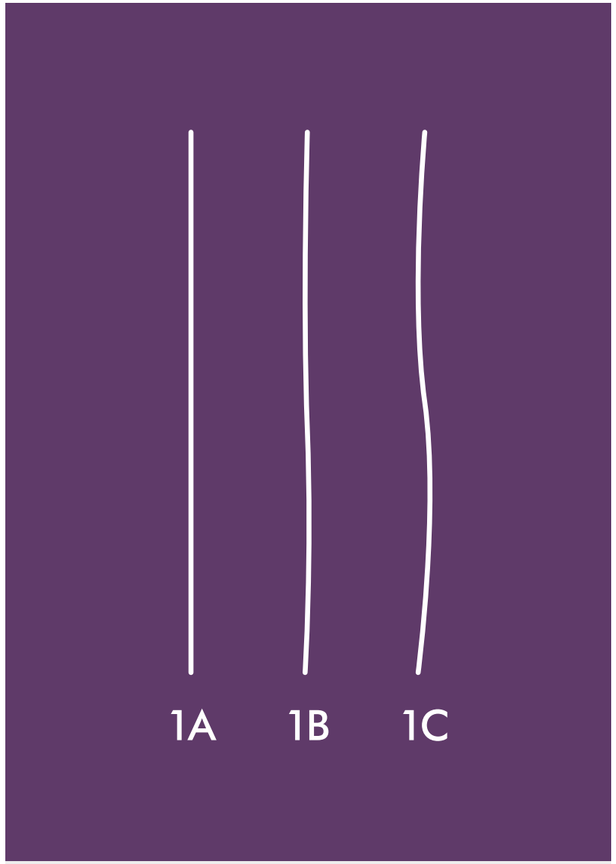
Lesson 02

Structure, composition and bonds

THE JAMES DYSON FOUNDATION

Hair types

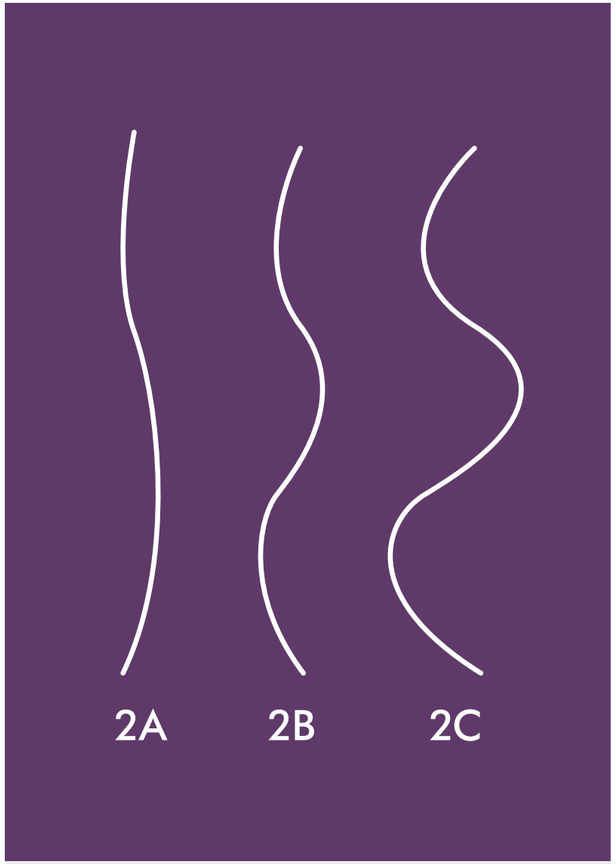


Type 1: Straight

1A. Poker straight

1B. Straight with a slight wave

1C. Straight with a slight wave and some S-waves

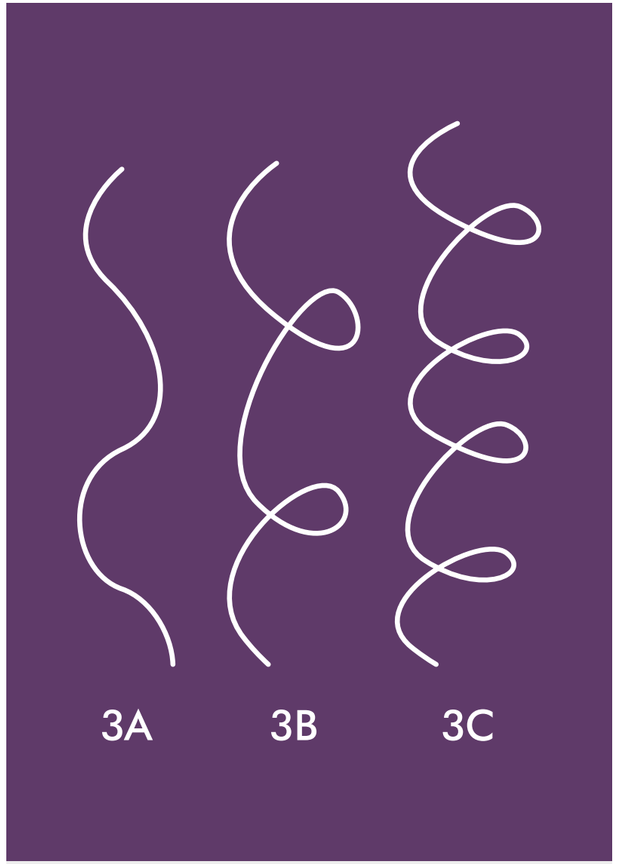


Type 2: Wavy

2A. Loose with stretched S-waves

2B. Shorter more distinct S-waves

2C. Distinct S-waves with some spiral curling

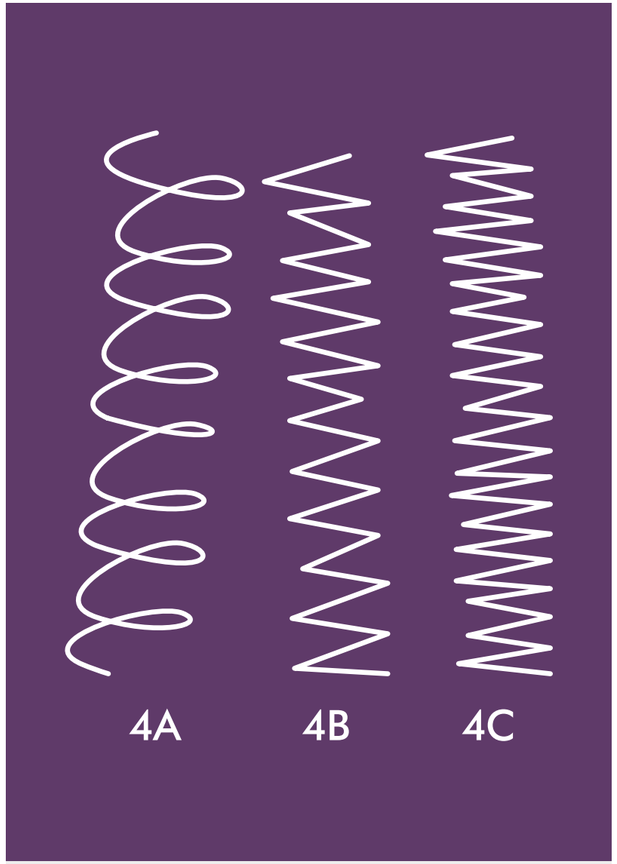


Type 3: Curly

3A. Big loose spiral curls

3B. Bouncy ringlets

3C. Tight corkscrews



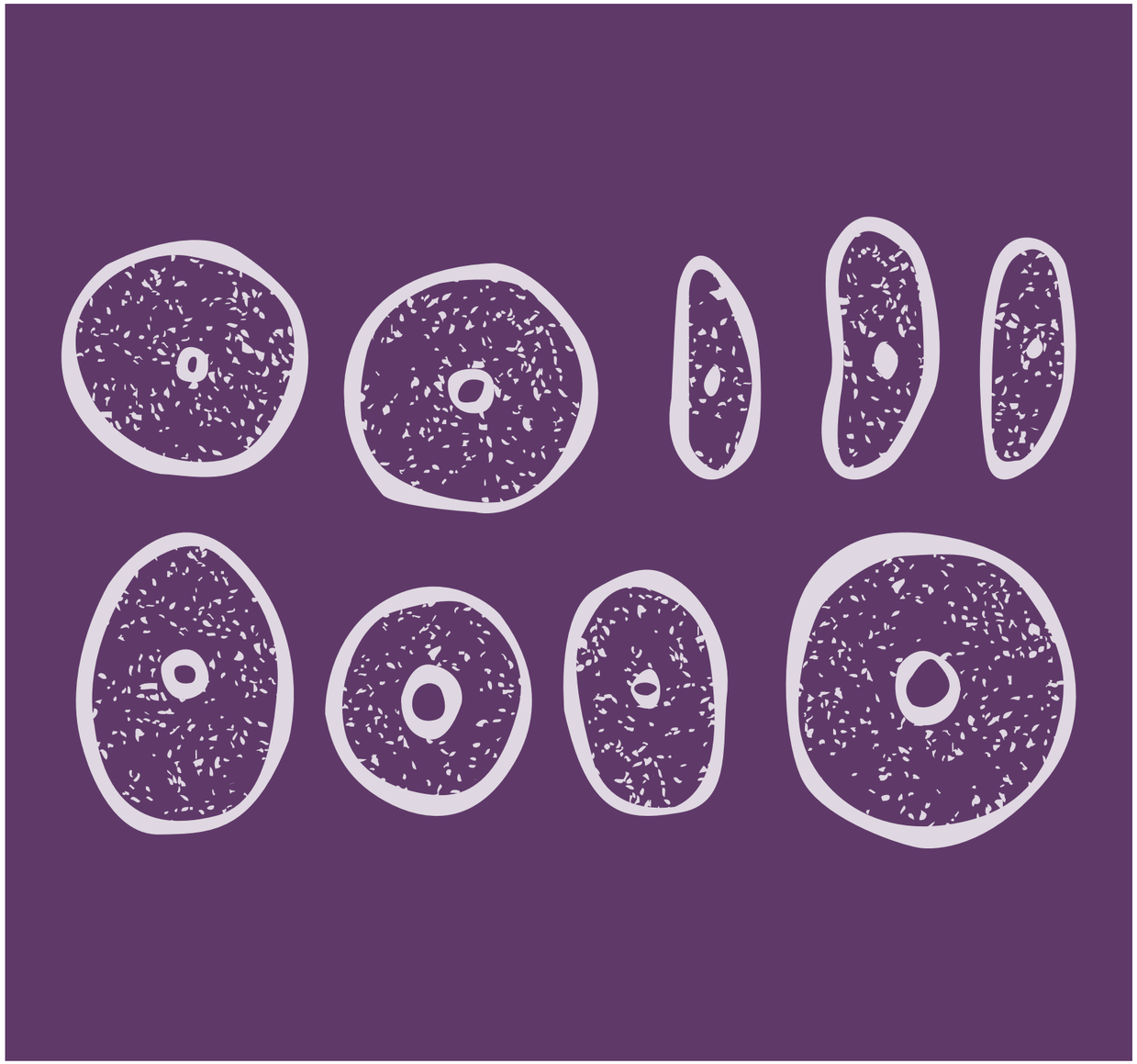
Type 4: Very curly to kinky

4A. Tightly coiled curls

4B. Z-pattern, tightly coiled, sharp angled

4C. Mostly Z-pattern, very tightly kinked

What makes up a hair type?



Shape

Hair can vary from poker straight to tight curls. Straighter hair typically has a rounder cross section. Curly hair, on the other hand, has a flatter, more oval shape.

Diameter

Across all hair types, the diameter of fine hair can be as small as 40 micrometers, with coarse hair being around 120 micrometers.

Volume

Volume is determined by the thickness of hair and the number of hairs a person has. A high number of finer hairs or a lower number of thicker hairs, will have the same overall effect.

Hair composition

Protein

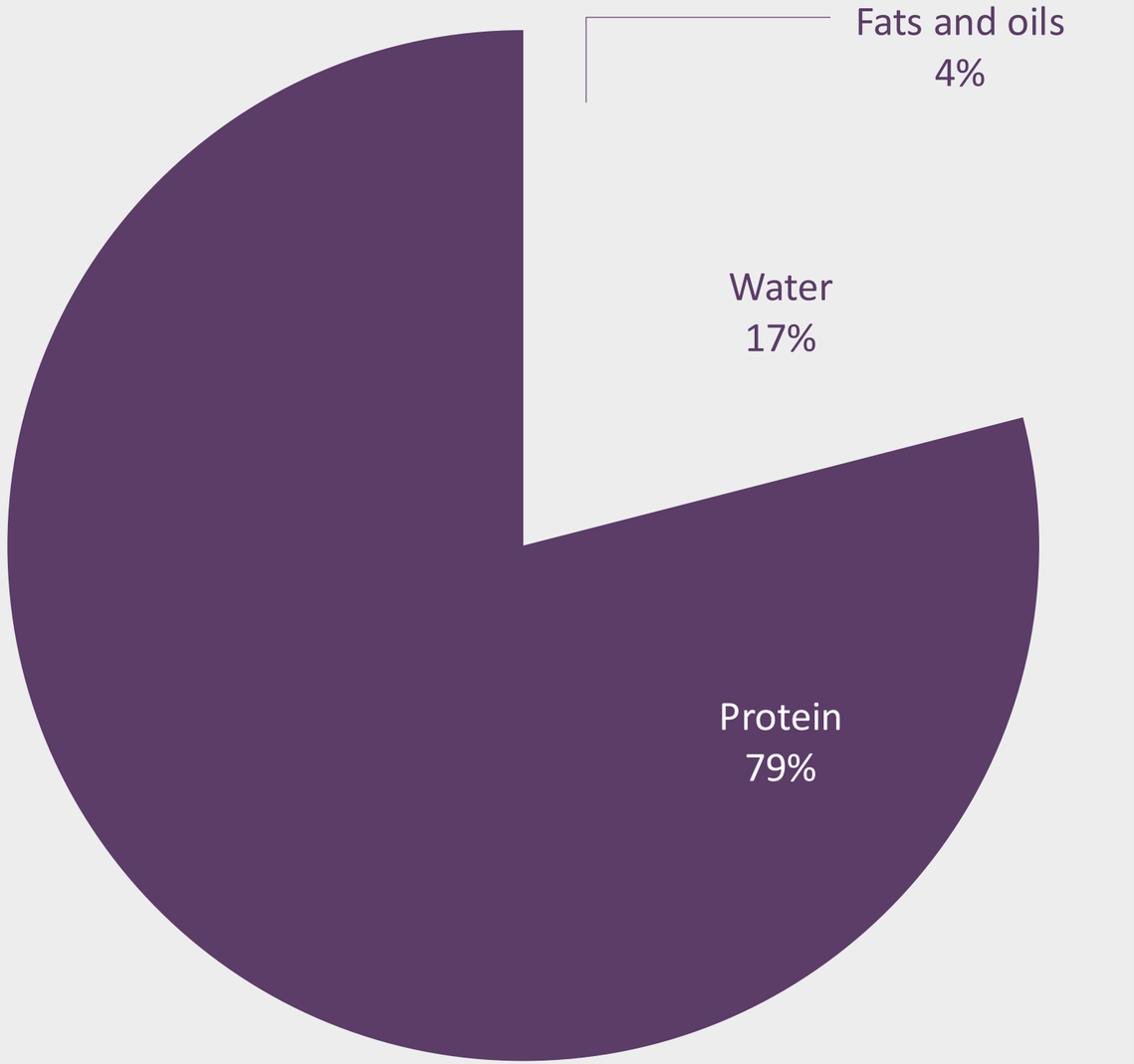
a-keratin is a long, fibrous protein made up of amino acids that gives hair its shape and structural properties. Keratin is also found in nails and skin.

Water

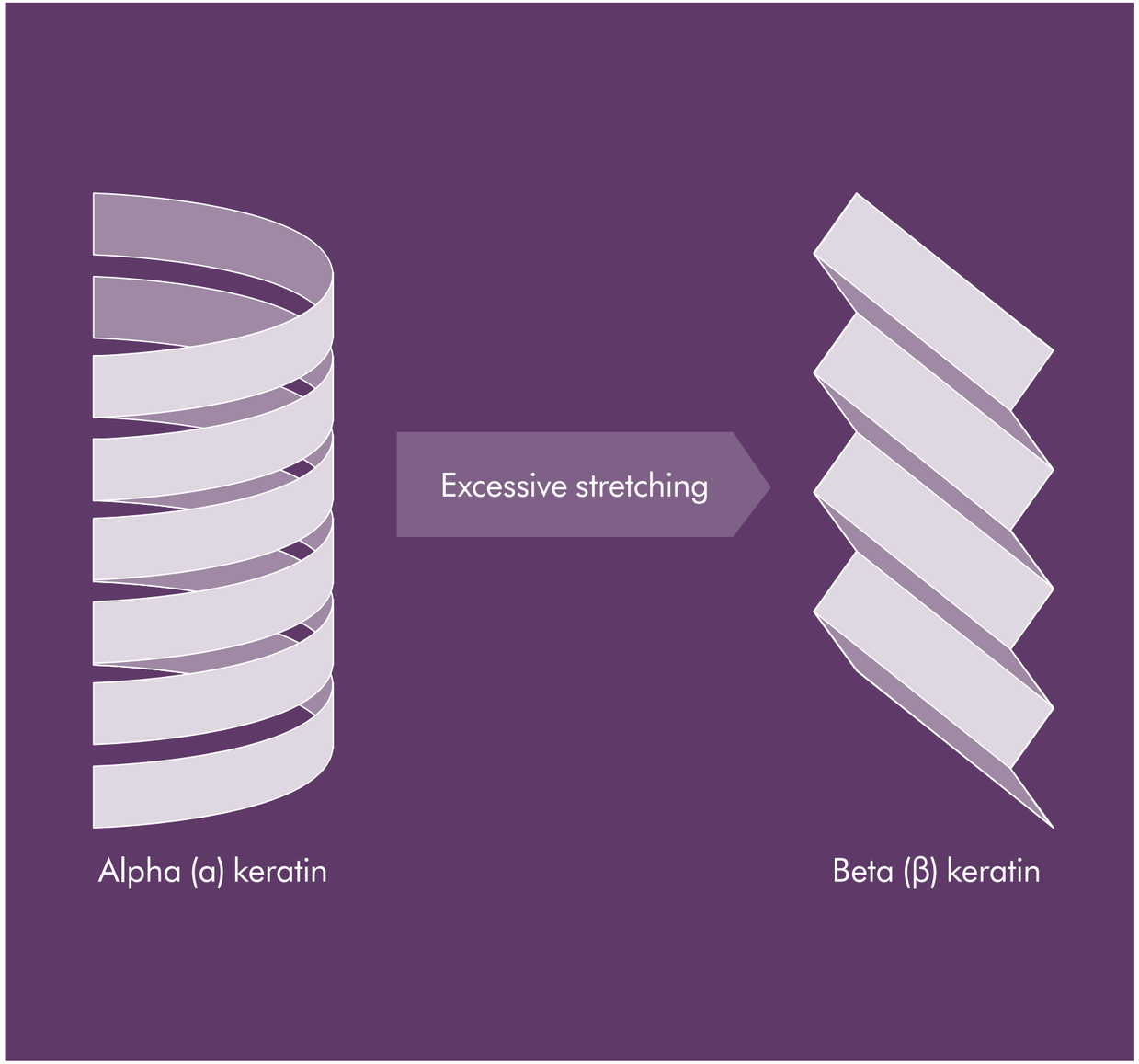
Hair naturally contains ‘bound’ water. The more humid an environment, the more water there will be. When there’s an excess of ‘free’ water, hair is considered wet.

Fats and oils

These act as a glue to help hold the structure and make hair water repellant. The amount produced can be affected by factors such as climate changes and how frequently hair is washed.



What is keratin?



a-keratin fibres are less than
2nm wide and 45nm long

Billions of proteins combine
to form a single strand of hair

Fibres combine to form
larger cortex cell structures

Fibres and structures are held together
by a matrix that acts like a glue

The shape of keratin is like a spring,
which allows hair to stretch slightly

When hair is stretched too far,
it changes permanently to β-keratin

Disulphide bonds

Strong, permanent bonds that give hair its strength

Disrupted by very high temperatures and chemical treatments

Formed within keratin and connect the fibres together

Salt bridges

Weak, temporary bonds that can be broken and reset

Can be broken during styling and chemical treatments

Can be broken by high pH levels, water and heat

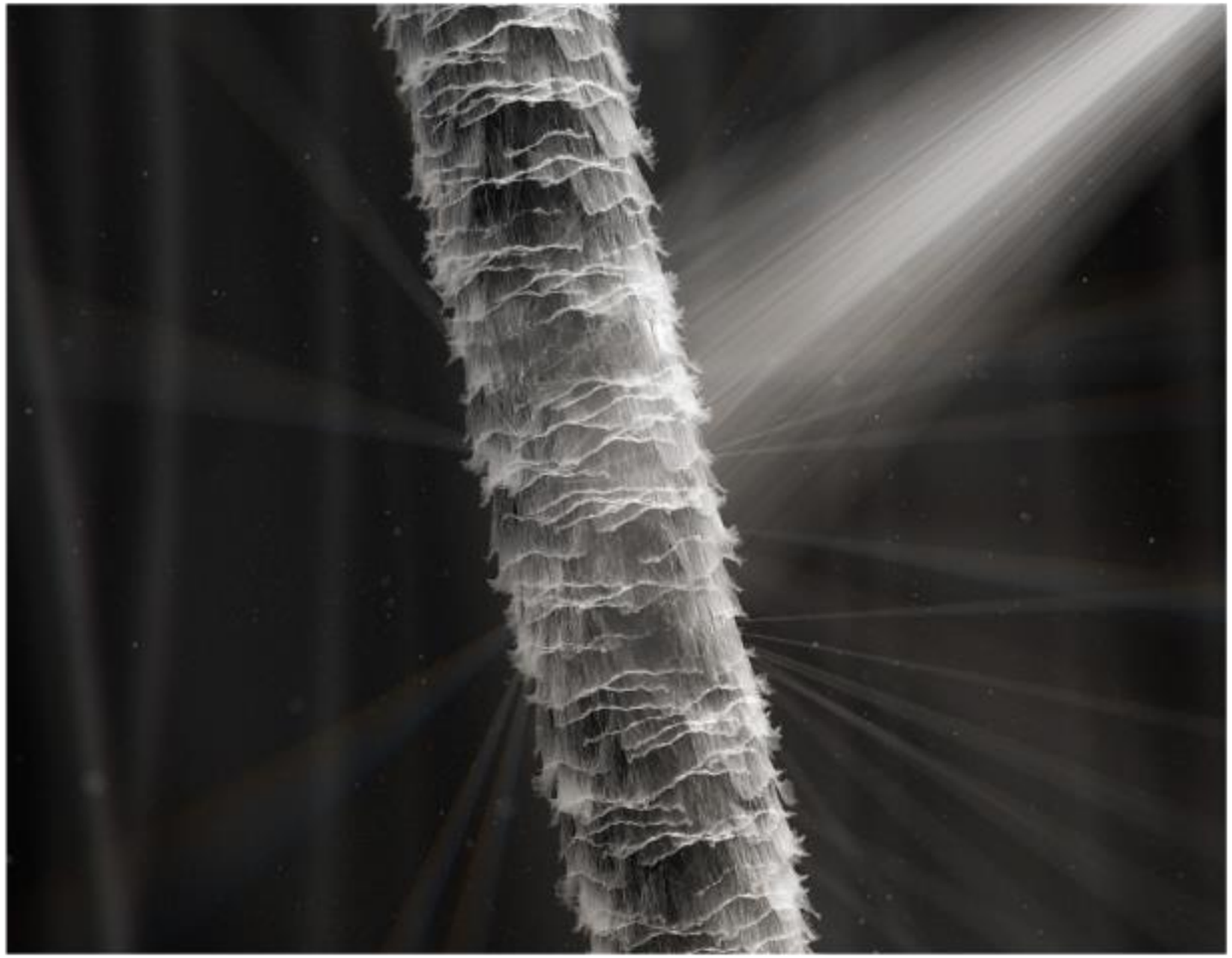
Hydrogen bonds

Temporary bonds that are naturally weaker

Can be easily broken by water and/or heat

Can reset during styling, making it easier to style hair

Hair fibre structure



Cuticle

Cortex

Hair colour

	Black eumelanin	Brown eumelanin	Pheomelanin
High pigmentation			
Low pigmentation			

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