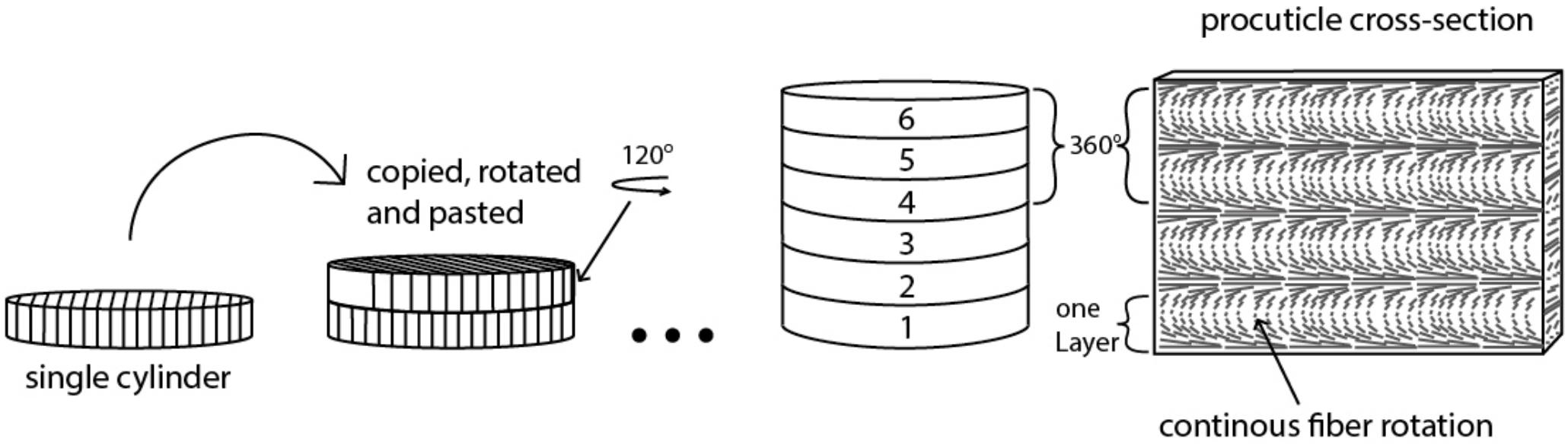

S-Figure 1: Scheme of the procuticle modelling for FEA. First a cylinder was created, subdivided into elements with alternating material properties reflecting the chitin-protein matrix, and afterwards simulated for mechanical impact. Then the initially build cylinder was copied, superimposed, rotated (120°) and pasted on top of the former cylinder, followed by the next simulation. This procedure was repeated to a maximum of 6 stacked cylinders. Each of these cylinders represented 120° of fibre rotation. Thus, three cylinders represented 360° fibre-rotation, equal to two procuticle layers, observed in STEM.

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