

be considerable, or the restraining power insufficient, then the amount of this callus will be considerable. The amount of provisional callus that generally forms around the trochanters and neck of the thigh-bone outside the capsular ligament is often considerable; the extended limb in all these cases forms a powerful lever, by which the smallest amount of motion in the foot is readily impressed upon the fractured neck, hence the necessity for the great amount of provisional callus in this instance. The callus fully formed, the ends of the fractured bone are firmly bound together and in preparation for the final union. During the progress of this condition, fibrine has been effused from the haversian canals, the capillary blood vessels of the bone—nodules of cartilage are developed; in these true cartilage cells are formed, they increase in numbers, and then gradually assume a longitudinal arrangement; when this condition is perfected the intercellular fibrous structure receives a deposit of the earthy salts, this deposit goes on with more or less regularity until the cartilage cells are enclosed in a bony wall, constituting a tube, continual layers of earthy matter are deposited in the fibrous element, until after a time the cartilage cells disappear and the space is occupied by a blood vessel in a true haversian canal. When this condition has been arrived at, the cartilage cells may be observed arranged in circles around the main group, and now the deposition of earthy matter progresses, until all the intercellular fibrous element is fully saturated with calcareous matter; the cartilage cells gradually disappear, and their positions are supplied by lacunæ and canaliculi, around which the earthy salts of the bone have been deposited—this is the true nutritive apparatus of fully developed bone. Heretofore, when the cartilage cell existed, no blood was supplied to this structure; but now red fluid blood enters into the bone, and traverses the capillaries, while the thinner parts, serum with the salts of the bone in solution, transude the coats of the vessel and are distributed to the canaliculi and lacunæ, to supply the earthy salts, and to moisten and nourish the fibrous element. This is the *definitive callus* of bone, the source of true bony union between the fractured extremities. Now the provisional callus begins to be removed, the earthy matter is taken up, the fibrous element becomes atrophied, and after a very considerable period of time will be entirely removed, leaving the fractured bone strong and perfect in its union and composition, if the fragments have been duly adjusted and maintained in proper apposition. When this condition has been fully accomplished in fracture of the