Dr. Budd has directed attention to the progress of cancer under some of its ordinary phases. Let us state an example: a small, hard knot is detected in the female breast, lying loose in that organ; this tumor enlarges, grows, fastens on the parts around, no longer lies loose in the cellular tissue, but contracts adhesions with the surrounding parts, spreads out its claws, as it were, like a crab (hence the name cancer), seizes on the glands of the axilla, and disseminates small tumors through the viscera. On examination after death, cancerous matter is detected in the viscera and lymphatic glands, and is frequently found in the lungs, the liver, and peritoneum. From these facts, and from the circumstance that the veins are found charged with the same cancerous matter, Dr. Budd infers (and a most important inference it is, if drawn from a sufficient number of authenticated facts) that the secondary tumors discovered in the viscera, and other parts so diseased, are derived from the first tumor—are caused by seeds from the primary or parent growth, conveyed by the blood to those localities, and form themselves new centres for the further dissemination of the complaint. Some curious results of the microscopic investigation of cancerous matter are adduced in aid of this hypothesis. The labors of Müller, who has investigated the minute anatomy of cancer by the help of the microscope show that the substance of cancerous tumors is a soft kind of pulp, held loosely together by a fibrous web. The pulpy matter presents an organised form of an extremely interesting kind, being found to be almost entirely composed of minute globular cells, containing within their cavities a vast number of very minute granules. Similar cells are found in the organisation of portions of the vegetable kingdom. Those granules are supposed to be what are called *cysto-blasts*, or germs of new cells, and becoming detached from their parent cells, are carried about until deposited in some place where, from their size, they are unable to pass through the smaller capillary vessels, and there they become parent cells, and engender new growths. This is a consideration of immense practical importance, as if, fully established, it would of itself demonstrate the necessity of immediate removal of the first cancerous tumor by the knife, and of its complete removal. The timely extirpation of cancerous growths is thus indispensable. In very many cases removal by the knife has proved fully successful in wholly eradicating the disease; in many cases it had not been successful. But in the latter it is inferred that the removal of the cancerous matter had not been complete—that either the operation had been deferred until the germs had been disseminated, or that the knife had not removed the whole of the diseased matter. So very minute are those germs, that it is altogether impossible to detect them unless by means of microscopic power; and Dr. Budd recommends that the cut surface should be subjected to microscopic examination, as if on that surface be found any of those cells, the clear inference is, that others have been left behind, and consequently that the removal has been incomplete. In those operations the surgeon should cut away not only enough, but what may be called more than enough.

This subject, Gentlemen, is altogether most interesting; but it requires further examination. What

the exact nature, and what the origin of those minute cells, are as yet uncertain; they may be termed a sort of hydatids. They appear, like plants, gifted with an independent vitality, possessing the power of generation, increasing and multiplying prodigiously, and capable of being conveyed to remote distances from the parent growth, without losing their character or powers; they might indeed be appropriately called a sort of parasitic animal. What is the origin of the primary or parent growth, it is, at least as yet, impossible to say. Some authors contended that cancer is infectious and contagious. Dr. Budd states that Langenbeck injected cancerous pulp from a living body into the veins of a dog; the animal after some time wasted away and died, and on examination several cancerous tumors were found in his lungs. Soot is supposed to be a cause of cancer, and one species of that disease is known as chimney-sweeper's cancer. Dr. Budd has alluded to cases of cancer of the penis in men, whose wives labored under cancer of the uterus, which would tend to establish the doctrine of its being contagious. The germs of cancer clearly possess an independent vitality, and are like parasitic animals, or a kind of fungous growth, perhaps somewhat resembling the disease known as scald head, which is now held to depend on a sort of cryptogamic plant, the *habitat* or one of the *habitats* of which is the human head. As I totally disbelieve the doctrine of spontaneous generation, I cannot yield to the suggestion that these germs originate in the body, but am of opinion that they are introduced by some yet unascertained mode. The introduction of insects into the human frame by unknown means is familiar to us all, and from all that is known I am induced to believe that cancerous matter is similarly introduced. In conclusion, I would again impress on the student the necessity of pursuing this important investigation, and again strongly recommend to him a careful perusal of the whole essay of Dr. Budd, as most interesting and instructive. Our familiar conversation on this day must now close. The portion of the intestines of Bedford, to which I wished to draw your particular attention, lie on the table for closer inspection, and from that inspection you will find the diagnosis fully verified. At our next meeting I shall address to you some observations on the modes of conducting clinical investigation, and recording its results.

COURSE
OF
LECTURES ON ORGANIC CHEMISTRY,
AS APPLIED TO
MANUFACTURES AND AGRICULTURE.

By M. PAYEN, Member of the Institute.

LECTURE II.

PRESERVATION OF WOOD.

Alterations of Wood—Chief Causes—Attacks of Insects—Mode of Detecting Albumen—Various Modes of Preservation.

GENTLEMEN,—The subject of the preservation of wood is one of the utmost importance in various points of view. The use of this material is daily becoming more necessary, while the progress of civilisation is gradually exhausting the source from which it is ob-

tained. Our railroads require an immense supply of timber; our navy likewise; in almost every department of industry on a grand scale wood is employed in greater or less quantity, while the causes of decay which are inherent in or accidental to it are numerous, and incessantly working out its destruction.

Let us then inquire into the nature of these causes, and endeavour to ascertain the means by which they may be obviated. To understand the subject of which I am about to treat, you must remember the facts mentioned in my last lecture relative to vegetable albumen. This substance, analogous in every respect to animal albumen, fills up the cellular cavities of wood, and is both a remote and immediate cause of decay; it attracts insects, and contains many of the elements of putrefaction. If timber was composed of nothing but pure cellulin, it would resist all the causes which induce decay, because cellulin is an inalterable substance; but it is always united with the tenacious matter already alluded to, and with a substance analogous to animal matter, which pervades all the cells, and influences in no small degree its power of resistance.

Albumen is the substance on which the insects that destroy timber live; they penetrate into the deepest cells, and riddle the wood in every direction for the purpose of arriving at it; hence, if we can remove the albumen, or render it indestructible by the aid of any chemical substance, the timber is completely preserved from the attacks of these destructive insects.

Another cause of decay resides in the influence of moist air and a moderate heat on the albuminous matter continued in the cells of wood. Some modern writers describe two forms of decay, the one moist, the other dry or *eremacausis*; but timber never undergoes any change in perfectly dry air; putrefaction cannot exist without moisture.

The manner in which vegetable albumen undergoes decomposition is exactly similar to that of animal matter; ammonia or carbonate of ammonia, carburetted hydrogen, carbonic acid, &c., are disengaged. The decay is favored, as I have said, by a variety of circumstances. When rain has penetrated the bark of a tree, and the albumen become moistened, decay commences in small points, and an access is opened for parasitical growths, &c. This also occurs in wood which has been long exposed under the air, and when the parasites just alluded to have once attacked timber, they render its decomposition more active and general.

When it is necessary to make a selection in our choice of wood for any construction, the first point to be inquired into is the quantity of albumen contained in it, for the durability of the timber will, *cæteris paribus*, be in an inverse proportion to its quantity of albumen. The quantity of the latter substance in a given volume of timber may be ascertained by a simple experiment, which consists in treating a small bit of the wood with a solution of caustic soda, at a high temperature. The soda dissolves the albumen, but leaves the cellulin unchanged. If the wood be weighed before and after the experiment the loss of weight will give the quantity of albumen. We may apply this fact to other useful purposes. Thus it will enable us to determine whether a woollen tissue is mixed with cotton, silk, &c., for the cotton remains unchanged, while the wool and silk are completely

dissolved. From what has been said, it follows that the arrangement of wood into *hard, soft, &c.*, is one founded on practical views. The poplar is a white wood, light and tender, because its tissue is loose and it contains a good deal of air with a quantity of azotised fluids; these are all so many causes of decay; the birch is a similar kind of timber, and, therefore, never employed for durable work; the oak, on the other hand, is a hard timber, its ligneous cells are closely set together and contain but a very small quantity of albumen. In 100 parts of oak timber we find 40 of cellulin, and nearly 60 of tenacious matter; it resists friction well, but not so well decomposition; it keeps well enough in water, because its tannin becoming dissolved acts on the albumen of the ligneous cells. The acacia is the timber least subject to decay, and the one which contains the greatest proportion of cellulin. Experience proves that it will last for fifteen to twenty years, under circumstances which cause the decay of oak timber in one or two years. The wood of the pine and fir tree is little liable to decay, but no means have been, as yet, discovered to preserve it from the attacks of insects.

We have just shown that the presence of albuminous matter in timber is the cause of the changes which lead to its decay; hence, it becomes a point of the first importance in the preservation of timber to remove the albumen or change it into an inalterable compound; upon these principles are founded the various methods employed for the preservation of wood. Hales, Duhamel, Buffon, &c., were the first who directed attention to this subject, and pointed out the means of rendering wood indestructible. A few years ago M. Biot showed that pressure might be employed for the purpose of forcing certain fluids into the heart of timber. It was even remarked that if a block of wood be placed upright in water it will gradually imbibe a large quantity of the fluid. This, however, is a very imperfect method, for the fluid penetrates into certain parts only, and the centre, in particular, is left untouched. M. Boucherie has availed himself of the natural circulation of fluids through all parts of plants to introduce antiseptic fluids into them. By his process he has impregnated trees of twenty to twenty-four feet high in ten or twelve days, even the leaves were impregnated. The process may be applied to tress while growing or after they have been cut down. When the tree is growing the following is the method employed:—A portion of the tree, to a certain depth, is sawn through on both sides, and the tree is supported by props to prevent accidents from the wind, &c. A band of leather or Indian rubber is then applied round the tree, both above and below the cuts made with the saw; the band is attached firmly with ropes, and the folds carefully closed with moistened clay. Two openings are then made in the band, and through them pass two tubes from the saw-cuts to a large tub filled with a saline solution. The fluid is soon drawn up by the tree, and reaches rapidly the most remote and the smallest branches.

It is more easy, however, and just as efficacious to cut down the tree and remove its smaller branches; a few tufts of leaves may be allowed to remain, but this does not seem to be absolutely requisite. The tub is placed on a very high pedestal, and the tubes, as in the former instance, introduced near the base of the

In this way the force of atmospheric pressure contributes very powerfully to the ascent of the fluid. Mr. Kyan has recently proposed a method much employed in England. The timber is cut up into planks of various sizes, placed in a large reservoir containing a solution of corrosive sublimate, where they remain for seven or eight days; after this they may be used for various purposes. The Duke of Devonshire employed wood prepared in this way in the construction of some hot-houses, and the timber is said to have resisted perfectly the attacks of insects and the effects of the weather.

As a general proposition we may lay down that all chemical substances which preserve animal matter are likewise suited for the preservation of vegetable matter. Corrosive sublimate, which is used for the preservation of anatomical preparations, coagulates animal albumen and forms with it an insoluble compound. Tannin, also, which combines with animal tissues, may be employed in the preservation of timber. Still the price of corrosive sublimate, which costs from five to six shillings the pound, must render the use of Mr. Kyan's process extremely limited.

M. Moll has proposed the use of creasote, and we know that the preservation of smoked meats depends on the presence of a small quantity of this substance. M. Moll proposed to expose the planks to the action of tar vapor; but, we repeat, the price of creasote and of corrosive sublimate must, except in a few limited cases, render their use impracticable.

M. Breant invented an apparatus much employed in some places for the preservation of wood. His apparatus enables him to compress the air contained in the ligneous cells, and the vacua thus formed contribute in no small degree to assist the imbibition or aspiration of the antiseptic fluid. This process is peculiarly suited to small pieces of timber, and is more complete than any other one. In Mr. Boucherie's method the whole tree is very seldom impregnated; the superficial layers imbibe the fluid, but the central parts and such as have ceased to live for some time are rarely, if ever, touched. By M. Breant's process, on the contrary, almost every particle of the timber is impregnated; the knots and the densest portions of the heart of the tree may resist, but these are generally so solid that they escape every kind of decay.

From M. Breant's idea has originated the plan of submitting wood to the action of heated fluids. The heat expands the air contained in the ligneous cells, expels it, and thus favors the ascent of the antiseptic fluid. In this way solutions of white resin, tar, &c., have been introduced into various kinds of wood. A particular preparation of linseed oil has likewise been employed, according to this process, with the most perfect success; wood prepared with it has remained free from rot under circumstances most favorable to the development of decay.

The sulphate of iron has been frequently employed, but M. Breant justly remarks that it should never be used by itself; a small quantity of the oxide of iron often combines with the various organic matters contained in the ligneous cells, while the sulphuric acid is set free and corrodes the timber on all sides. Wood preserved with a solution of sulphate of iron frequently crumbles into dust.

Long before any attempts were made to preserve

timber artificially it had been remarked that the wood employed in salt-mines remained perfectly free from decay, and that the beams and planks, &c., were occasionally covered by a species of efflorescence. The latter depends on the different degrees of temperature to which the wood is exposed, and to the presence of a small quantity of sulphate of soda in the common salt. The preservation of the timber evidently depends on its being impregnated with chloride of sodium, the preservative *par excellence* of all organic substance.

The observations now mentioned were first made in the salt-mines of Saltzbourg, and were afterwards repeated in those of Dieuze; the result of the experiments made leaves no doubt but that wood impregnated with a solution of salt is perfectly free from every species of alteration. Still the application of this method is comparatively limited, from the tendency of salt to attract moisture, and from its being always mixed with a small quantity of deliquescent salts, as the chloride of magnesium, of calcium, &c.

The various processes now described have been applied to the preparation of timber used for fancy articles, &c. Thus, when the wood of the plane-tree is impregnated with a solution of pyrolignite of iron, and then polished, it presents a very elegant tint, and is marbled in a curious manner.

Again, by employing a solution of tannin in the first instance, and then the pyrolignite of iron, a species of ink is formed in the ligneous cells, which gives a beautiful marbled appearance to the wood when polished. By varying the coloring matter there is little doubt but that we could obtain wood which would rival any foreign timber in brilliancy of color and durability.

CASE OF STONE,

IN WHICH THE OPERATION OF LITHOTRITY WAS ONCE,
AND THAT OF LITHOTOMY TWICE, PERFORMED.

WITH REMARKS.

By ROBERT ELLIOTT, Esq., M.R.C.S., Surgeon,
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Mr. C. H., aged sixty-three, a highly respectable farmer, living in my immediate neighbourhood, a man of temperate habits, and the father of a large family, first consulted me in the month of Nov., 1837. Up to within a year of that time he had enjoyed excellent health with the exception of occasional attacks of dyspeptic headache, but then first began to suffer from symptoms of stone. In January, 1838, the symptoms had become so urgent that he consented to an examination, and, on sounding, a stone of considerable magnitude was found presenting itself at the fundus of the bladder. It was fixed immovably in that position, the instrument coming in contact only with its upper surface, and the irregular contractions of the bladder causing the contents of that viscus to assume the appearance of septa. Many unsuccessful attempts were made to dislodge the stone, but, after persevering patiently for about three weeks, I ultimately succeeded in tilting it from its position.

The spasms which followed the introduction of the instrument were subdued by morphia.

The stone, once removed from the sac, never returned to its old position, and, finding that it remained loose in the bladder, I determined on its destruction by the lithotrite. The operation was performed in March