In *Helianthus multiflorus* a cell from the same tissue measures very closely the same; so that in these two instances we see that the walls of the cells of the palisade-parenchyma, so far as they are exposed to disruptive forces, are stressed far below the experimentally derived tenacity of cellulose. In fact there is a coefficient of safety amounting to 25.

The dimensions of the cylindrical cells of the sheath are the following:—

Cytisus Laburnum, length = .100 mm., diameter = .030 mm.

Helianthus multiflorus, length = .108 mm., diameter = .018 mm.

These are the maximum dimensions observed. The thickness of the walls in each case is about .001 mm.

It results from these figures that if the pressure is 300 grs. per sq. mm. that cell-walls of *Cytisus Laburnum* will be subject to a stress of less than 3,500 grs. per sq. mm. This leaves a coefficient of safety of at least 14.

It has been noticed as probable that the walls of the cells of the spongy parenchyma do not, under normal circumstances, sustain any appreciable stress. But even if it is assumed that their cellulose membrane is sufficiently rigid to maintain its irregular shape when exposed to these high internal pressures, it is easily shown that the stress in the cell-walls does not rise above 1,500 or 2,000 grs. per sq. mm.

So it appears that the wall of every cell of the leaf is amply strong to sustain the high osmotic pressures which are demonstrable as giving rigidity to the leaf, and that, so far as the strength of the cell-walls is concerned, much higher osmotic pressures than those actually observed might exist in the cells of the leaf.

H. H. DIXON, Dublin.

STRUCTURE OF CODIUM.—Two years ago, in the month of April, I gathered some material of *Codium tomentosum* near Ventry, Co. Kerry. In sections prepared from this for teaching purposes, I was struck by the peculiar appearance of the club-shaped ends of the ramifications of the coenocyte. Sections 10 μ thick, stained with Delafield's Haematoxylin, showed in many of the branches of the coenocyte a stout axial strand of a violet substance. The strand is thin and more delicate in the narrow interweaving parts of the coenocyte, and thickens gradually as it passes out into the enlarged

terminations, which form the surface of the plant. Where it comes into contact with the protoplasmic mass occupying the extreme end of the branch of the coenocyte, it enlarges into a club- or funnel-shaped head. The strand occupies an axial position in the coenocyte and probably does not come into contact with the cell-wall at any point. In this respect it differs wholly from the transverse bars in *Caulerpa*.

In some of the branches the axial strand seems to be composed of a homogeneous refractive substance (Fig. 1). In others it is a tubular structure formed of a refractive material, lined and more or less filled up with granular matter. Where it is tubular, the ending in the protoplasm is open (Fig. 2). In the younger parts of the plant it is usually covered with a delicate coating of protoplasm, in which nuclei are sometimes seen.

Woodcut 12.

Fig. 1. Portion of a longitudinal section of *Codium tomentosum*, showing the longitudinal strands in two adjoining branches of the coenocyte. $\times 170$.

Fig. 2. Terminal portion of a branch of the coenocyte in long section: the axial strand is tubular and open at the extremity. $\times 170$.

In its reactions as well as in its general appearance the strand resembles some form of cellulose. It dissolves in sulphuric acid; it partially dissolves in ammoniacal cuprous oxide; it turns yellow in liquor Iodi. Neither it nor the walls of the coenocyte turned violet with chlorzinc-iodine; but it does not swell as much with this reagent as the walls, and becomes an orange yellow. The wall of the extreme end of the branches often resembles the strand in these two particulars, and differs in them from the remaining parts of the wall. Another

distinction between the strand and the substance of the walls is that it often yields a dark violet colouration with liquor Iodi followed by sulphuric acid, while the walls do not. It stains readily with haematoxylin (especially the granular parts) and with methyl- or aniline-blue.

It seemed possible that this cellulose-like substance might be a reserve-material to be used up in the rapid production of the filamentous branches which occurs in this *Alga* during the summer. To test this point I obtained some specimens after the summer growth had taken place. For this material I am indebted to Mr. C. Green, who gathered it for me on Clare Island, last July. In it not only the branches of the coenocyte forming the compact thallus, but also those which are prolonged into the filamentous out-growths, frequently exhibit the axial strand.

It may also be interesting to note, that in this material, which was fixed in methylated spirit, one stage, at least, of nuclear division could be observed. In several instances the chromatin of the minute nuclei could be seen divided into two dome-shaped masses, the convexities being directed towards the poles of division. The surfaces of the chromatin-masses, which lay towards the equator, appeared fimbriated. The fimbriations possibly represent the ends of the chromosomes in diaster. A strand of more densely stained protoplasm connects the two masses. Except for this, I have seen no indications of a spindle. However, as only a few stains were tried, and no special care was taken in the fixing of the material, it is hardly to be expected that these details, which would be very minute in *Codium*, could be seen.

H. H. DIXON, Dublin.

**ON SPENCERITES, A NEW GENUS OF LYCOPODI-
ACEOUS CONES FROM THE COAL-MEASURES**¹. By D. H. Scott, M.A., Ph.D., F.R.S.—The fossils which form the subject of the present paper are Cryptogamic strobili, showing evident Lycopodiaceous affinities, but differing in important points from other fructifications of that family, so that it appears necessary to establish a new genus for their reception.

Two species are described, one of which (*Spencerites insignis*) is already known to us from the investigations of Williamson, who named

¹ Abstract of a paper read before the Royal Society, Nov. 18, 1897.

Dixon, Henry Horatio. 1897. "Structure of codium." *Annals of botany* 11, 588–590. <https://doi.org/10.1093/oxfordjournals.aob.a088674>.

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