patient has been up once or twice lately, the wound having nearly healed ; transplanted pieces of skin not so prominent as they were. Patient ordered to keep in bed.

August 10th.—Up, and about ward.

14th.—Discharged.

The appearances of the leg on his discharge are seen in Pl. II, fig. 3.

The interest of this case lies in the fact that the transplanted skin which was taken from dead subjects never seemed to have thoroughly assimilated with that of the patient. The grafted pieces remained all through as distinct projecting islets of skin, although this appearance was less marked when he left the hospital than it was before. The new pieces had, however, a marked stimulating influence upon the margins of the sore itself, and hastened repair.

CASE 3.—*Ectopia vesicæ in a female child, æt. 7 ; skin grafting* (Plate I, fig. 5).

This case is given to illustrate the interesting fact that a piece of skin may be transplanted on to a mucous surface and grow. In this instance it almost doubled its natural size, but no more ; it did not exert any skin-forming power on the mucous membrane on which it was placed.

