the operation more difficult, and must often fail, as it did in Case I. Moreover, it seems probable that the presence of the patella after the operation, by covering in the front of the wound, and preventing the free escape of purulent and other fluids, may do harm.

ST. MARY'S HOSPITAL.

FRACTURE OF FOUR BONES, WITH CONCUSSION OF THE BRAIN: RECOVERY.

Under the care of WILLIAM COULSON, Esq., Surgeon to the Hospital.

SHADRACH W., aged 15 years, a plasterer's assistant, was, on December 3rd, 1855, engaged on a scaffold carrying material for building, when his foot slipped, and he lost his balance, falling from a height of sixty feet to the ground. During his fall, he came in contact with some steps, and then with a pile of slates. He was thereby rendered insensible, and was at once brought to St. Mary's Hospital, where he was admitted under the care of Mr. Coulson.

The boy was suffering from concussion of the brain, and was, when admitted, and for a little time after, insensible. On examination, it was found that no less than four fractures existed. In the first place, there was a compound fracture of the left arm, just above the elbow-joint, the wound being on the outer side. The wound attending this fracture was not very large. In the next place, the right leg was fractured at the junction of the upper with the middle fourth of the leg, the fracture involving both the tibia and the fibula. The left external malleolus was also broken across, and the ankle-joint strained and contused. Bleeding from the urethra to a slight extent was present.

The complication of injuries was therefore great. After a short time, the boy recovered his mental faculties, and seemed much better. The arm was set, and wet lint applied over the wound, the arm being kept at a right angle as much as possible. A long external splint was adjusted to the right leg, and cold lotions to the left ankle, with a splint to the inner side.

Dec. 6th. The boy is doing remarkably well. He complains of pain, but there is no symptom present which need occasion uneasiness. The cold lotions are continued to all the injured parts. A slight oozing of blood from the left arm occurs from time to time. The arm was soon after put up with splints.

Jan. 5th, 1856. Between this date and the last, nothing has occurred calling for mention. Union of the fractured bones is proceeding satisfactorily. The leg is now put up with starch bandage, and the injury to the left ankle-joint is apparently quite recovered from.

Jan. 9th. Feels well. The arm has still a right angle splint applied to it.

Jan. 28th. Sitting up. No complaint of pain. But little motion of the elbow-joint has yet been allowed, but the union is proceeding as well as can be expected. The boy will soon be discharged, quite well.

This case is interesting, as showing the great amount of injury which may be sustained with impunity by individuals who are little advanced in years. The great height (sixty feet) from which the boy had fallen was certainly quite enough, according to the doctrine of probabilities, to have produced a fatal result. As it was, however, the fatal result did not take place, although very severe injuries were produced by the fall. These injuries were, as is seen above, happily recovered from; and this case shows, in addition, what a short space of time will suffice to establish the reparative process, and produce such an amount of union as is compatible with a certain degree of motion of the affected members.

Original Communications.

AUTOPLASTIC SURGERY OF THE EYELIDS.

By AUGUSTIN PRICHARD, Esq., Bristol.

THE free vascular supply to the skin of the face, and the consequent easy union of clean cuts; the great deformity arising from injuries and scars; the frequent occurrence of the cases, and the great inconvenience attendant upon impaired power in the external organs of sense, have conspired to make this region of the body an especial favourite with autoplasmic surgeons.

Of the following cases of restoration of the lids, some are like those which other surgeons have narrated, but the rest present certain peculiarities in the mode of relieving a very troublesome condition of the eye and lids, following burns, which I do not remember to have seen recorded, and to which I should like to draw the attention of the readers of the JOURNAL.

I have introduced a series of these cases, that they may be complete; but I do it as briefly as possible, in accordance with the judicious plan lately adopted in the JOURNAL of the Association, of curtailing lengthy contributions.

CASE I. *Notch in the Upper Eyelid from Accident: Cure by Operation.* E. G., aged 20 years, had a deep triangular notch extending through the lid, almost as far as the upper edge of the tarsal cartilage, in consequence of a cut. The margins of the notch were quite healed, and the eye and lids were in every other respect healthy. I pared the edges of the opening, and brought them together with a fine German silver pin, which I removed on the third day, when the wound was quite healed, and the patient cured.

CASE II. *Fissure of the Lid from Accident: Operation.* F. S., aged 19 years, met with a gunpowder accident eight years before he came under my care. He exploded an ink-bottle full of gunpowder, by which his right eye was lost. When I first saw him, the eye was almost sunk, the upper lid divided, with adhesion between the sclerotic and the margins of the fissure. The conjunctiva of the lower lid was swollen, and his eyebrow much cut and disfigured with the scar. The eyelashes and the adherent lid kept up constant irritation and discharge, so that he was scarcely able to use his uninjured eye.

I first divided the adhesion between the sclerotic and the edges of the cleft, so as to free the lid; this required some careful dissection with the scissors. A fine pin was then passed in along the edge of the lid, to bring the two portions of the fissure in apposition with a twisted suture, which was satisfactorily done; and, as the wound gaped a little above, I inserted a single suture of fine thread. The remains of the eye were left untouched.

He suffered intense pain for some time after the operation, but the next day was much more comfortable. I removed the upper stitch on the third, and the pin on the fourth day; and found the patient quite comfortable, the wound healed, and the left eye already much stronger than it has been for a long time. A few days afterwards, with a tenaculum and scissors, I removed all the projecting red conjunctiva of the lower lid, and divided a little frenum, which still passed from the edge of the lid to the remains of the sclerotic.

This patient went home nine days after the first operation, with a small notch still existing in the margin of the lid, but with his left eye strong, and both much more comfortable in every respect.

The operation just described was performed five years ago; and the case well illustrates the sympathetic irritation of an otherwise sound eye, and its speedy cure on the removal of the cause.

CASE III. *Complete Eversion of the Upper Lid, cured by Operation.* H. B., about 18 years of age, came under my care as long ago as the year 1848, with the following

history and appearance. As a child, she had a tumour situated over the external angular process of the frontal bone on the left side, which was treated by a seton, and cured. Absorption of the bone took place afterwards, and a fistulous opening was formed, extending from the outer part of the forehead, just above the orbital edge, into the orbit. The whole of the skin of the lid had apparently been destroyed; the conjunctiva was quite exposed, with a bright red surface; and the margin of the lid was adherent to the edge of the orbit, the eyelashes having found their way through the abnormal opening above described. The eye was always open, and the cornea had consequently become a little opaque.

Fig. 1.—A. Red exposed conjunctiva of upper lid. B. Upper orifice of fistulous opening, with eyelashes appearing through it.

In performing an operation to relieve this great deformity, I first introduced a thin knife, to try to separate the upper lid from its situation. This did not succeed; and therefore laying hold of the eyelashes, with an ordinary scalpel I dissected down the lid, close to the tarsal cartilage (bringing the lashes down to their proper place), as far as it could be done; but the swollen state of the conjunctiva prevented its being brought very close to the eye, and it considerably overlapped the lower lid. It was dressed with water dressing and a light compress. After a few days, granulations sprang up, and the new lid, which had been much too large, began to decrease in size. A week after the operation, her eye was somewhat open, but the new lid was immovable; and a week afterwards, the retraction had gone on too far, and she was unable to close the eye; for whenever she attempted it, the lid was completely everted, as before the operation. This unsatisfactory state continued; and, a little more than a month after the operation, the eye was almost as bad as ever; I therefore operated again, and first removed with a tenaculum and scissors a considerable mass of the conjunctiva of the upper lid, and then took off a small portion of the cartilages of each lid, including the external canthus, bringing them together with a suture, so as to lessen the aperture. The lid was thus held in its place, but considerable inflammation ensued; and the lids becoming very sore, the wound in the external canthus did not heal, nor did the sore left by the excision of the conjunctiva cicatrize; and the whole affair seemed almost as bad as ever. Water dressing was the only application. In this unpromising state of affairs, the patient went home of her own accord; and I marked the case as one of complete failure, and frequently narrated it to the students as a warning not to interfere with contracted scars without replacing the lost skin.

About five years after the last operation, the patient reappeared for some trifling ailment, and I was agreeably surprised to find her with an excellent lid, cornea almost clear, and with great power of opening and shutting her eye. She had never undergone any other treatment; the wounds made at the last operation had gradually healed and contracted, bringing the lid into its proper place. The opening in the frontal bone remained.

CASE IV. *Eversion of Lower Lid, cured by Operation.* J. P., aged 18 years, had a scar upon the left cheek, from a burn, producing considerable ectropium of the lower lid. I removed a vertical flap from the side of the face, and turning it at right angles, fixed it by three sutures in a horizontal incision made in the scar, bringing the new wound together by twisted sutures. The central portion of the

flap sloughed, but it adhered and united wherever the sutures held it; and when the whole was healed, the lid was pretty well in its proper place, and the patient was much pleased with his improved appearance.

CASE V. *Renewal of the Upper Lid.* M. H., aged 26 years, burnt her brow four months before I saw her, and in this way the eyebrow and all the skin of the right upper lid had been destroyed. The tarsal cartilage was everted, and the eyelashes adhered to the upper margin of the orbit, producing great disfigurement in an otherwise good-looking young woman.

In this case, I first dissected the eyelashes and tarsal cartilage from their adhesion to the orbital edge of the frontal bone, and then separated a long narrow flap of integument from the forehead, parallel to the same margin, leaving it attached externally: this I brought down, and stitched in its new place for the lid, and afterwards lessened the edge of the new wound by means of twisted sutures. Two vessels required ligature.

The new lid adhered well, and she even regained the power of closing her eye. After two weeks, I divided the root of the flap, replacing the external portion upon the remaining granulating surface, whence it had originally been taken. The cicatrization of the wound in the forehead took place very slowly, but she went home cured, and exceedingly improved in appearance.

CASE VI. *Union between the Lid and Globe from a Burn, cured by transplanting Skin to replace the lost Conjunctiva.* B. E., aged 27 years, burnt his eyes with melted iron, the left many years ago, and the right a few months ago. In the left eye there was symblepharon (adhesion between the lid and the globe), the scar uniting the globe to the middle part of the lower lid, and encroaching so far upon the cornea that he was unable to find his way about comfortably. It had been divided twice, but had healed again. The right eye was injured more recently, but more severely, and was in a similar way affected, but to a much greater degree. This eye was sightless. I operated upon the left eye without chloroform, as the patient had good courage, and was not unwilling to bear the pain, and I was anxious to avail myself of his power of moving the eye to and fro during the operation to determine how far to free it.

Fig. 2.—A. The flap detached by pinching up the skin—after arsis united to the conjunctiva, in the place of the scar, which is seen in the figure as it was before it was divided.

I first detached a piece of skin (A) from the lower lid, leaving it united at the inner canthus. Then I freed the globe from the lid by cutting the scar with a scalpel until he could move his eye easily in every direction, taking care to keep close to the globe of the eye. Thirdly, I sewed up with two fine sutures the wound made in the lid by the removal of the flap; and, lastly, I turned the flap over the margin of the lid into the raw surface made within by dividing the scar, and attached it to the conjunctiva by two sutures, making it thus take the place of the cicatrix. The patient was a little faint, but otherwise very steady, and everything that I attempted was satisfactorily accomplished. The lids were closed by plaster and a light bandage. The next day the patient was quite easy, without any sign of irritation about the eye; but on the third day there was great intolerance of light, with some swelling and puriform discharge. I therefore bathed his eye, and

removed the two sutures from the external wound. His eye felt free. On the fourth day I removed the two sutures from the conjunctiva, and found the flap adherent in its new place, and its vitality unimpaired.

The eye gradually became stronger, but I did not divide the root of the flap until ten days after the operation. The little portion of skin was very vascular and sensitive; but after the division of the root I trimmed the remaining portion within the eye without any sign of pain from the patient. It was necessary to insert a little stitch in the lid at the point of division of the flap. He went home (to Wales) with full power of moving the eye freely in every direction, but with the sight much the same as before the operation.

After a few weeks I saw the patient again. His eye was still free in its movement, and his cornea had cleared so much that he was able to see to work, and the eye was in every respect comfortable. The skin of the little flap remained as skin, and had not become converted into mucous membrane, as I thought would have been the case.

Fig. 3. —The flap as it existed some weeks after the operation.

The cicatrix in the lid, as is the case when a linear scar in the proper direction has been made, was invisible, and the patient went home very grateful for his restored sight and comfort.

CASE VII. Cure of Symblepharon by Operation. This case so exactly resembles that last described, that I need not narrate it fully. The patient, also an iron worker, lost both eyes by burns—the right thirteen years, and the left two years before he applied to me for advice. The right eye was gone; in the left there was symblepharon, the scar from the lower lid encroaching upon the inner part of the cornea. The same operation was performed, and with the like success; for it resulted in great improvement in the sight, and a restoration of the power of moving the eye. The skin, which had been transplanted into the eye, projected in each case as far as the edge of the lid, but entirely prevented the return of the cicatrix and the contraction, and before the operation the scar in each had been twice divided, and had grown again to its original state, so as almost entirely to limit the movements of the eyes.

OBSERVATIONS ON THE ACTION AND SOUNDS OF THE HEART.

By R. HUTCHINSON POWELL, M.D.Lond., Physician to the Royal Infirmary for Diseases of the Chest.

[Read before the Harveian Society, 1852.]

It is an evident proof of the inherent difficulties attaching to investigations connected with the circulatory apparatus, that some of the fundamental points connected with its action remain still to be established, and form a subject for debate amongst many competent and able physiologists of the past and present age. The problem to be solved, though seemingly simple and superficial, is truly complex and recondite, involving exact anatomical knowledge, acute hearing and perception, familiarity with physical laws, more especially those affecting the properties of solids and fluids, and several minor requirements. It is to be feared, moreover, that not the least among the causes of retardation are referable to views derived from and propounded upon insufficient data, partial observation, or purely hypothetical reasoning. I shall endeavour, while avoiding collateral matters, to bring together the results arrived at by

well known experimentalists; striving to eliminate the points of accordance from opposing and divergent results, which, however, frequently are not irreconcilable or opposing, having in view certain circumstances as regards the interval of time separating the operations, and their respective facilities and diversity of intention.

As a trustworthy basis and point of departure, I subjoin the following deductions of Volkmann, being one of the most recent and painstaking investigators. It may be remarked, that the illustrious Harvey's doctrine—that the heart is the sole moving power—is maintained throughout.

"The moving power of the heart is equal to $4\frac{1}{2}$ lbs. 3 drs.; being composed of that force setting the blood in motion, and that overcoming resistance throughout the circulating system. There exists a direct proportion between the pressure and the velocity of the current, just as in the motion of fluids through rigid channels.

"The amount of blood ejected from the heart at each contraction is 6.2 oz., deduced from the definite relation observed to exist between the velocity of the blood and the total weight of the body. The total amount of blood in the adult being 30 lbs., the weight of blood given out in one systole being 6.2 oz., and the duration of the pulse 0.85 seconds, the period of the circuit is estimated to be 67.5 seconds." [Other observers state it to be from 25 to 30 seconds; moreover, acceleration of the pulse does not quicken the velocity of the blood-current.]

"Certain fluids either diminish or increase the circulation of the blood, alike in artificial channels, in the dead or living organism; alcohol or serum producing the former, solution of nitrate of potash the latter, effect. [The connexion of this law with the concomitant of chlorosis is obvious.]

"The special influence of the capillaries is to modify the heart's impulse into an uniform current.

"The suction power of the heart is very insignificant, the right auricle being nearly passive. The accelerating effect of inspiration being equal to its retarding, the result is null.

"The distribution of the blood is governed by other forces than the heart's action (which is essentially that of enabling the blood to pass from the origin to the termination of the blood circuit, against opposing forces); a change in the elasticity of the vessels, as also the influence of respiration, being the elements chiefly involved in this distribution.

"An equal quantity of blood is received into the heart during dilatation as leaves it during contraction; the blood-wave being diffused from ventricle to its corresponding auricle during one pulsation."

The received explanations of cardiac phenomena, with which members are presumed to be familiar, will be referred to only as agreeing or contrasting with more recent views. Volkmann concludes from his experiments that "the first sound of the heart is mainly due to distension of the auriculo-ventricular valves, the second sound being exclusively caused by distension of the semilunar valves". This opinion was held by the late M. Bouillaud, Dr. Hope, and very closely agrees with that of Dr. Billing. Professor Kiwisch propounds the following doctrines, as resulting from his experiments and deductions, derived from the laws of acoustics, the data furnished by auscultation, the result of vivisections, various acoustic experiments with elastic membranes, with vessels and hearts taken from the dead body. "Cardiac sounds are produced in the healthy organism only through the movements of its valves. Muscular sounds are acoustic delusions, arising from the vibration of air in the stethoscope and meatus, which, if obviated, no sound is heard, as shown over a contracting uterus. In the same way, the heart's stroke appears to cause, but does not in fact produce, sound." Dr. Williams's experiments (destruction of the cardiac valves, and removal of the ribs) disposes of the assertion that the heart's apex, when (said to be) tilted forward during contraction, induces sound. The apex, moreover, was shown by Dr. Corrigan not to advance at all during contraction. But how recon-