

**On a peculiar form of elastic tissue found in the ligamentum nuchae of the giraffe / by John Quekett.**

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Quekett, John, 1815-1861.  
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**Publication/Creation**

[London] : [Microscopical Society of London], [between 1850 and 1859]

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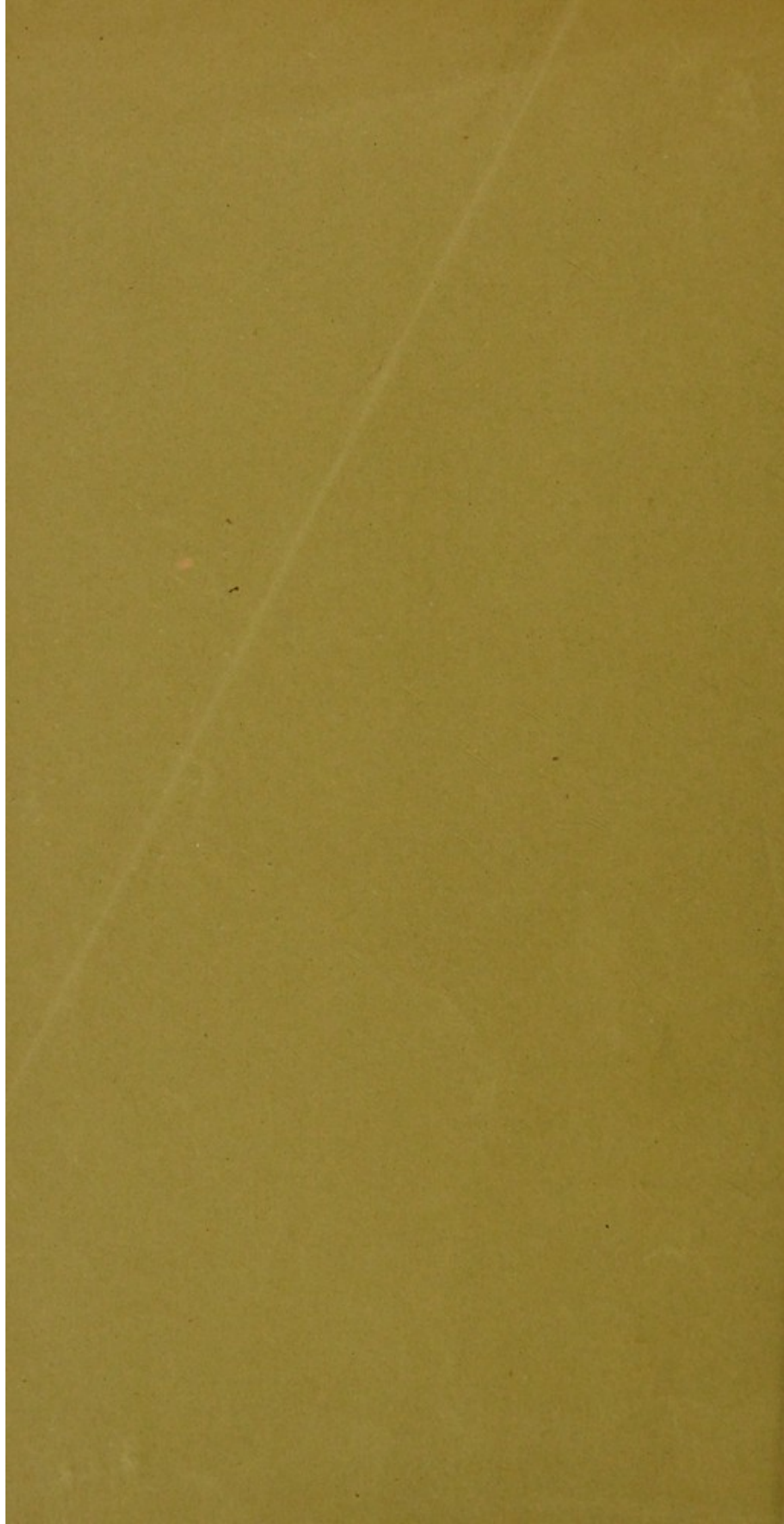
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ON A

## PECULIAR FORM OF ELASTIC TISSUE

FOUND IN THE

### LIGAMENTUM NUCHÆ OF THE GIRAFFE.

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[From the '*Transactions of the Microscopical Society of London*,' Vol. iii. page 45.]

Two kinds of fibrous tissue, *viz.*, the *white* and the *yellow*, are now familiar to most anatomists. They differ from each other in many respects, but chiefly in their ultimate structure, their physical properties, and their colour; both are largely employed in the animal economy, but principally in those parts subservient to the functions of locomotion.

The white fibrous tissue is (when perfectly cleared of the areolar) of a silvery lustre, and is composed of bundles of fibres running for the most part in a parallel direction, but if there be more than one plane of fibres they often cross or interlace with each other; in some specimens it is difficult to make out the fibres distinctly except in certain lights, and in these cases it appears that this tissue may be composed of a longitudinally striated membrane, which may now and then split up into fibres.

The white fibrous tissue is principally employed in the formation of ligaments and tendons, a purpose for which it is admirably fitted on account of its inelasticity; it also is concerned in the formation of fibrous membranes, *viz.*, the pericardium, dura mater, periosteum, perichondrium, the sclerotic coat of the eye, and all the different fasciæ.

It is sparingly supplied with blood-vessels and nerves; the former always run in the areolar tissue connecting the bundles of fibres together, but in the generality of the fibrous tissues the blood-vessels are not well seen except in the dura mater and in the periosteum.



The yellow fibrous tissue is highly elastic ; it consists of bundles of fibres covered with and connected together by areolar tissue ; the fibres are of a yellow colour, in some cases round, in others flattened ; they are not always parallel, but frequently bifurcate and anastomose with other neighbouring fibres. It is always rather difficult to separate the fibres from each other, and when they are separated, the elasticity of each individual fibre is shown by its tendency to curl up at the end. The fibres in the human subject vary in diameter from the one-five-thousandth to one-ten-thousandth of an inch. The acetic acid of ordinary strength does not act on the yellow fibrous tissue, nor after maceration in water or spirit for a very long time does its elasticity diminish. Very long boiling is said to extract from it a minute quantity of a substance allied to gelatine, but no nuclei or trace of cells can be seen in it when acetic acid is added ; these, however, are very readily shown when the white fibrous element is treated with this acid.

The yellow tissue is best seen in the *ligamentum nuchæ* of quadrupeds ; it also occurs in the *ligamenta subflava* of the spine, in the larynx, in the trachea, and in the *transversalis fascia*, and various other parts of the body ; the finest example of this tissue is to be found in the neck of the giraffe. In November, 1846, I removed from the neck of a large giraffe which had died in the gardens of the Zoological Society, in the Regent's Park, the entire *ligamentum nuchæ* ; when *in situ* it was six feet two inches in length ; on separating it from its several attachments to the spinous processes of the vertebræ, it immediately contracted to four feet ; its weight was upwards of eight pounds ; in its centre it was three inches in diameter, and consisted of an elongated cylindrical portion which received considerable addition to its under surface from the spinous processes of the four lower cervical vertebræ ; these portions of the ligament were much flattened, and about one inch in thickness. With the exception of a strong sheath of areolar tissue which passed into its interior, and separated some of the bundles of fibres, the entire ligament was composed of yellow elastic tissue.

When a portion from the outer surface of the ligament was examined with a power of two hundred diameters, it was found that each fibre presented the usual curled extremities so characteristic of this form of tissue ; but what was most remarkable, the individual fibres exhibited a series of transverse markings or striæ, somewhat resembling those of *fibrillæ* of voluntary muscle in particular animals. The transverse markings occur at nearly regular distances



and appear to be produced by the puckering up of an internal membrane, whereby minute cells or spaces are formed like those occurring in the hairs of some of the smaller *Mammalia*. A few of the fibres are represented in Plate X. fig. 3, as seen under a power of fifty diameters, and portions of others magnified five hundred diameters, are shown in fig. 4; in both these the peculiar striated condition is well exhibited. The diameter of the largest fibres is about the one-five-hundredth of an inch, whilst others sometimes occur as small as the one-two-thousandth. When the striæ were first observed, the ligament was in one piece; since then it has been divided transversely in many places, and it has been found that fibres from the centre, although more dense than those from the outer surface, and of much larger size, do not always present transverse markings; in these, however, a linear stripe may occasionally be seen, which would appear to afford an indication of a tubular character. For the sake of comparison, some of these last-mentioned fibres are represented in Plate X. figs. 5 and 6, under the same magnifying power as those of the striped variety; in fig. 6, may be seen some examples of fibres having the stripe in the centre. In order to show how much larger these fibres are than those from the *ligamentum nuchæ* of the sheep, two specimens from the latter animal are given, in figs. 7 and 8, both being viewed under the same powers as those from the giraffe.

As a striated form of elastic tissue has, I believe, never yet been noticed by any anatomist, and as the discovery of a new variety of animal tissue is not of every-day occurrence, I have ventured to bring the subject before the notice of the Society on the present occasion; for it would appear, that this peculiar kind of elastic tissue would form a link between the true striated muscular fibre, and the ordinary elastic tissue, found either in the *ligamentum nuchæ* of quadrupeds, or that in the coats of arteries, in areolar tissue, or in any other of the textures of the animal body, where some substance of an elastic nature may be required.

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## EXPLANATION OF PLATE X.

- Fig. 3. Yellow fibres from the outer surface of the *ligamentum nuchæ* of the giraffe, showing transverse striæ.
- Fig. 4. A portion of the same more highly magnified, showing the true shape of the striæ, and the fact of their not extending across the entire diameter of the fibres.
- Fig. 5. Yellow fibres from the interior of the *ligamentum nuchæ* of the giraffe, showing the absence of the striæ.
- Fig. 6. A portion of the same more highly magnified, showing faint indications of the central linear stripe.
- Fig. 7. Yellow fibres from the *ligamentum nuchæ* of the sheep.
- Fig. 8. A portion of the same more highly magnified.
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Fig. 3. 50 dia.<sup>6</sup>

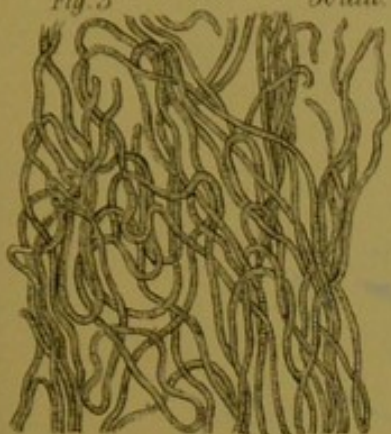


Fig. 4. 500 dia.<sup>6</sup>

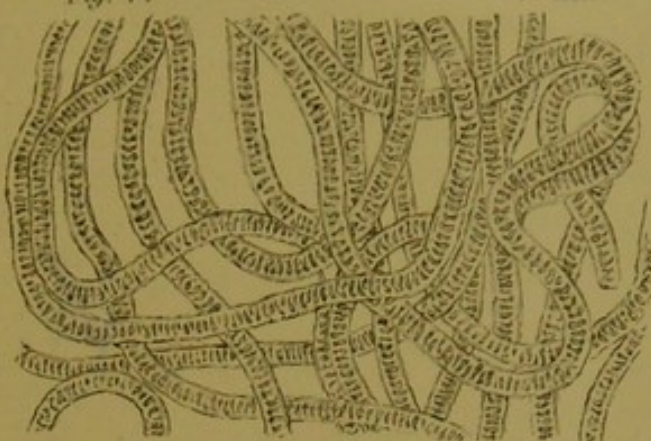


Fig. 5. 50 dia.<sup>5</sup>

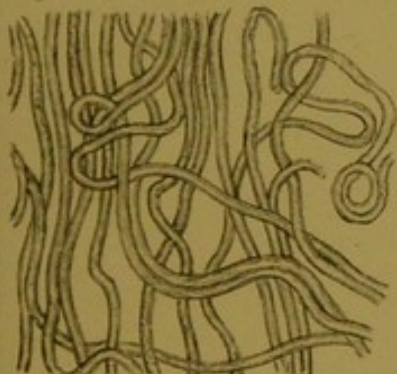


Fig. 6. 500 dia.<sup>5</sup>



Fig. 7. 50 dia.<sup>5</sup>

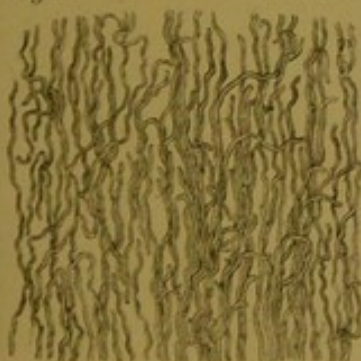


Fig. 8. 500 dia.<sup>5</sup>

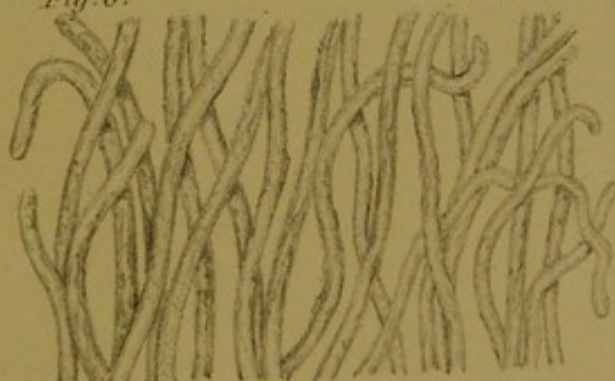


Fig. 1.



Fig. 2.

