

Imbedding in elder pith, for cutting sections / by C.H. Golding Bird.

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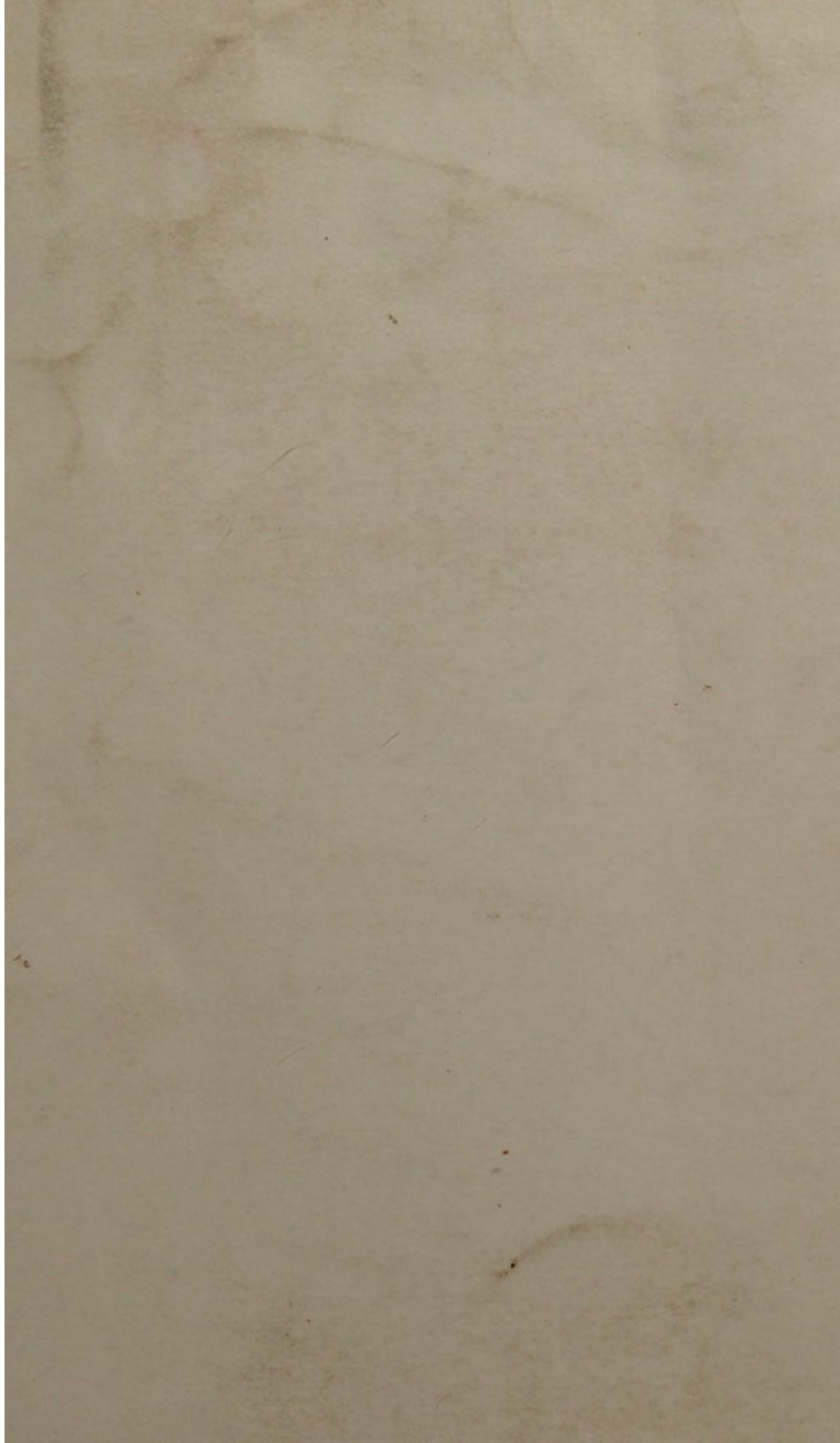
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(22.) Jabez Hogg Esq.
 with the author's
 kind regards

IMBEDDING in ELDER PITH, for CUTTING SECTIONS. By C.
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SOME time ago a paper was read before this Society explaining the *modus operandi* of section cutting after imbedding in wax; and taken as a whole, there is nothing in that process that is objectionable, nor is there anything wanting to allow of its being as perfect a method as possible of attaining the end for which it was designed. It is, therefore, not as a rival that I bring before your notice the process in elder pith—one known, perhaps, to some of you, though not generally adopted in this country; yet it possesses certain advantages over the one in wax, and especially so where it is a question not only of imbedding, but of using a microtome as well. If held simply in the fingers without instrumental aid, pith will yield sections in most cases equal to those obtained by the more complicated wax method, and at a cost of far less time and trouble. In the histological laboratory of Prof. Ranvier, at the Collège de France, Paris, pith is the only imbedding medium employed for all varieties of tissue, and transverse sections of spinal cord obtained through its means I recollect as peculiarly good.

The principle on which it depends is simply the swelling of the parenchymatous tissue of the dried pith in the presence of moisture, so that if placed dry in a rigid tube, as that of the microtome, with the tissue to be cut let into its centre, the addition of a little water will in the course of a few minutes so cause the pith-cells to expand, that the specimen becomes immovably fixed. Sections are then very readily cut.

Any microtome may be used for this purpose; but, as a rule, the English instruments have so large a bore that a great expenditure of pith is involved: hence I prefer the smaller instrument known as Ranvier's microtome, the one alone used in the Collège de France.² It carries tubes of three different sizes, and is intended to be held in the left hand of the operator, and not to be fastened to the table; and though, perhaps, a little more practice and manipulative skill are required, it has the advantage of so far yielding to the razor that the brass top need *never* be cut, while with a

¹ Read before the Medical Microscopical Society, June 19, 1874.

² This instrument is made by Verick, of Paris. The three tubes have the following diameters: 19 mm., 16 mm., 12 mm.

slight rotatory action on its own axis given to the instrument at the moment the section is being cut, so as to meet the razor halfway, as it were, the specimen may be literally "whipped off" without any of that pressure exerted upon it where a fixed microtome and a razor held in both hands are employed.

The pith used is that of the common elder, and so is found in cylindrical pieces of varying diameter. As, however, it does not matter in how many pieces it is employed, provided the specimen be well held, the thickness of the pith is not of much moment; still, to avoid trouble, it will be found that the thicker are the better.

Suppose it be required to cut a section of a tissue of about one eighth of an inch in breadth, select first a piece of pith about the size of the tube of the microtome, and of the same length as the specimen; split it longitudinally, and with the finger-nail make a small furrow on the cut surfaces of each half, somewhat corresponding in depth to the thickness of the tissue to be cut; place the latter in the groove thus formed on one piece of pith, and lay the other upon it. Holding the mass between the thumb and finger, force it by gentle pressure into the microtome from above, bevelling off the extremity of the pith, if necessary, to make it enter more readily; and then with the thumb press down the whole to a level rather below that of the plate of the instrument.

The mass now, if properly fitted, should remain tolerably firmly fixed in the tube by the force of compression employed, but not so tightly as to enable one to cut sections at once; for if this be the case, the addition of water, will on expanding the pith, cause such pressure as might injure the specimen. Experience alone can suggest the exact amount of force to employ. Should the mass be too small, it must be either fitted to a still smaller tube, if there be one, or some extra slips of pith should be packed around. In either case the next step is to invert the microtome into a saucer of water; or, in the case of an instrument already fixed in the upright position, water must be poured upon it. In about three minutes the pith will have swollen sufficiently to hold the specimen firmly in its place, to have moulded itself so as to fill all inequalities or irregularities in the outline of the tissue enclosed, and to prevent effectually any chance of its revolving in the microtome when the section is being cut.

Where larger pieces of tissue are used, say of $\frac{1}{4}$ to $\frac{1}{2}$ inch in breadth, they must be packed in a manner similar to that described. Only four or more separate pieces of pith must be employed according to circumstances. Support on two sides

only is often enough, especially in the case of chromic acid specimens that have undergone a full degree of hardening. Besides causing it to swell, the moistening of the pith takes away that extreme brittleness that characterises it in the dry state, and which, by causing it to break from the specimen embedded, would effectually frustrate any attempts to obtain a good section; for this reason pith, even if held in the fingers only, should be previously moistened. As in cutting wax specimens, the razor should be dipped in spirit.

To those who have never tried it this process will probably at first sight offer several objections; these, however, I hope to show may not only be overcome, but that real advantages are to be found in it. The pressure exerted upon the specimen by the swelling pith naturally first suggests itself as the principal drawback. In answer I can only say that if the tissue be hardened in the usual manner and to the usual degree, nothing is to be feared on this score; I have both used it and seen it used with very many varieties of tissue, and never found it exert a pressure that in any way was productive of harm, and this remark applies even to such structures as spinal cord, provided they have previously undergone, as stated above, the usual amount of hardening. Should it be feared in any one case that pressure, however slight, might do some injury, the specimen can previously be covered with a thin coating of wax or paraffin, and then fitted into the pith. The chance of the pith revolving in the microtome like wax has already been alluded to; this inconvenience never occurs, the friction offered by the rough pith being sufficient to prevent it. To the vegetable histologist pith is an invaluable medium; for wax *et hoc genus omne* are almost out of the question when it comes to cutting sections of leaves and the like; while, further, the pith is far less likely to blunt the razor, and is more easily moulded than carrot, to which many resort for a similar purpose.

It may further be urged that pith always involves the use of the microtome; and so it certainly does: for when simply held in the fingers, though capital results may be obtained, I fully admit that imbedding in wax is preferable if the time for it can be spared. The question, therefore, of pith *versus* wax is one chiefly of time and of comparison, and though many microscopists seem to have an innate hatred of microtomes, I ask whether it is better to adopt a process involving mechanical aid, but that costs no time to speak of, and next to no trouble, or one in which mechanical aid without special adaptation cannot, even if required, be

employed, and in which time must be sacrificed in preparatory steps; and, in consequence, much trouble given? It will be seen, of course, that I am especially alluding to the rotation of the wax in the microtome, as well as to the fact that a tissue once imbedded in the machine cannot a second time be refitted without an entirely new process of casting. Such is not the case with pith. The specimen may be placed a score of times in the microtome, and after each be replaced in spirit, and as quickly refitted in the pith, if required, as on the first occasion. This suggests the combined use of pith and wax that may be employed; it has already been mentioned as protecting the specimen from all harm from pressure; but it is useful also after a wax cast has been made in the microtome. Remove the wax when sufficient sections have been cut, pare the sides, and make it more or less square, and then, on the next occasion, pack it in a little pith, and it will be found to act as efficiently as at the first casting, minus even the previous chance in its slipping round under the pressure of the razor.

I have advocated the use of pith, even, it may be, to the disparagement of the invaluable paraffin and wax. I feel, however, warranted in so doing, convinced as I am that not only unexceptional results may be easily obtained by pith, but that much valuable time may be saved.

As to the *quality* of the specimens obtained, I am almost converted to the belief that it matters but little, except in one or two cases, how or in what one imbeds, but that a good result is rather owing to the skill and ingenuity of the manipulator in each particular case. Every one upholds, naturally, the way in which he himself is accustomed to work, and rightly so; yet I question very much whether a more expeditious method of imbedding than that described is in any one's hands. Its easy portability and the complete absence of the necessity for all accessory instruments, such as tripods, spirit lamps, dishes, paper boxes, and the like, may be placed last, even though it may be least, among the advantages to be obtained by the use of elder pith.



