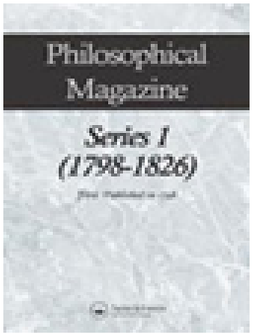

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XXXVII. On the transverse strength and resilience of timber

Mr. Thomas Tredgold

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named Langbargh, from its form, a name which it has imparted to the whole wapentake*.

This singular ridge is composed of blocks or masses, generally oblong, and lying across the vein, parallel to one another, in a form approaching to that of basaltic pillars, yet without any regularity of shape or size. The interstices are filled with a kind of ferruginous earth, or decayed whinstone, and the blocks are coated with a crust of the same colour: the recent fracture, which is rough and granular, presents a dark blue colour, with a number of small shining crystals. The stone is exceeding hard, and is excellent metal for making roads. Mr. Bailey, in his Survey of Durham, (p. 32.) justly remarks, that it "seems to have been in a state of fusion when it filled up the fracture, as the seam of coal, for some feet distance on each side, is turned into a sooty substance, which becomes a cinder as the distance from the whinstone increases, and by degrees assumes the natural appearance of coal with all its properties: which takes place about 50 yards from the whinstone." What impression it has made on the aluminous schistus, which it traverses in our alum hills, has not been ascertained: but in Langbargh quarry we see the south side of its bed, against which it has leaned, appearing smooth and firm, as though it had been baked.

XXXVII. *On the transverse Strength and Resilience of Timber.* By Mr. Thomas Tredgold.

To Mr. Tilloch.

Sir, — The growth of our own *ship-timber* has always been considered to be of great importance to this country; but on account of the slow growth of the oak, the demand, it is probable, will soon far exceed the produce of the British Islands: therefore, the introduction of the *larch*, which has been very extensively planted by a few patriotic individuals, is very justly esteemed an object of national importance, as the rapid growth of the larch far exceeds that of most of our native trees, and "it is remarked," says Dr. Hunter, "that those trees which have been planted in the worst soils, and most exposed situations, have thriven the best†."

The timber of the larch is durable; it does not burn readily,

* The original name Langberg signifies Long-hill: the ancient name of Rosebury was Ohtneberg or Hogtenberg = High-hill. The wapentake courts were formerly held at Langbargh, and the steward still holds his court, *pro forma*, beside Langbargh quarry.

† Notes on Evelyn's Silva, i. 280.

and

and it is not inferior to any of the common kinds of timber (native or foreign) either in strength, toughness, or elasticity.

Results of Experiments, on the transverse Strength of Timber, made at Mr. Atkinson's, Grove End, St. John's Wood, on Thursday, March 12th, 1818.

The pieces were each an inch square, except No. 3, which was only 8-10ths of an inch in breadth. The numbers in the table show the weights it would have borne if it had been an inch square; the pieces were supported at each end, and were loaded by putting 5lbs. at a time into a scale suspended from the middle; —the distance between the supports 30 inches.

Description of Timber.	No. 1. Memel Timber.	No. 2. Red Larch.	No. 3. Red Larch old and very dry.	No. 4. English Oak.	No. 5. English Oak.	No. 6. Riga Timber.
Compar. stiffness—or the weight that bent each piece half an inch	145lbs.	30 lbs.	93 lbs.	60 lbs.	65 lbs.	125 lbs.
Compar. strength—or the weight that broke each piece	212 lbs.	253 lbs.	295 lbs.	222 lbs.	231 lbs.	212 lbs.
Compar. extensibility—or the space through which the middle had bent at the time of fracture	2·25 inch.	3 inches.	2·75 inch.	2·5 inches	1·4 inches	1·3 inches
Weight of a cubic foot of each kind of timber in the nearest whole numbers	34 lbs.	40 lbs.	31 lbs.	41 lbs.	46 lbs.	30 lbs.
Remarks	Broke short.	Splintered.	Broke short.	Broke short.	Splintered.	Broke short.

As the strength of small pieces depends much on the position of the annual rings, the pieces were placed as nearly alike in this respect as possible. When the pieces were in the position in which they were broke, the dark lines or portions of the annual rings that appear in the section of a piece were vertical.—From the results exhibited in the preceding table, it appears very clearly, that larch is best adapted to resist the force of a body in motion;—but to leave no doubts in this respect the following experiments were made.

Experiments on the Resilience of Timber.

The pieces were each an inch in depth, and laid upon supports thirty inches apart. The weight fell between two vertical guides (similar to a pile engine), upon the middle of the piece.

No. of Exper.	Description of Timber.	Breadth of the Piece.	Weight.	Height from which the Weight fell.	Effects.
No. 7.	Oak, same kind as No. 4.	1 inch.	7 lbs.	48 inches	Broke.
No. 8.	Larch, same kind as No. 2.	1 inch.	7 lbs.	48 do.	No effect.
	The same			54 do.	No effect.
	The same			60 do.	Set to a slight curve.
	The same			66 do.	A little more curved.
	The same			72 do.	Curved about an inch.
	The same, convex side upwards			72 do.	Curved the contrary way.
	The same		14 lbs.	42 do.	Broke.
No. 9.	Larch, same kind as No. 3.	0·8 inch.	7 lbs.	48 do.	No effect.
	The same			54 do.	Broke.
No. 10.	Oak, same kind as No. 5.	1 inch.	7 lbs.	48 do.	No effect.
	The same			54 do.	Broke.
No. 11.	English Oak	1 inch.	7 lbs.	54 do.	No effect.
	The same			60 do.	Broke.

No. 11 was a dark-coloured and apparently very strong piece of wood; specific gravity 0·872 or 54½ lbs. per cubic foot*. On the whole then it appears, that larch is superior to oak in stiffness, in strength, and in the power of resisting a body in motion (called resilience); and it is inferior to Memel or Riga timber in stiffness only.

I am, sir, yours, &c.

Grove End, March 16, 1818. THOMAS TREDGOLD.

* These experiments were made in the presence of his Grace the Duke of Atholl, Lord Prudhoe, Lord James Murray, John Deas Thomson, Esq. William Adair, Esq., Mr. Geo. Bullock, and Mr. Atkinson, architect to the Ordnance.

XXXVIII. *No-*