at an acute angle. Had I the case to treat over again I should perform the tenotomy at the same time as the main operation. But except the loss of time that has occurred, the result is nearly all that could be wished. Under the use of a Scarpa's shoe he has continued to improve steadily, and when I last saw him, in the early part of September, he could walk firmly and well, and complained only of some remaining stiffness of the ankle.]

[To be continued.]

PERIOSTEAL PRESERVATION IN OPERATIVE SURGERY.*

By WILLIAM STOKES, JUN., M.D.,

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As the value of periosteal preservation in operative surgery is a topic in which I have been much interested during the past five years, I am desirous of drawing the attention of this Section of the Association to it; not because I can boast of having to add much to the knowledge which we already possess on the subject, and for which we are so largely indebted to Professors Syme and Langenbeck, and M. Ollier; but because this modification in operative surgery is one which I cannot but think is of considerable practical value in the technical department of our art. This opinion, however, is far from being generally accepted. Operating surgeons—some of them of the highest eminence—question the possibility of performing subperiosteal resections; others absolutely deny the utility of this modification; while, again, others either contemptuously ignore it in their writings as if it were altogether unworthy of discussion, or, at most, consider its value very questionable indeed. This being the case, I was specially anxious to bring the subject under your notice in a brief communication; inasmuch as, although, as I previously mentioned, I have nothing that is very novel to relate on the subject, yet some operations in which I have practised both preservation as well as transplantation of periosteum, have been attended with results which, in truth, I may say have been signally illustrative of the importance of this modification in joint resections, as well as in other operative measures.

Did time permit, I would wish much to draw your attention to many points connected with this subject, which have led to the practical application of periosteal preservation in operative surgery. First, for example, to discuss the results of subperiosteal resections made on the lower animals; secondly, the proofs of osseous regeneration by the periosteum in man; thirdly, the result of transplantation of the membrane in the lower animals; and, lastly, to discuss generally the results of the experimental researches proving the osteogenetic properties of periosteum, which have been made, in the first instance, by Du Hamel, his pupil Fougereux, Vigarous and Wiedmann, as well as those of Syme, Ollier, and others; all of which have, in truth, proved incontestably that the function of the membrane is not limited, as was formerly held by Haller, Bordenare, Bichat, and others, to simply limiting the form and size of osseous structure, its vessels supplying nutrition to the bones it enveloped, and, lastly, acting as a barrier against the extension of disease. The discussion of these topics would, of necessity, be replete with interest; but, on consideration, I have determined to refrain from entering on this part of the subject on the present occasion, as it would require, to do it justice, much more time than is at my disposal, and is also, perhaps, more adapted for purely physiological investigation, than for that which is the prime object of our present meeting; namely, to discuss subjects which may, directly or indirectly, tend to modify or improve the science or art of practical surgery.

My attention was specially directed to this subject, in consequence of my having witnessed on several occasions, during the years 1863 and 1864, the application of the subperiosteal method, applied not alone to articular resections, but also, in some instances, to those of bones in their continuity. These were performed respectively in the surgical clinics of Professor Langenbeck and M. Ollier; and it was from the remarkable results which I had an opportunity of witnessing, that induced me to investigate the subject myself—first experimentally, and subsequently practically.

I shall not detain you by attempting to demonstrate the possibility, as well as facility, of this operative method, both of which have been denied—or, at all events, strongly questioned—by various surgeons, many of whom, I cannot but think, have condemned this novel procedure without first taking the necessary trouble of investigating its merits for them-

selves; but, without reference to any experimental research on the lower animals, having given you the leading facts connected with some of the cases on which I have operated in this way, I shall then indicate the difference between the results obtained in the one instance by the subperiosteal method, and in the other by the ordinary mode of excision.

The first of these operations was performed on a girl, aged 12, of delicate habit, who was under my care in the autumn of 1864, and who suffered from strumous disease in her left elbow-joint. The patient stated that, four months previous to her admission into hospital, she received a fall in which the elbow was struck against the ground with great violence. After falling, the patient suffered severe pain in the joint; it swelled greatly; and she found it impossible to extend or "stretch" it, to use the patient's own expression. The inability of extension of the arm remained a permanent condition. Three months after the accident, the patient was admitted into my wards in the hospital. I found the arm forcibly flexed; extension was impossible. The soft parts about the joint were swollen and puffy, so that it was quite impossible to determine whether the original injury was an epiphysary disjunction, which the age of the patient rendered probable, or a simple luxation. There were three or four sinuses, situated over and in the immediate vicinity of the internal condyle; and, on introducing a probe into any one of these, the existence of soft diseased bone could be readily determined. I accordingly performed the operation, adopting the long vertical incision, carrying it over the ulnar side of the olecranon, and, taking especial care not to divide the triceps tendon, proceeded to raise the periosteal envelope by means of the various formed raspatories devised for the purpose. The elevation of the periosteum was not attended with any great difficulty, and the remaining steps of the operation were then completed in the ordinary manner. The limb was afterwards put up in a gypsum bandage, and kept in a continual bath for four weeks. After this, the wound being all but healed, gradual flexion and extension were commenced. Three months and a half after the operation, the power of flexion and extension of the joint was almost perfect; and now, at a period of little more than three years after the operation, during which period there has not been the slightest evidence of a re-appearance of the disease, the patient enjoys every motion that the healthy joint possesses, perfect power of flexion, extension, pronation, and supination; and, what bears more directly on the immediate subject of this communication, there is a most obvious osseous re-formation, not only of the condyles, but also of the olecranon. This re-formation of the olecranon has also been frequently observed by Langenbeck, and also by Hueter, one of his former assistants.

The next case was also one in which I excised the elbow-joint. The patient was a girl, aged 8. The right elbow-joint, which was the seat of very extensive strumous disease, had been affected for upwards of nine months; the disease had commenced, according to the account which her parents gave, without any local exciting cause. There were several sinuses over the posterior portion of the joint. Through these, on introducing a probe, softened diseased bone could be felt. Excision was performed precisely in the same manner as in the previous case; and the subsequent treatment by the gypsum-bandage and the continual bath in every respect identical. It is now six months since I saw the case; but then the sinuses had healed, the motions of the arm were excellent, and the re-formation of the portions of bone removed was perfectly obvious.

In a third case, in which I excised the elbow subperiosteally, the case progressed most favourably until the ninth week after the operation, the wound being at that time quite healed; but symptoms of pneumonia supervened, which unfortunately proved fatal. I regret extremely that I was not permitted by the friends of the patient to make any examination of the joint.

Another case affords a striking illustration of the osteogenetic properties of periosteum, and, consequently, of the great practical importance of carefully preserving it in resections. The patient, a young woman, about 19 years of age, suffered from suppurative osteitis of the right ulna, the result of a severe blow. A free incision was made down to the bones; and over this, which I found extensively diseased, the periosteum was much thickened. Having divided the membrane by one of Nélaton's so-called periosteal knives, I then detached it by means of raspatories from off each side of the bone. The diseased portion of bone, about two and half inches in length, was then removed by small resection-saws. Three months after the operation, the wound was completely healed. New bone had formed throughout, and the patient was enabled to return to her employment, which was that of a house-servant. The result of this case, though of the last importance, does not afford so signal an example of the importance of periosteal preservation, after resections of portions of bones in their continuity, as the classical case of Louise Gaillard, recorded by M. Ollier—a case which I was fortunate enough to have an opportunity of seeing—where the upper half of the humerus was excised for a similar affection, and with

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the happiest result. A year after the operation, the patient was enabled to return to her employment with an useful arm.

The next cases to which I would wish to draw attention were two of caries of the metatarsal bone. The first of them was that of a young man, aged 26, who was under my care in September 1864. Eighteen months previously he commenced to suffer from abscess formations on the dorsum, as well as in the sole of the foot. He was quite unable to continue his work, which was that of a sawyer; and, in truth, had not attempted to walk for the sixteen months previous to September 1864. He had been under the care of various surgeons, who had done every thing that tonic medicines, generous diet, rest, etc., could do, to improve his condition. I removed the diseased bones subperiosteally on the 2nd of September. The disease was found to be confined to the third and fourth metatarsal bones; and the periosteum being much thickened over them, was easily detached. The case was subsequently treated by the continual bath, the temperature of which was kept steadily at 85 deg. in the manner I have described in the *Dublin Quarterly Medical Journal* for May 1865. On September 25th, the wound being nearly healed, I took the foot out of the bath; on the 1st of October it was completely healed; and on the 2nd of October, one month after the operation, the patient showed that he was able, not only to walk and run, but even hop across the ward on the foot that for eighteen months had been the seat of a painful and distressing disease. Since that time I have had frequent opportunities of seeing the patient, and of satisfying myself of the obvious reformation of bone that has taken place. There is not the slightest trace of reappearance of any carious disease in the foot or elsewhere. The second case in which I performed a subperiosteal resection of metatarsal bones, was one which was under my care last September. The patient, a boy, aged 16, of very strumous habit, stated that about two years previously he suffered from an abscess formation in the foot, for which he could not assign a cause, never having received any injury whatever to the foot. At the time of his admission he suffered greatly from pain. Over the third, fourth, and fifth metatarsal bones numerous sinuses were situated; and, on introducing a probe through them, softened diseased bone could readily be felt. There was a great deal of general infiltration and swelling about the diseased structures. The operation was performed in the following manner. I commenced by making an incision about two inches and a-half in length over the situation of the fourth metatarsal bone, and at the centre of this I made another an inch and a-half in length at right angles with the first passing inwards. The two triangular-shaped flaps thus made, were dissected back, and thus I was enabled to see the diseased osseous structures. The periosteum was, as is usually the case under such circumstances, much thickened, and, consequently, easily detached from the bones, which were without much difficulty removed. A fortnight after the operation, the wound and sinuses being completely healed, the patient, free from pain, left the hospital, enabled to walk about without any inconvenience. Eight months subsequently I examined the patient carefully, and, after the use of local anaesthesia, inserted needles over the portion of the foot where the bones had been removed, and satisfied myself, beyond all question, as to the osseous re-formation.

The next case I would wish to draw attention to, is one where I excised the ankle-joint in the spring of last year. This case, however, was only a partial subperiosteal resection, the articulating extremity of the fibula being removed by the chain-saw not subperiosteally. After this was done, the articulating extremity of the tibia was dislocated outwards through the wound, which was made by a long, somewhat curved incision along the lower end of the fibula, and then brought obliquely forwards and inwards towards the internal cuneiform bone; and the periosteum, which was found thickened and loose, was easily detached from the bone without the necessity for any of the periosteal raspatories. This case I also treated by the continual bath. In connection with this operation, I may mention, in passing, that Langenbeck, in the Schleswig-Holstein war, performed subperiosteal resection of the ankle-joint in five cases, four of which were successful.

The last of my cases to which I shall refer, as proving the osseous reproductive power of periosteum, and which proves it more satisfactorily than any of those I have already referred to, was an Indian rhinoplastic operation, modified by transplantation of periosteum from the frontal bone into the flap, for the formation of the new nose. This modification was first suggested by M. Ollier, but first practised by Professor Langenbeck. In this operation the transplantation of periosteum has been objected to by some surgeons, on account of the supposed injury to the bone from which it is removed. In a letter which I received some time ago from Mr. Cesar Hawkins on this subject, he remarked: "I must confess I doubt the propriety of removing periosteum in such operations as yours for the nose, especially in adults in whom the bone is more easily killed." However, when we consider the sources from which the cranial bones

derive their vascular supply, we need not so much fear the deprivation from the os frontis of a portion of its periosteal covering as this; and the other cranial bones derive their means of nutrition and reparation not merely from the periosteum, but also from the dura mater. The case is somewhat different when other bones have become deprived of their periosteal covering from injury or disease. Then we may not unreasonably apprehend the unhappy sequence of partial necrosis of the bone; but even this does not occur as frequently as is commonly supposed. Professor Humphry, in his classical work on the Human Skeleton, mentions several cases in proof of this. In none of the animals either on which I have made periosteal transplantation have I been able to determine the existence of any necrosis following the operation; and I think we may not unreasonably suppose that, as far as this matter is concerned, what holds good in the lower animals may also hold good in man. I have never observed either in rhinoplastic or uranoplastic operations any injurious effect produced on the bone from which the membrane was removed.

In the case of the young man on whom I performed a rhinoplastic operation, to which I have before alluded, the nasal bones were completely destroyed by lupus. About fifteen months after the operation, I inserted, in two different situations in the nose, the so-called "entomologist" pins down to the newly formed bone, and satisfied myself and others present, beyond all doubt, as to its existence.

There is another class of cases, in which recently Professor Langenbeck has suggested, and practised, I believe, extensively in the Bohemian war of 1866, periosteal preservation. This is when amputations were required. He proposes removing a strip of periosteum from a point considerably below where the section of the bone is made, so that, after the bone is divided, the broad strip of periosteum can hang over its cut surface like a curtain. As he believes the membrane becomes in a very few hours adherent to the bone, he thinks that it can in this way act as a barrier and protection against purulent absorption, and that in this way the chances of osteo-myelitis and pyaemia are greatly diminished. I have not myself had any experience of this novel proposal; and I cannot, therefore, either verify or disprove his statements respecting the value of this measure.

It is a matter of regret to me that periosteal preservation has not been adopted more largely by operating surgeons in the British schools. The cases are, in truth, very few where it has been practised. Of the Dublin cases, with the exception of my own, the only important ones bearing on this subject were two of excision of the superior maxillary bones, which occurred respectively in the practices of Dr. Collis and Dr. R. McDonnell. The latter case was one of considerable importance, as showing that, even at a very advanced age, the osteogenetic properties of periosteum remain unimpaired. The patient was a hale-looking countryman, aged 68. The left half of the hard palate was the seat of epithelial ulceration. The disease had resisted treatment by caustics, etc., for months; and then Dr. McDonnell determined to remove the affected part by excision. The upper lip was divided in the middle, and the ala of the nose separated from its attachment. Before dissecting up to the flap so formed, the gum along the outside of the alveolar processes was divided; and the periosteum from the outside and anterior part of the bone was carefully raised, along with the more superficial parts. That portion of the superior maxilla (on the left side) which forms the roof of the mouth, and the floor of the antrum was then removed with the forceps. The flap was placed in apposition; and the patient made a rapid recovery, and left hospital. After spending some months in the country, he returned to hospital, in order to get an artificial palate, and to have his teeth readjusted. At this time, the periosteal membrane dissected from off the bone at the time of the operation had already formed a complete ring of bone, in front attached to, and supporting, the ala of the nose. The opening in the floor of the antrum was also completely closed up by the new bone.

In America, our surgical brethren have not been slow to test, and many of them adopt, the subperiosteal method, not only for the resection of joints, but also of bones in their continuity. Among others, I may mention the names of Dr. W. Hunt of Philadelphia, Professor Wood of New York (who is a warm advocate for this method), and also Dr. Moon of Philadelphia. The latter gentleman has related a case of great interest, to which I cannot avoid alluding. The patient was a man whom he treated for a gun-shot wound in the right leg, which he received at the battle of Petersburg, in July 1864. Very nearly two-thirds of the tibia were removed subperiosteally. On May 10th, 1865, he wrote: "I am at work at my trade, coach-building, and have complete use of my injured leg, running up and down stairs as well as any of the workmen. The wound has entirely healed, and new bone formed throughout." In another case, five inches and a half of the tibia were removed, the periosteum being left; and resulted in a like cure. A still more remarkable case occurred during the last Schleswig-Holstein

campaign in 1864, in which Professor Langenbeck performed a subperiosteal resection of a large portion of the diaphysis of both tibia and fibula, and which was brought to a successful termination, with complete re-formation of bone.

Time would not permit me to discuss some other points connected with this subject, which I consider of the utmost importance. I shall content myself, therefore, with stating the following propositions, which are based on the physiological experiments and clinical experiences of M. Ollier especially, Langenbeck, Lücke, Moon, Wood, my own, and others who are interested in this subject. These are:

1. That, in subperiosteal resections, the reproduction of bone is more complete, and effected with greater rapidity, than after total removal of both bone and periosteum.

2. That the osseous reproductive properties of the membrane vary according as it is taken from the long or short bones, being greater in the former than in the latter. (Ollier.)

3. That the normal form of the joint is better preserved than when the precaution of leaving the periosteal covering is taken.

4. That the subperiosteal resection involves less danger than when conducted on the old principle. This proposition is grounded chiefly on the results of Ollier's experiments on the lower animals; the number of unfavourable results which followed when the membrane was removed being much greater than when it was left.

5. That the difficulties attending the separation of the membrane in the dead subject are not to deter us from attempting the operation on the living, inasmuch as the membrane is less adherent in the latter, and also much thicker, in the great majority of cases, on the diseased than on the healthy bone.

6. That the chances of much shortening of the limb are diminished by this method, as shown by the results of the ankle-joint resections during the late Schleswig-Holstein war.

7. That subperiosteal resections are more conservative, as, in a great many cases, they diminish the necessity for amputation.

Gentlemen, accept my best thanks for your kind attention during the reading of this communication on a comparatively novel procedure in operative surgery, and of my experience in which I am sorry I can only give so brief an account. But still I trust that what I have said will convince some present of the importance and applicability of a practice which is based on accurate observation of physiological phenomena, on which alone all systems of rational therapeutics, whether medical or surgical, can truthfully be founded.

ILLUSTRATIONS OF THE VALUE OF THE MICROSCOPE IN THE TREATMENT OF THE STERILE CONDITION.*

By J. MARION SIMS, M.D., Paris.

THE great Velpeau died, having no faith in the practical utility of the microscope; and I am ashamed to say that, even ten years ago, I was one of those who believed it to be merely a scientific toy with which to while away leisure hours. Fortunately, my ignorance was dispelled, and I now look upon the microscope as essential to the daily duties of the physician. While I would refer you to Beale and others for what it has done and is doing in the broad domain of medicine, I shall content myself with laying before you now a few illustrations of the value of the microscope in the treatment of the sterile condition.

In the investigation of a case of sterility, there are three questions that must be settled at the outset, if we expect to proceed understandingly.

1. We must be sure that we have semen with spermatozoa.
2. We must ascertain if the sperm enter the utero-cervical canal.
3. We must determine whether the secretions of this canal are favourable or not to the vitality of the spermatozoa.

The present advanced state of physiological knowledge warrants us in saying that conception is impossible without spermatozoa; that it is impossible if the spermatozoa cannot pass into the cavity of the uterus; and that it is equally impossible if they die, or are poisoned, on their passage to this cavity. These three points we must determine, it matters not what other complications there may be. Fortunately, they are all easily and quickly settled by the microscope. Without the microscope, it is utterly impossible to determine either one of them. Without the microscope, then, our treatment of the sterile state is simply blind empiricism. With it, our diagnosis becomes absolutely certain, and our treatment at least rational. What, then, are the first steps in

this investigation? How can we begin? Where shall we begin? We only need a drop of seminal fluid to determine whether it contains spermatozoa or not.

I am in the habit of examining the vaginal and cervical mucus for spermatozoa some hours after coition, and I have thus often determined the three propositions above laid down all at once. Gosselin and other French physicians direct the man to use one of the abominable things so common in France (and, I am sorry to say, now also in my own country), which are intended to protect the male against infection, and the female against both infection and conception. This, with its contents, is sent to the microscopist for the necessary investigation. But a nicer way of managing this disagreeable but important affair is that adopted by my friend Mr. Curling. He directs the man, immediately after intercourse, to squeeze a drop of mucus from the urethra on the object-glass; and from this the examination is made. This will settle the question, so far as the man is concerned; but it will still be necessary to examine the utero-cervical secretions, to determine the second and third propositions; and therefore I never put the man through the above ordeal till I am forced to do so. Fortunately, it is not often necessary. Given a case of sterility for investigation, the physician examines the state of the uterus and its appendages. His patient may have a frightful dysmenorrhœa, a contracted or flexed cervix, a malposition, or something that would probably prevent the passage of the semen into the cavity of the uterus. He may feel perfectly convinced that his patient can never conceive, unless some surgical operation be performed—perhaps incision of the cervix uteri. This operation is usually done, to permit the easy passage of the semen into the uterine cavity. But how can we tell that the semen does not pass into the uterine cavity? We must not take it for granted that it does not, simply because the os uteri seems to be small; for we know that cases are on record where conception has occurred where the os would barely admit a small sized probe; and we know also that spermatozoa occasionally pass along the Fallopian tubes, which barely admit the passage of a bristle. If the semen enter the cervical canal, we may lay it down as a rule, that an incision of the cervix is not necessary; but, if it do not, it may be necessary. We may perform any operation we please for the relief of suffering, and for the restoration of health; but I insist that we have no right to perform any operation, or to institute any treatment whatever, solely for the cure of the sterile condition, till we have first settled the three propositions above laid down touching the presence and viability of the spermatozoa. To find out all at once, and with the least delay and trouble, I usually say to the husband (or wife, as it may be), "It is very important, before instituting any treatment, to be sure that the semen enters the canal of the neck of the womb, and also to be sure that the uterine secretions do not neutralise the semen; for, under such circumstances, there could be no conception. Will you, then, have the kindness to send your wife to me, or come with her, some day when you have had sexual intercourse in the morning?" In nineteen cases out of twenty, the wife presents herself the next day. The speculum is introduced, and some vaginal mucus is removed with the syringe, and placed on an object-glass. Then some cervical mucus is drawn out, and placed on another object-glass. These are then examined under the microscope. If we find spermatozoa, well and good; but, if we find none, our fears are at once aroused. What then is to be done? I simply say that I am not quite satisfied with the examination, and would like to see the wife again under the same circumstances. But suppose we find none on the second examination: then I have been in the habit of saying, "I would like to see your wife in bed twenty or thirty minutes after sexual intercourse, for I fear her vagina holds no semen." The husband appoints the time; and, of course, I am punctual. If I then find in the vagina a fluid with the seminal odour, I am satisfied with the microscopic examination. But it will not do to say we have no spermatozoa, simply because we find the vagina empty; for I have occasionally examined the vagina eight or ten minutes after coition, and found it empty, and with no sign of spermatozoa whatever in the little mucus that would naturally stick to its walls; and that, too, where a normal quantity of semen, full of the fructifying principle, had been ejaculated. But, unfortunately, the vagina had ejected the whole of it, as a consequence of some anatomical configuration. If we fail to get any for examination, we are then forced to Mr. Curling's expedient. Suppose, at last, we are satisfied that the semen contains spermatozoa, then, as before said, we have to determine whether these pass into the cervix uteri; and, if so, do they find a fluid there favourable to their existence alive? And all this can only be done by the use of the microscope.

The question of the entrance of the semen into the cervical canal and of the effect of its secretion upon the spermatozoa, can be fully and satisfactorily ascertained only during a very brief period. We may make a mistake if the microscopic examination be undertaken just before the

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