first case experiment has proved to us that the vibrations are transmitted along the fibres of wood quickest in this position and under these circumstances, and in the second it will be remarked that the tone of the Cremonese masterpieces is always most brilliant when this perpendicular setting of the grain has been adhered to. Care must be taken to select the pine neither too hard nor too soft in texture, and without any defect, knot, stain, or other fault.

Deal *[spruce .ed]* owes its great recommendation for bellies to its slight density, elasticity, and vibratory powers. If a rod of steel, another of glass, and another of deal be taken of identical dimensions, they will, when similarly struck, produce the same note ; therefore, of these three bodies deal is equal in elasticity and immeasurably superior in lightness. Maple is much more slow to vibrate than deal, and consequently a fourth rod made of maple would give a lower note than that made of deal; and consequently the back of a violin (maple) when struck, or vibrated alone with a bow, would yield a lower note than the belly (deal), if the plates were of the same thickness, but being made of *different* thicknesses, the back, when finished, is about a tone HIGHER than the belly when finished by the cutting of the *ff* holes and the affixing of the bass bar[1]. And M. Fétis, in his " Notice of Anthony Stradivari "[3] (a book much more instructive to the practical luthier than its title would denote), fixes this difference of sonority at exactly one tone, and M. Savant coincides in (though he has sometimes been made to contradict) this statement, and his numerous experiments went to prove that if by a reduction of the thickness of the back it were made to coincide in intonation with the belly, a feeble and unsatisfactory tone would characterize the fiddle so formed. If the difference were less than a tone, the tone of the instrument would be throbbing, and if more than a tone an even more unsatisfactory result would be obtained.

[1] Nearly every author who has written on this subject has declared that *the back should be a tone lower* than the belly. It is useless (as many of them probably never actually *made* a fiddle) to persuade them that exactly the reverse is the case. Mr. Davidson is the only author who ever reproduced M. Savart's *right* words on this point. All the others have made him say that the back should be a tone lower : the verbatim report of his own words is in *L'Institut* (" Sciences mathamatiques, physiques, et naturelles," Nos. 319, 321, 323, 327), where he rightly states that the back should give a tone *higher* than the belly. It is extraordinary that such an error should have so long been an authority. Mr. Bishop, indeed, seriously criticises and reproves the correction of his own error, or rather the *correct* rendering of his own authority. Let any one make a fiddle, and this will be proved to him more satisfactorily than by a volume of " premeditated pleonasm " on the point.

[2] F. J. Fétis, "Notice of A. Stradivari," translated by J. Bishop (London, 1864). *Vide* note2 p. 37.

To ascertain the normal tone of a plate of wood, it must be clamped firmly at a point where two nodal lines cross one another,[1] and vibrated with a bow drawn along the edge. The note it then renders is the lowest of which it is capable, and is called "its normal tone." Some interesting experiments of this kind have been made with some fragments of Stradivarius violins of various dates. Thus :— rods were made 7 ¾ inches long, ¾ inch broad, and $^1/_5$ [*? Ed.*] inch thick of maple and deal from one of these fiddles which had been destroyed. Two rods of maple, one plain, the other figured, dated respectively 1708 and 1717, gave, when struck, identically the same note. Three rods of deal, dated 1690, 1724, and 1730, gave identically another higher note,[2] and the coincidence of tone with the disparity of dates and appearance must surely indicate that Stradivari had a standard of acoustic intonation, and relation between back and belly, to which he paid more attention than the mere appearance of his fiddles. (*Vide* Fétis' " Notice of A. Stradivari " [note [2], p. 37], p. 78.)

Let it be noted that blocks or planks for fiddle-making should not be cut with a saw, but split with the axe, as the marks of the saw will hide any defects in the wood, which would at once be revealed on the shining silky surface of a plank or block split open by the axe, and besides this splitting with the axe ensures the fibers being left whole and straight, and not cut into as they are by the teeth of the saw. In Chapter III. I made frequent use of the terms "whole," half," or " slab" backs, referring to the way in which the wood forming that part of the instrument was cut, and I here give a woodcut of a section of a tree trunk (Fig. 77) with cuttings to explain these terms. As bellies are almost invariably joined, and very frequently (nay, almost always) backs are cut in this manner, I will shortly explain this figure before proceeding. It represents a trunk cut at D "on the layers " *(sure couche)* for the whole back, and at A "on the quarter" *(sur maille)* for the half or joined back. The wedge A is squared at the thick end

[1] I have tried to exclude such terms as these from this work, as being difficult to understand, and confusing. This one, however, I cannot avoid. If a plate be strewed with sand and then vibrated with a bow, the sand arranges itself in certain lines, called "nodal lines." It is at a point where two of these cross one another that the plate must be clamped. As good a way as any is to place a piece of cork near the edge of the bench, balance the plate on it, and hold it firmly with the finger, pressing it on to the cork. The edge overhanging the edge of the bench may then be vibrated with a well rosined bow.

[2] The belly (deal) here also sounded higher than the back (maple). *Parfaitement !* because the rods were identical in point of size and volume In the mass *(i.e.*, the whole plates) the intonation of the back and belly is found to vary correctly, the former being a tone higher than the latter.