

from one of the diseased roots or stems, there may be seen the flat, silky, white bands of mycelium running in the plane of the cambium, and here and there protruding tiny white cushions between the scales of the bark (Fig. 12); in advanced stages the fructifications developed from these cushions may also be found. The wood inside the diseased root will be soft and damp, and in a more or less advanced stage of decomposition.

On examining the timber itself, we again obtain distinctive characters which enable the expert to detect the disease at a glance. I had the good fortune to spend several pleasant hours in the Munich Museum examining and comparing the various diseases of timbers, and it is astonishing how well marked the symptoms are. In the present case the wood at a certain stage presents the appearance represented in the drawing, Fig. 13. The general tone is yellow, passing into a browner hue. Scattered here and there in this ground-work of still sounder wood are peculiar oval or irregular patches of snowy white, and in the centre of each white patch is a black speck. Nothing surprised me more than the accu-

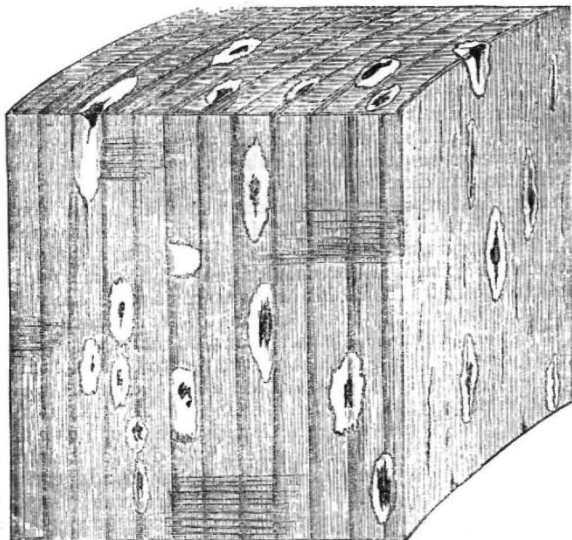


FIG. 13.—A block of the timber of a spruce-fir, attacked by *Trametes radiciperda*. The general colour is yellow, and in the yellow matrix of less rotten wood are soft white patches, each with a black speck in it. These patches are portions completely disorganized by the action of the mycelium, and the appearance is very characteristic of this particular disease. (After Hartig.)

racy with which Prof. Hartig's figures reproduce the characteristic appearance of the original specimens in his classical collection, and I have tried to copy this in the woodcut, but of course the want of colour makes itself evident.

It is interesting and important to trace the earlier changes in the diseased timber. When the filaments of the fungus first begin to enter the wood, they grow upwards more rapidly than across the grain, piercing the walls of the cells and tracheides by means of a secretion—a soluble ferment—which they exude. This ferment softens and dissolves the substance of the walls, and therefore, of course, destroys the structure and firmness, &c., of the timber. Supposing the filaments to enter cells which still contain protoplasm and starch, and other nutritive substances (such as occur in the medullary rays, for example), the filaments kill the living contents and feed on them. The result is that what remains unconsumed acquires a darker colour, and this makes itself visible in the mass to the unaided eye as a rosy or purple hue, gradually spreading through the attacked timber. As the

destructive action of the fungus proceeds in the wood, the purple shades are gradually replaced by a yellowish cast, and a series of minute black dots make their appearance here and there; then the black dots gradually surround themselves with the white areas, and we have the stage shown in Fig. 13.

These white areas are the remains of the elements of the wood which have already been completely delignified by the action of the ferment secreted by the fungus filaments—*i.e.* the hard woody cell-walls have become converted into soft and swelling cellulose, and the filaments are dissolving and feeding upon the latter (Fig. 14). In the next stage of the advancing destruction of the timber the black dots mostly disappear, and the white areas get larger; then the middle-lamella between the contiguous

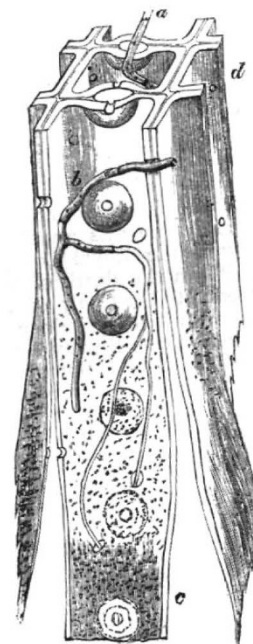


FIG. 14.—Sectional view of a tracheide of the spruce-fir, attacked by the hyphæ (*a, b*) of a *Trametes*, highly magnified (after Hartig). The upper part of the tracheide has its walls still sound, though already pierced by the hyphæ; the lower part (*c*) has the walls completely delignified, and converted into cellulose, which swells up and dissolves. The middle-lamella is also undergoing dissolution. The holes in the walls have been bored by hyphæ.

elements of the wood becomes dissolved, and soft places and cavities are produced, causing the previously firm timber to become spongy and soft, and it eventually breaks up into a rotting mass of vegetable remains.

It will readily be understood that all these progressive changes are accompanied by a decrease in the specific gravity of the timber, for the fungus decomposes the substance much in the same way as it is decomposed by putrefaction or combustion, *i.e.* it causes the burning off of the carbon, hydrogen, and nitrogen, in the presence of oxygen, to carbon-dioxide, water, and ammonia, retaining part in its own substance for the time being, and living at its expense.

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(To be continued.)

#### PROFESSOR ALEXANDER DICKSON.

THE close of 1887 has been marked by a long death-roll in the ranks of science. In the company of botanists it has been especially heavy, and now the sad news of the tragically sudden death of Prof. Alexander



Dickson, at the early age of fifty-one, comes upon us with startling unexpectedness. Two days before Christmas Prof. Dickson left Edinburgh, in his usual health and vigour, for Hartree House, his Lanarkshire residence. During the following days he spent much of his time in the favourite pastime of curling, which he much enjoyed. On Friday last, December 30, 1887, he was in exceptionally good spirits on the ice; his side was winning a close match, and he entered keenly into the excitement of the moment, when, without warning, he dropped dead in the act of making a shot.

Alexander Dickson was born in Edinburgh on February 21, 1836, the second son of David Dickson, of Hartree and Kilbucho, extensive estates in Lanarkshire and Peebles-shire, to which he afterwards succeeded, his elder brother having predeceased his father. Educated when a boy at home, he proceeded to the University of Edinburgh, where he graduated M.D. in 1860, obtaining a gold medal for a thesis on "The Development of the Seed-vessel of *Caryophyllaceæ*." After graduating, he soon abandoned medicine, and devoted himself to botanical pursuits. During the year 1862 he acted as Deputy Professor of Botany in the University of Aberdeen for Prof. Dickie, then in bad health; in 1866 he was appointed to the Chair of Botany in the University of Dublin, vacant by the death of Dr. W. H. Harvey; and a year later he added to this appointment that of Professor of Botany in the Royal College of Science for Ireland. In 1868, on the death of Dr. G. W. Walker-Arnott, he succeeded to the Chair of Botany in the University of Glasgow, which he held until 1879, when he was appointed Professor of Botany in the University, and Regius Keeper of the Royal Botanic Garden, in Edinburgh, upon the resignation of these offices by Dr. J. H. Balfour. He held these appointments at the time of his death. He received the honorary degree of M.D. from the University of Dublin, and that of LL.D. from the University of Glasgow, and was a member of various learned Societies. Besides his scientific life he had another important part to play as a laird with large properties in three counties, and he was a model landlord. He had the highest ideas of the duties of his position, and acted up to them. Money, time, and energy were given with self-denying devotion to the improvement of his farms and of the condition of his tenants, and no better-ordered estates could be found than those which he controlled. He was a Deputy-Lieutenant of Peebles-shire, and took an active share in all the functions which his position entailed.

By the death of Alexander Dickson the botanical world loses one of its best morphologists. He wore the mantle of the old French school typified in Mirbel, Richard, St. Hilaire, and Payer, of which Baillon is at present the foremost French representative; and at a time like the present, when it is a fashion to decry morphology, his loss falls all the more heavily. No botanist in this country had so full and accurate a grasp of organography. His published papers, numerous and valuable as they are, afford but an imperfect idea, significant indeed, of the wealth of his knowledge, and the keenness of his perception. Those who came in contact with him will remember the fascination of his discourse, and the surprising variety and aptness of the illustrations which he could bring up one after the other to support his own views or confound those of an opponent. In all his scientific work the strong conservatism of his nature found expression. His cautious and logical mind did not allow of his following with enthusiasm rash speculations of the more ardent botanical workers; and the flood of literature on botanical subjects which is poured out year by year had no terrors for him, as he acted upon the principle, which many will agree is a sound one, that, if you leave the literature until it is a year or two old, what is worth reading sifts itself. The soundness of his judgment upon scientific problems may

in some measure be traced to the influence of the precept and example of that glorious band of real teachers, which at the time of his University career made Edinburgh a centre of attraction in the intellectual world; and a good illustration of his force of mind is to be found in his attitude towards the much-discussed question of the growth of the cell-wall. Having satisfied himself that the apposition theory was a sufficient explanation, he consistently opposed Nägeli's intussusception theory during the years when it was all but universally accepted; and now the botanical world has come round again to regard an apposition theory as that which has the better basis in fact.

All organographic questions had a peculiar interest for Dickson. A considerable portion of his own work was devoted to the elucidation of the true nature of the flowers in *Coniferae*. As the result of his researches on *Dammara* and observations on other *Coniferae*, he adopted Baillon's view of the carpellary nature of the integument in *Pinus*, and, notwithstanding the defection by Strasburger, who originally supported this view, he continued to maintain it. Phyllotaxis was a subject to which he devoted great attention, and upon which he published several important papers. Amongst his most valuable researches are those on the embryogeny of *Tropæolum*, in which he traced the history of the peculiar roots by which the embryo is nursed in the seed; and the records of his embryological researches in *Pinguicula*, *Ruscus*, *Zostera*, *Phoenix*, *Delphinium*, and other plants, are very interesting and valuable contributions to knowledge. In recent years he gave considerable attention to the construction and development of pitcher-plants, and proved the true nature of the parts of their complex organs; and the structure of the *Hepaticæ* also engrossed him, one of his last papers being upon some species of this group, in which he joined issue with Leitjeb upon some fundamental points. In all his work there may be seen the scrupulous accuracy and attention to detail which was a leading feature in his character, and no man ever worked with more care and jealous regard for truth and with a more generous appreciation of the work of others.

Amidst the work of his scientific life and the duties connected with his estates he found time to cultivate the artistic side of his nature, which was developed in no ordinary degree. He was an accomplished and enthusiastic musician, and in later years found peculiar pleasure in collecting Gaelic airs. At botanical excursions to the Highlands he might be frequently found noting down an air as it was droned by a gillie or whistled by a herd, and he amassed a considerable number of these airs, which at one time he thought of publishing. He was also a very skilful draughtsman, and his drawings in chalk on the slate were quite a feature of his lectures.

In the discharge of every duty he was most conscientious, and his unostentatious kindness attracted everyone who had dealings with him. Quiet and retiring in disposition, he was endeared to all by the nobility of his character and his sympathetic nature. As Professor his students loved him; as laird his tenants loved him. It has been said of him he could never lose a friend, for he never could say an unkind word or omit to do a kind action, and in this estimate all who knew him will concur. The news of his death will be heard with sorrow by a wide circle of friends, and bring sadness to many a heart which will mourn for one who had fine generosity of the kind that lets "not the right hand know what the left hand doeth."

#### NOTES.

THE Municipal Council of Paris proposes to establish in the Faculty of Sciences a new professorship devoted to the philosophy of biology, and especially to the teaching of the doctrines of Darwin. This distresses some of the older French zoologists,