be guided by the special circumstances of the case, such as the situation of the injury—"whether near a joint or otherwise, the limb affected, the length of time the fracture has existed, the degree of mobility existing in the fragments, whether the fragments be in apposition or otherwise, and how connected." Having duly considered these points, the surgeon is then in a position to decide upon the plan of treatment likely to give satisfactory results; and we might add here that a careful perusal of this essay would greatly aid him in making the selection.

The essay on compound fractures is not one from the study of which we derived either pleasure or profit. After referring to the frequency of such injuries, the various complications, and the important questions which may arise, the author tells us that he has no aversion to poultices, and his knowledge of the antiseptic measures now so successfully employed in the treatment of compound fractures, is to be found in the remark "that carbolic acid is of service as a disinfectant, and tends to drive away the flies." Truly there is room for comparing the surgery of the past with "the results of more recent investigations."

On the subject of the statistics of the mortality following the ligature of arteries our space forbids us to enter. And we lay down the book, which is nicely printed on fine toned paper, with the recommendation that it is one worthy of a careful study, and a place as a work of reference in the library of the surgeon.

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IV.—The Anatomy of the Lymphatic System. By E. Klein, M.D., Assistant-Professor at the Laboratory of the Brown Institution, London. 1. The Serous Membranes. London: Smith, Elder, & Co., 1873

The great delicacy of the walls of the lymphatic vessels, and the extreme minuteness of their ultimate ramifications, has, up to within a very recent period, stood in the way of their successful investigation, the former circumstance precluding the possibility of minute injection, and the latter carrying them beyond the range of all but the highest microscopic powers. Now, however, that the distinctive character of the epithelial lining has been established, and that lining easily demonstrated by the aid of nitrate of silver solution, much progress is being made in this department of Histology. Already, we have had important memoirs by Recklinghausen, Schweigger-Seidel, Dogiel, Rollett, Ludwig, Burdon-Sanderson, and others, but never
before have there been recorded so extended a series of observations, or so complete a history of the lymphatics of any tissue as the one before us of the lymphatics of serous membranes.

Our author divides his essay into two parts; the first of which, treating of the normal structures, has an especial interest for anatomists and physiologists, while the other, describing the same structures under the influence of inflammation, appeals more directly to the sympathies of pathologists and practitioners of the "art of healing."

The normal structures may be divided into two great classes.

1. **Cellular Elements**, including both those found on the surface of the membrane, and those which help to form the mass of its substance, and 2. **Channels, canals, or cavities**, which serve for the transmission of blood or lymph, or form communications between the surface of the membrane and lymphatic capillaries.

These we shall briefly summarize, as they are given by Dr Klein, leaving our readers to draw their own inferences on the facts thus laid before them.

I. **Cellular Elements of Serous Membranes.**

a. Common flat endothelial (epithelial) cells of the serous surface; having a wavy outline, and being transparent and apparently structureless.

b. Germinating endothelium, occurring in small groups of cells on the surface of the membrane, generally in the neighbourhood of the *stomata*. The cells are composed of granular nucleated protoplasm, which when irritated grows very rapidly, so that large masses are produced which project from the serous surface (*lymphangial nodules*). By the proliferation of this endothelium also, free cells are produced, which bear a close resemblance to white blood corpuscles, but are usually smaller; they possess an ameboid movement, and are called "lymphoid corpuscles."

c. Branched anastomosing cells which are distinctly seen to occupy the cavities of the "lymph canalicular system" of Recklinghausen. These are finely granular, are more or less flattened parallel to the surface, and possess an oval nucleus and nucleolus; the nucleus as well as the cells themselves, are often constricted as if dividing, and furnish, no doubt, another source of origin of the "lymphoid corpuscles" above described.

d. Here and there the branched cells become aggregated together, and the intervening tissue much diminished in quantity, so that they lie almost side by side; in these places (which
Klein has named **lymphangial tracts**), they are seen to be continuous with the endothelium lining the lymphatic capillaries. Within the lumen of the smaller lymphatics, more especially of those which invaginate the blood vessels, similar tracts are seen stretching from wall to wall; from their position they have been called **endolymphangial tracts**. These form another source of origin of the lymphoid corpuscles.

II.—**Channels, Canals, or Cavities.**

a. Large lymphatic vessels with valves.

b. Lymphatic capillaries which have no valves, and which vary greatly in their arrangement. Sometimes they run in straight lines—this being their disposition between the tendon bundles of the central tendon of the diaphragm—in other places they are tortuous, very variable in their calibre, and having more the character of irregular spaces than of true vessels; but for their epithelial lining, which is always the same.

c. Pouch-like dilatations of the capillaries, forming what are known as **lymph sinuses**. These are lined with sinuate epithelium, and must be looked upon simply as parts of the vessel.

d. A system of irregular channels which have been named **lymph canaliculi** (Recklinghausen), and which are contained in the “matrix” “stroma,” or “ground substance” of the serous membrane; they are identical in arrangement with those described as existing in the cornea.

e. Small openings called **stomata**, which connect the lymphatic capillaries with the surface of the membrane. They are generally round, and most frequently lined with granular protoplasm. **True stomata** are found only over a lymphatic vessel, or (as in the frog) in the wall of a lymph sac.

Besides these elements, Dr Klein describes what he calls **false stomata**; they consist of gaps in the surface epithelium, through which the protoplasm of the lymphangial tracts protrudes. In inflammation this protoplasm produces lymphangial nodules in the same manner as the germinating endothelium of the surface already described.

A very interesting description of the development of lymphatic and blood capillaries, and of the conversion of the lymphangial tracts into fat is here given, but unfortunately our space will not permit that we should enter on the discussion of this subject.

We confess that we are not entirely convinced as to the existence of the lymph canalicular system and of the cells contained therein, on which so much stress is laid, and which
form the chief centre round which the interest not only of this present memoir but of many others on the same subject is concentrated. Our suspicion is increased by the fact that in the description of the "cellular elements of the ground substance," no mention is made of the connective tissue corpuscles, and we cannot believe it possible that these should be altogether absent in such vital and active tissues as those described. Some such suspicion, indeed, seems to have entered the mind of Dr Klein, for he takes great pains to prove that similar cells in the infraorbital gland of rabbits are not developed into connective tissue fibres, but are converted into fat cells. We shall be glad to note additional evidence on this point in the other parts of Dr Klein's work, this being, as we understand, the first of several volumes on this important subject.

Although we are inclined to set a very high value on the work before us, and to believe that (as instanced by it) the Brown Institution has already shown a greater scientific usefulness than we anticipated, we at the same time cannot suppress an expression of regret that all the microscopic investigations here detailed should be entirely "Comparative," and that the author has not given more attention to the structure of serous membranes in the human body. To our mind the value of this monograph is greatly diminished by this defect.

We have no doubt that we shall do Dr Klein a great injustice if we suggest that his illustrations are "too good to be true," and that it is utterly impossible for any microscopist, however accomplished in his art, to produce specimens of such beauty and such perfection as those here depicted; and yet such is the impression produced on the minds of most persons, even of those who have had considerable experience in histological investigation. Still, we believe that Dr Klein has fairly and accurately drawn appearances which he really saw under the microscope, and that the explanation lies in the fact, which we find hinted at here and there throughout the book, that he made scores of preparations before he obtained such as satisfied him.

We only wish that we had a few more observers as earnest, as accurate, and as indefatigable as the author of the "Anatomy of the Lymphatic System."