

funnel-shaped cicatrix following an healed bone tuberculosis. After loosening the scar from its underlying tissue, he took a piece of fat from the upper arm of the patient and implanted it in the funnel, which it completely filled. The skin was then sewed over the fat. The wound healed, and the cosmetic result was perfect.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXII Kongress, 1893.

VII. Bone-Filling. By DR. SONNENBURG (Berlin). For the purpose of filling the cavities in bones by some foreign substance Sonnenburg holds that the material used must have the following qualifications: It must harden quickly, and not be poisonous, and have some antiseptic property. Then it does not become necessary to make the cavities in osteo-myelitic and tuberculous bones strictly aseptic before filling. Such materials are employed by the dentists. The experiments of Dr. Oscar Mayer, with copper amalgam, have demonstrated that this filling material not only prevents the further development of bacteria, but kills those already present. Plaster of Paris does not seem to answer the purpose, because it is too porous and heavy, and, even when mixed with carbolic solution, does not remain antiseptic. A series of experiments have been made with dogs. The filling was found completely healed in from four to six weeks. In one case a gauze sponge was accidentally left in the bone cavity with the filling material, and was found healed in. It was found in all cases that newly-formed bone substance had grown over the filling. Experiments must still be made to discover what material is best adapted in surgical practice to filling the cavities in bone.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXII Kongress, 1893.

VIII. Histological Observations After Bone Implantation. By DR. A. BARTH (Marburg). The author has made a series of observations in the pathological institute of Professor Marchand, in Marburg, to determine the histological processes which take place in transplanted bone which retains its vitality. Though previous observers have come to the conclusion that a piece of bone

which has been separated entirely from its anatomical surroundings, when returned to its former place, or placed in another defect in the living skeleton, can not only become fixed, but can retain its vitality, and indeed grow, Barth has found that the transplanted bone in all cases undergoes necrosis. It may now become fixed by connective tissue encapsulation, or, as more frequently occurs, become united by a deposit of bone with the bone with which it is in contact. This last mode of healing involves a very peculiar process. It shows to the best advantage in trephine wounds of the skull, in which the button of bone has been replaced. In the early stage, about the fifth day, the button is found adherent to the dura-mater by a deposit of fibrin, while its chinks and spaces are filled with fibrin. The index of the condition of the bone is the nucleus of the bone cell, and in these transplanted bones the nuclei appear as empty spaces, or are seen to be undergoing degeneration. Now an active proliferation of connective tissue begins from the periosteum and dura-mater. The young granulation tissue grows into the spaces of the dead bone button, absorbs the fibrin coagulum, encloses in its meshes and vascularizes the dead bone as a porous foreign body. Almost immediately, sometimes after the seventh day, a deposit of new bone from the dura-mater begins, which is deposited in lamellæ through the dead bone. It is this constant depositing of layers of new bone through the dead button that is peculiar of the first few weeks. This springs not only from the dura, but also from the Haversian canals and spaces in the cut surface of the living skull, and from the border of the periosteum. The new bone is distinct from the dead bone, and is easily distinguished by the tint of its nuclei contrasted with the degenerated nuclei of the latter. This new bone formation goes steadily on from week to week, as the dead bone becomes replaced by the living. The process is peculiar, as it goes on without any anatomical sign of the old bone being absorbed. Although where the implanted bone can subserve no function, or is superfluous, as, for example, where it projects beyond the level of the skull surface, absorption by the usual means takes place. But with this absorption

the disappearance of the old bone, which fills the opening in the skull, has nothing in common. In many preparations the osteo-blasts can be seen entering directly into the old bone and forming new lamellæ, without being preceded by the formation of lacunæ. It very much resembles the cartilaginous bone formation, as is observed in the foetal long bones, in which the bone lamellæ are deposited directly in the calcified cartilage. As the substances of the calcified cartilage are of direct use in the formation of the bone, so do those of the dead bone button in the present case serve as material for the building of the lamellæ of the new bone. It is, therefore, not an absorption, in the usual sense, and subsequent substitution by new growth, but a sort of metaplasia, a substitution of the dead by living bone tissue.

This process can be best observed on the edges of the button, where the newly-formed bone lies in layers, which can be contrasted with the dead bone. The bony callus which connects the button with the skull can always be distinguished by the direction of its grain, which is transverse to the surface of the skull, and indicates the direction of the connective tissue fibres which in the beginning sprang from the periosteum and dura-mater.

Barth found the above conditions in all the specimens which he examined in which the transplanted bone was not cast off as a sequestrum. The bone became healed in this manner only when it fitted well into the defect. The stage which the process reached depended, of course, on the length of time the animal was allowed to live after the operation. The age of the animal and its vital energy seemed also to have an influence on the rapidity of these histologico-anatomical changes. The whole process in favorable cases takes, perhaps, two months.

In the extremities, pieces of bone which have been separated entirely from all of their attachments and reimplanted, undergo the same changes. Barth resected portions of the walls of dogs' humerus and forearm, usually opening the medullary canal, and then replacing the resected piece. This in all cases died, and was either cast

off as a sequestrum or became incorporated in the callus. In the latter case, a callus grew from the marrow and periosteum and enveloped the dead bone, just as occurred in the experiments on the skull. He does not believe that the periosteum of the implanted bone has any influence over its vitality.

It is of special interest in view of these facts that macerated pieces of bone become healed in after the same method as a freshly implanted piece. Barth made a number of experiments, in which he replaced the trephined buttons after they had been macerated in potash and stained with boiling carmine solution. In the most cases, connective tissue encapsulation took place. In two cases bony healing occurred, and the buttons were found, microscopically, to have undergone the same depositing of new bone lamellæ as was observed in the freshly implanted cases.—*Verhandlungen der deutschen Gesellschaft für Chirurgie*, XXII Kongress, 1893.

JAMES P. WARBASSE (Brooklyn).

OPERATIVE SURGERY.

1. Resection of the Rectum, with Transverse Separation of the Sacrum. By Dr. LEVY. Levy proposed, more than three years ago, a method of resection of the rectum, the prominent features of which included the proposition to (1) leave intact the lower or external anal sphincter; (2) to preserve the coccyx; (3) to avoid injury to the levator ani.

He has more recently modified his procedure as follows: An arch-shaped incision is made, through the skin and fascia, over the lower end of the sacrum. This is located a finger's-breadth above the points of the cornua of the coccyx. Laterally it is continued upon either side to a point five centimetres from the tuberosity of the ischium and parallel to the course of the fibres of the gluteus maximus. Below the fourth sacral foramen the incision is carried to the bone, the lateral muscular fibres are separated by a blunt dissection until the lateral edges of the greater sacro-sciatic ligament is reached.