brown colour, as well as those seven the pore-grains of which assume a blue tint,—which grains iodine proves to be real starch. It would be remarkable indeed, if the substance in the former were not also of a similar nature to starch,—if it were not in fact isomeric with starch.

2ndly. It would also be most remarkable, if plants of the same family, the nectaries of which agree with one another in situation and structure, should in some cases contain starch in the nectary and in others a different substance. Amongst the *Labiatæ*, for instance, it is indisputable that the nectaries of *Mentha arvensis* and *Clinopodium vulgare* contain starch. It would be extraordinary indeed if the contents of the nectaries of many other *Labiatæ*, as of *Stachys sylvatica* and *arvensis*, *Prunella vulgaris*, *Lamium album*, &c., were not also starch, although they are turned brown by iodine, for their nectaries are in all other respects exactly similar to those of the first.

3rdly. The elements of starch (C^{12}, H^{10}, O^{10}*) form also with the same number of atoms three or four other substances, dissimilar in their chemical and physical properties, viz. cellulose, inuline, dextrine, and lichen starch. Schleiden, however, in his 'Wissenschaftliche Botanik,' 1846, does not consider lichen starch as a distinct substance, although Mulder in his 'Chemistry of Vegetable and Animal Physiology,' which I have before me only in an English translation by Fromberg, without date, regards it as a chemically distinct body. When will the time come when chemistry will state results on these important substances which will meet with general acceptance? It is certain, at all events, that the chemical combination of $C^{12}\ H^{10}\ O^{10}$ constitutes a most variable substance. Although we may never be able by direct analysis to prove the identity of the granular matter in the nectaries, which is coloured brown by iodine, and the formula $C^{12}\ H^{10}\ O^{10}$, there is nothing to prevent us from assuming the identity, and concluding that the contents of the nectary, which are coloured brown by iodine, are isomeric with starch. From this substance, therefore, and the nitrogen contained in the pollen and ovules, the sugar of the nectar results.

Cringleford, near Norwich, April 1849.

On the Intimate Structure of Articular Cartilage. By Dr. Leidy.

As is familiar to every anatomist, articular cartilages always fracture in a direction perpendicular to their surface, the broken edge presenting a striated appearance in the same direction. This character the older anatomists ascribed to a fibrous or columnar structure of the cartilage, like that of the enamel of the teeth, while histologists at the present day consider it as dependent upon the vertical arrangement of the rows of cartilage-cells, although it has been suspected to depend upon some ultimate arrangement of the matrix or intercellular substance not yet detected. In some late observations upon the structure and development of articular cartilage, through means of an excellent microscope, made for me by

* I quote from Mulder's 'Chemistry of Animal and Vegetable Physiology.'

Messrs. Powell and Lealand of London, I have been enabled to discover a definite structure in the intercellular substance. This consists of an arrangement of exceedingly fine, transparent filaments, nearly uniform in thickness, and having an average measurement of the $\frac{1}{23000}$th of an inch. An easy method of detecting this filamentous structure, is to tear a fine fibre from the broken edge of an articular cartilage which has been macerated in diluted muriatic acid, by means of a fine-pointed forceps, and exposing it in the ordinary way in water beneath the microscope, using the quarter- or eighth-inch objective power. The fine filaments, partly detached, will be seen in great numbers along the sides of the fibre. When these filaments are viewed by very oblique light, they appear to have an indistinct granular appearance, each composed of a single row of granules, which of course, in the articular cartilage, adhere together with greater tenacity in the direction of the length of the filaments than laterally.

When an articular cartilage is broken in a direction from the under to the free surface, it is found that the fragments adhere by a membranous layer, covering the free surface of the cartilage, which by the older anatomists was considered as the extension of the synovial membrane; by the anatomists of our day, either as a homogeneous layer, or as nothing more than a stratum of the cartilage, the rows of cells of which take a direction parallel with the surface, or at right angles to those more deeply situated, and thus giving rise to this distinct laminated condition. That it is a cartilaginous layer is undoubtedly correct; but instead of the rows of cells determining the arrangement, I find it depends upon the filamentary structure of the matrix, the filaments taking a course parallel with the surface of the cartilage, in a direction at right angles to those forming the matrix of the deeper part of the cartilage.

A straight fibre may be torn from the articular cartilage, and in the act of tearing, should a row of cells be in the line of rupture, as is frequently the case, (for although generally following the course of the filaments, yet a number are oblique or even somewhat irregular,) it will be torn through, which in itself would be sufficient to indicate that the fibrous arrangement of the cartilage did not depend upon its rows of cells, and indeed they have but little or no influence in this respect.

From the foregoing description of the structure of the intercellular substance of articular cartilage, it can be readily understood that it may determine the course of the rows of cells, which is really the case. In the earliest period of the existence of the articular cartilage, the cartilage-cells are single, isolated, and equally diffused throughout a mass of hyaline substance, which latter in the progress of development becomes indistinctly granular, and then for the first time have I observed the appearance of the filamentary structure. In the splitting up of the primary cartilage-cell and development of others, they arrange themselves in the direction in which there is least resistance, which would be of course in the direction of the filaments of the intercellular matrix. Hence, in the deeper part of the articular cartilage, the rows of cells are generally vertical to the surface, and parallel to the same in its more superficial portion.

In some of the articular cartilages sometimes there are peculiarities of structure which I think have never been pointed out, and are worthy of notice.

In the articular cartilage of the condyles of the os femoris, I have occasionally noticed numerous minute lacunæ?, found in greatest abundance near the surface of attachment, and gradually decreasing in number until they entirely disappear in the superficial third of the cartilage. They are elongated, compressed, and their long diameter is invariably situated transversely, at right angles to the filamentous matrix, or parallel with the surface of the cartilage. The longest measure transversely $\frac{1}{1200}$ of an inch, the shortest $\frac{1}{3125}$ of an inch, in the vertical direction $\frac{1}{6250}$ of an inch. When well-defined, they appear more transparent than the cartilaginous matrix in which they are situated; when viewed a little within the focus they appear deep black.

Fibres of bone are not unfrequently met with in the articular cartilages, especially in that of the head of the os femoris. They are generally found near the surface of attachment, but are not the continuation of the bony structure upon which the cartilage is placed, for they are always arranged in a direction parallel to the surface. They are compressed cylindrical in form, and in transverse section present an elliptical figure, the long diameter of which is placed at right angles to the filaments of the cartilage matrix. They present a concentrically laminated and a radiated structure, resembling somewhat that of the Haversian ossicle, but they neither present the canal nor the Purkinjean corpuscles.—*Proceedings of the Academy of Natural Sciences of Philadelphia*, vol. iv. p. 117.

NOTICE OF AN EXCAVATING CIRRIPEDE.

On the 8th of last June Mr. Albany Hancock communicated to a Meeting of the "Tyneside Naturalists' Field Club," an account of an excavating Cirripede which he had recently discovered on the neighbouring coast. This animal possesses much interest, not only on account of the peculiar habit of burying itself in the shell of mollusks, but likewise for its remarkable deviation of form from all the known types of the class. No part of the animal, though unprovided with shelly plates, is exposed, except two lips which guard a small narrow opening in the surface of the substance in which the Cirripede is concealed.

On the Arrangement of the Areolar Sheath of Muscular Fasciculi and its relation to the Tendon. By Dr. Leidy.

It is well known that the fasciculi of fibres of the muscles are surrounded by sheaths of areolar tissue, but the arrangement of the filaments of fibrous tissue forming the sheaths, and their relation with the tendon, I think has not been properly pointed out. From repeated observation, I have found that the filaments of fibrous tissue cross each other diagonally around the muscular fasciculi, forming a doubly spiral extensible sheath. None of the filaments run in the direction of the length of the fasciculi, and but few are transverse. Many of the filaments of a sheath form an interlacement in the same diagonal manner with the filaments of the sheaths of neighbouring