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nature REVIEWS

december 2002 volume 3 no. 12
www.nature.com/reviews

MOLECULAR CELL BIOLOGY

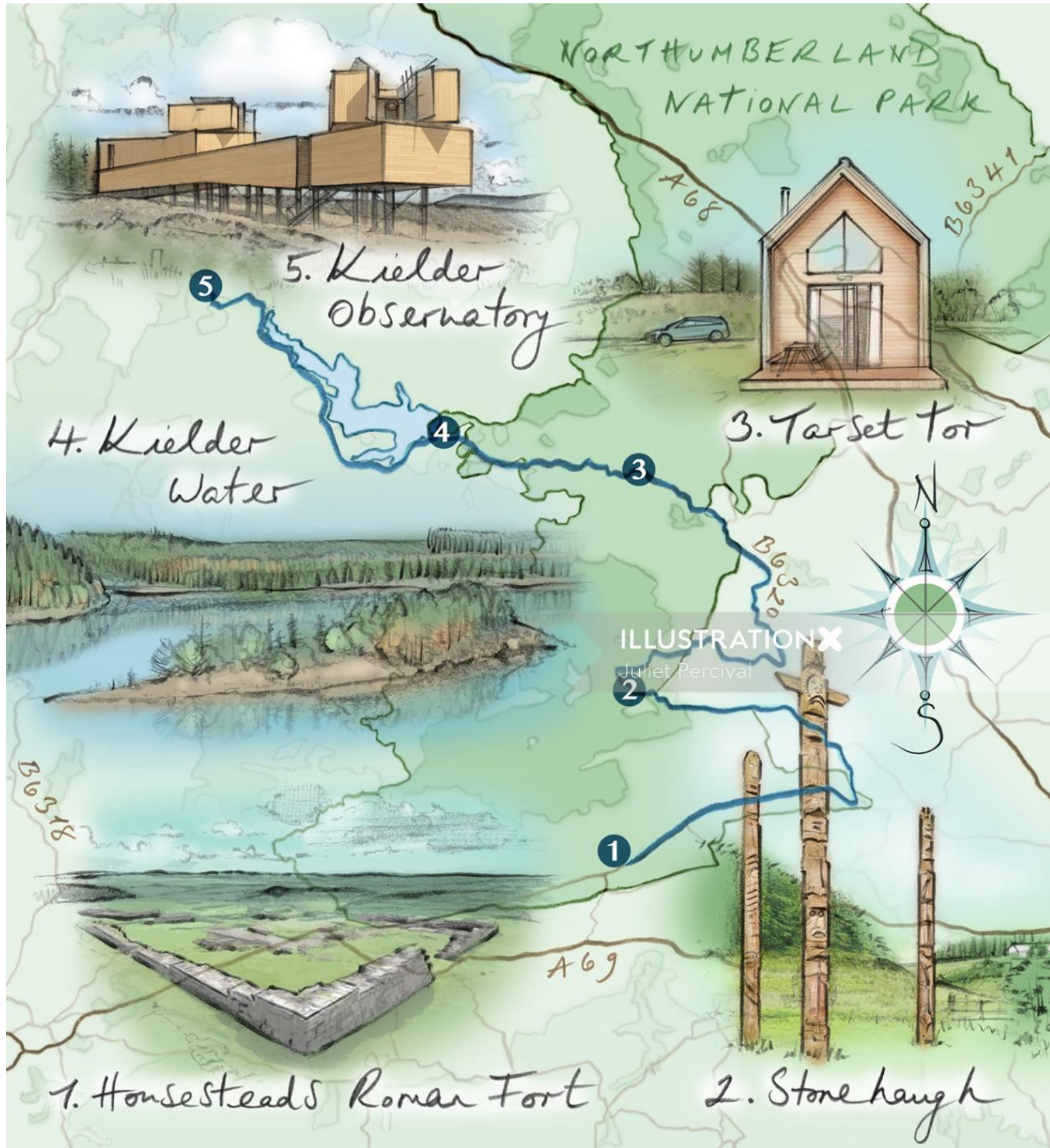


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Cell Migration

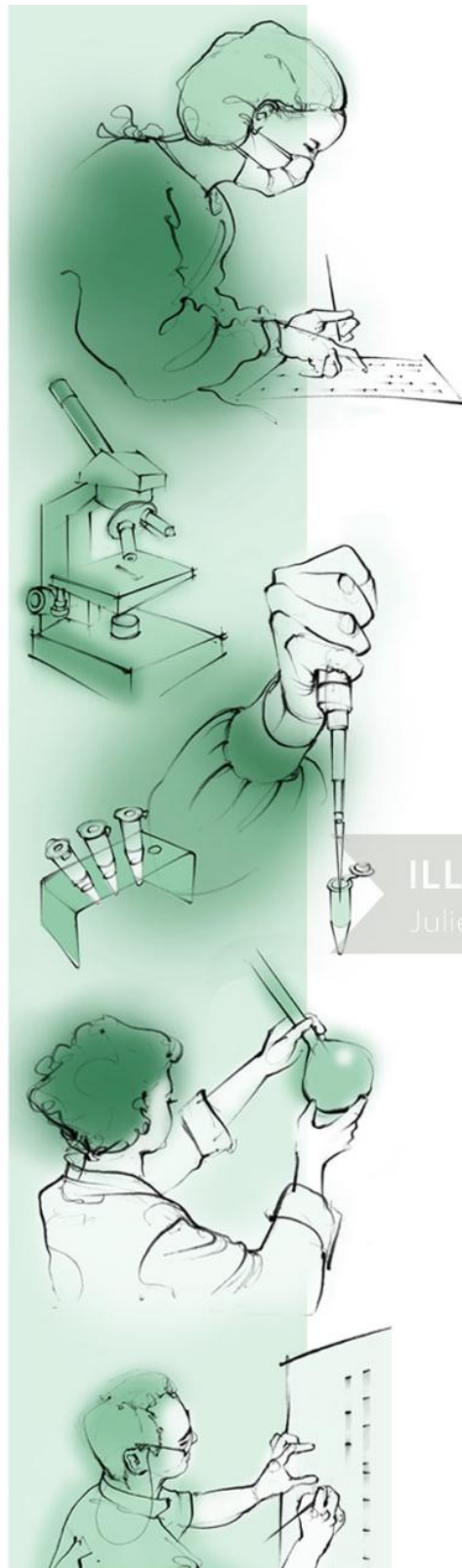
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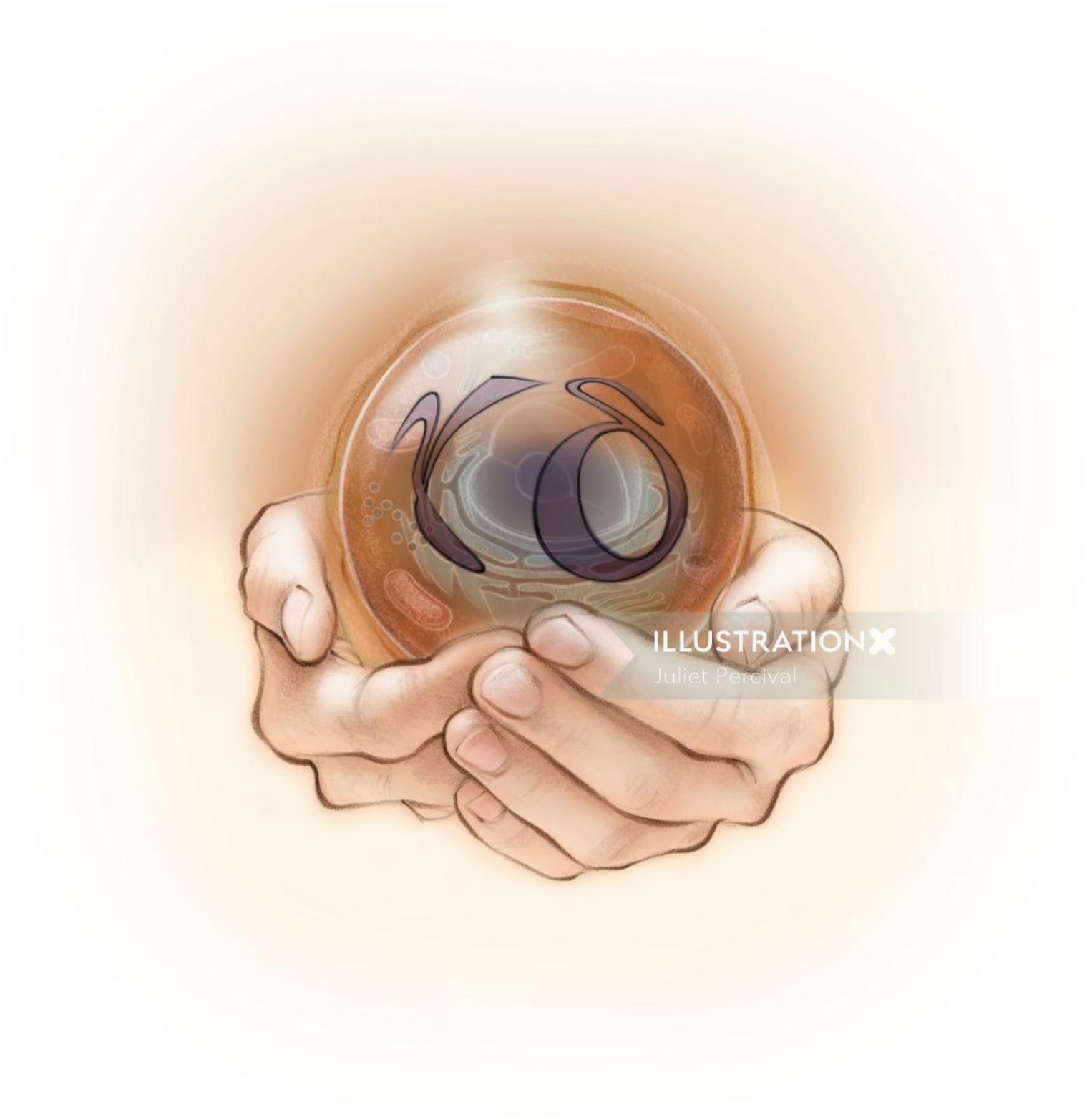
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THE PILGRIMAGE OF LIGHT

The nearly 145 mile Pilgrimage of Light was walked in 8 separate linear stages of approximately 20 miles each, as group social walks, between February - March 2022.

HOLY ISLAND TO BELFORD
Saturday 15th October
16m

HIGH NEWTON-BY-THE-SEA TO BELFORD
Saturday 1st October
7m

WARKWORTH TO HIGH NEWTON-BY-THE-SEA
Saturday 3rd September
17m

ROTHBURY TO WARKWORTH
Saturday 9th July
18m

KIRKWHELPINGTON TO ROTHBURY
Saturday 25th June
15/20m

HEXHAM TO KIRKWHELPINGTON
Saturday 30th April
22m

CASTLESIDE TO HEXHAM
Saturday 26th March
21m

DURHAM TO CASTLESIDE
Saturday 26th Feb
20m

Combining two long-distance paths:

- 1) The Northern Saints Trails, Way of Light. This is a new trail, 45 miles long, from Durham Cathedral to Heavenfield, which transports us on a journey through Christianity's illustrious history in the North East.
- 2) St Oswald's Way. This more established path, 97 miles long, from Heavenfield to The Holy Island of Lindisfarne, links a number of places associated with the King Saint, Oswald.

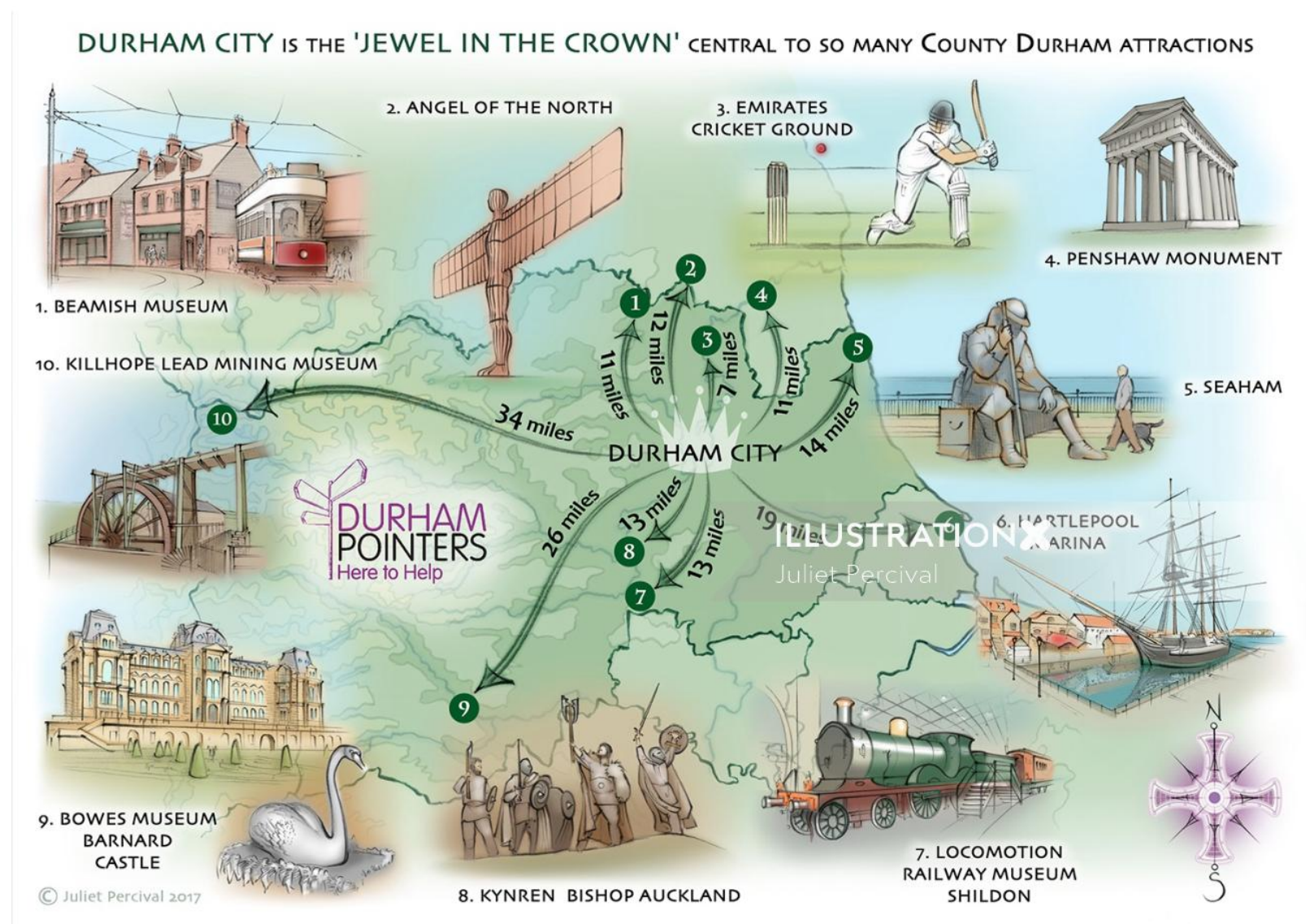
The Pilgrimage of Light Walk was organised by Paul Nellist, Northumbria Group LDWA Walks Secretary, to commemorate the 50th anniversary of the LDWA 2022.

PILGRIMAGE OF LIGHT
LDWA
NORTHUMBRIA GROUP

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FEATURE | MOTHS AT NIGHT

Shine a light

Optometrist and Butterfly Conservation member **Simon Berry** discusses his remarkable research into how nocturnal insects' eyes adapt so they can see at night.

I've always been interested in photography and capturing things that are unusual or have never been seen before. At my optometry practice, we use a specialist bit of equipment called an OCT (Ocular Coherence Tomography) scanner, which shows a cross section of biological tissue. This 3D scanner, sometimes likened to optical ultrasound, is very useful in diagnosing certain eye conditions.

A few years ago, I became interested in whether this scanner could be used to scan insect eyes, and wondered if it could reveal something new about them. In 2018 I started scanning butterfly eyes – I managed to scan 12 different species of our local butterflies found in Durham. This is the first time anyone has ever scanned a compound eye with an OCT scanner. For someone used to looking at these scans, the scans do look unusual, but they didn't really show anything new about butterfly anatomy. Then in 2019, I started scanning moth's eyes, and they turned out to be more interesting.

Adaptation
To see effectively at night, moths and other nocturnal insects have a problem they must overcome. When light levels are low, their eyes need to be very sensitive, but they also need a way of adapting to environmental light conditions, and protecting those sensitive organs, if they encounter a bright light.

Human eyes have a pupil that changes size to regulate the amount of light entering the eye. Moths have a different method – their eyes have a light-absorbing pigment that can move around to protect them in the light. This pigment migrates into a clear zone in the eye. This is a dynamic process and only occurs in a live moth.

When a moth is 'dark adapted', the pigment is squeezed in between the rhabdoms in the eye. This allows the maximum possible light to pass through the eye to the retina. When the insect becomes 'light adapted', the pigment migrates into a clear zone within the eye, blocking the light and reducing the amount of light reaching the moth's retina.

We know about this process of light adaption in because they have a tapetum (similar to a cat's eye) which means that moths' eyes glow when light is shined directly at them. The state of adaption can be measured by how brightly their eyes glow.

Simon Berry
Optometrist and Butterfly Conservation member

DARK ADAPTED | **LIGHT ADAPTED**

Crystalline core layer | Pigment | Rhabdom layer

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cornea | crystalline cone layer | CLEAR ZONE | rhabdom layer | axons | basal lamina

New ground
By using OCT technology on insect eyes for the first time, my research has shown that this can be used to visualise the structures and processes within the compound eye of a live moth. The big advantage of this is that the results

Above: This illustration shows the pigment migration that occurs inside an insect's eye during light adaption, to protect them in the light.

The only other way of seeing the pigment migration in a moth is to look at the eye of a dead insect under a microscope.

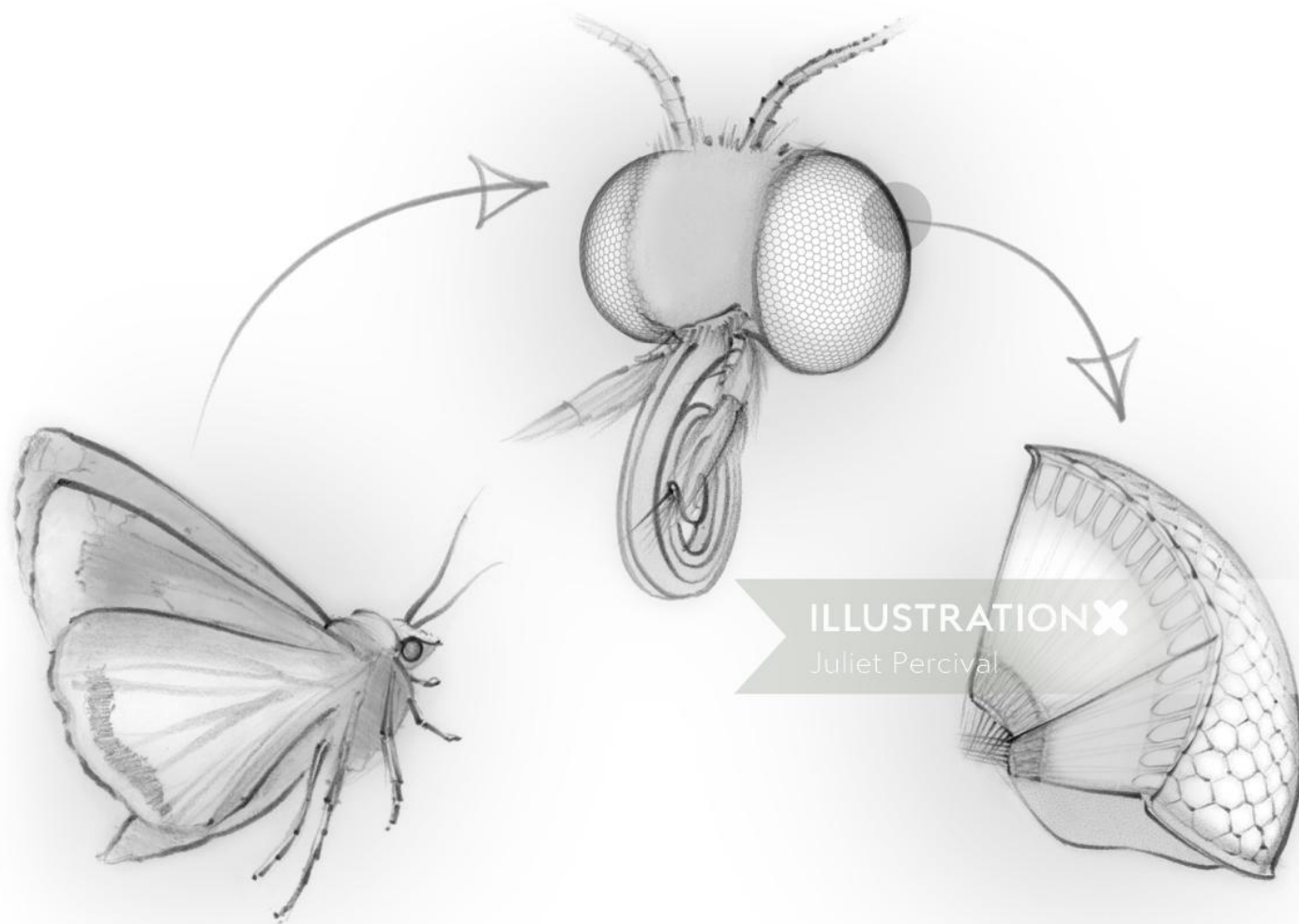
Photo:

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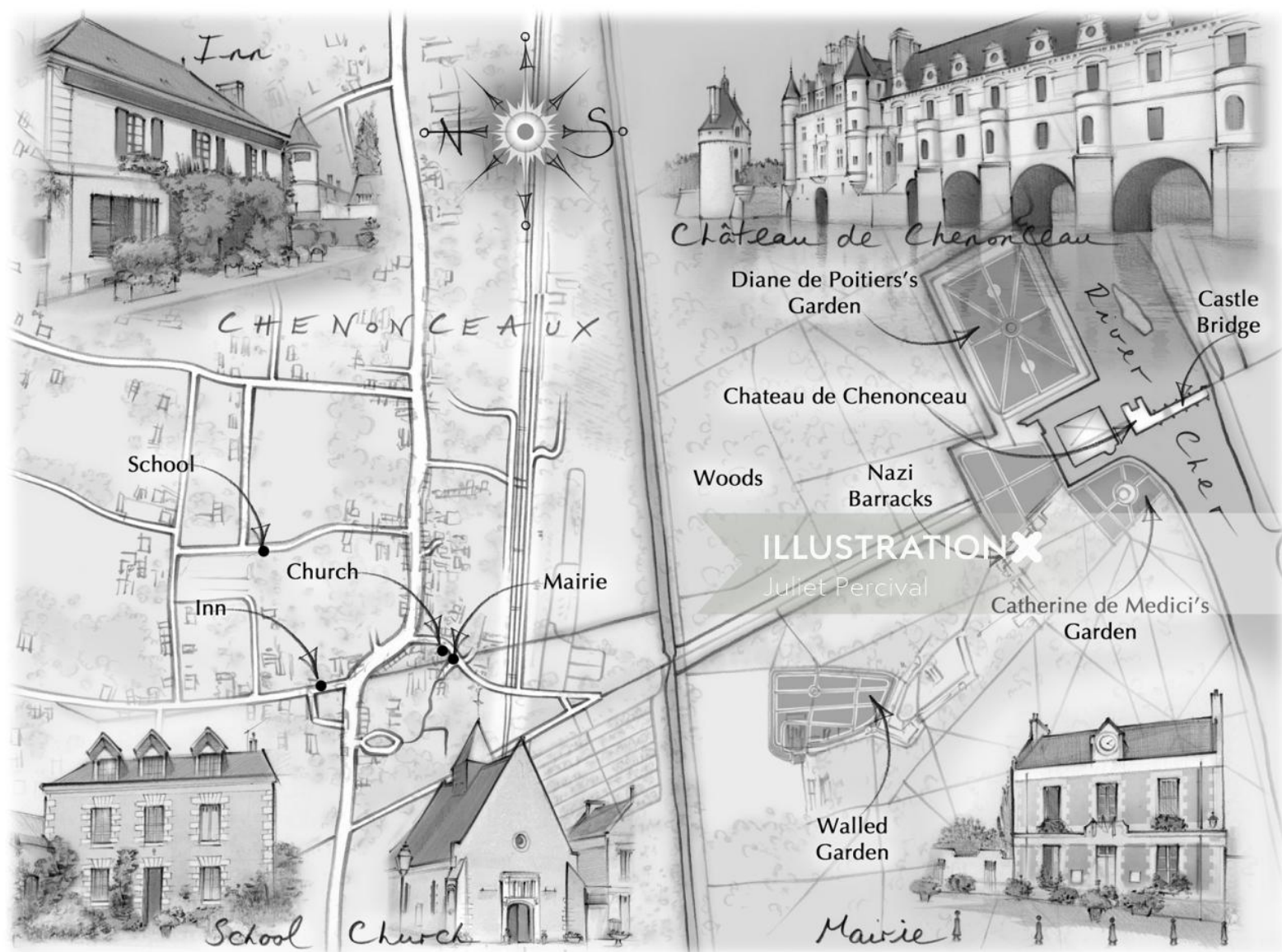


**Large yellow
underwing moth**

**Section through
compound eye**

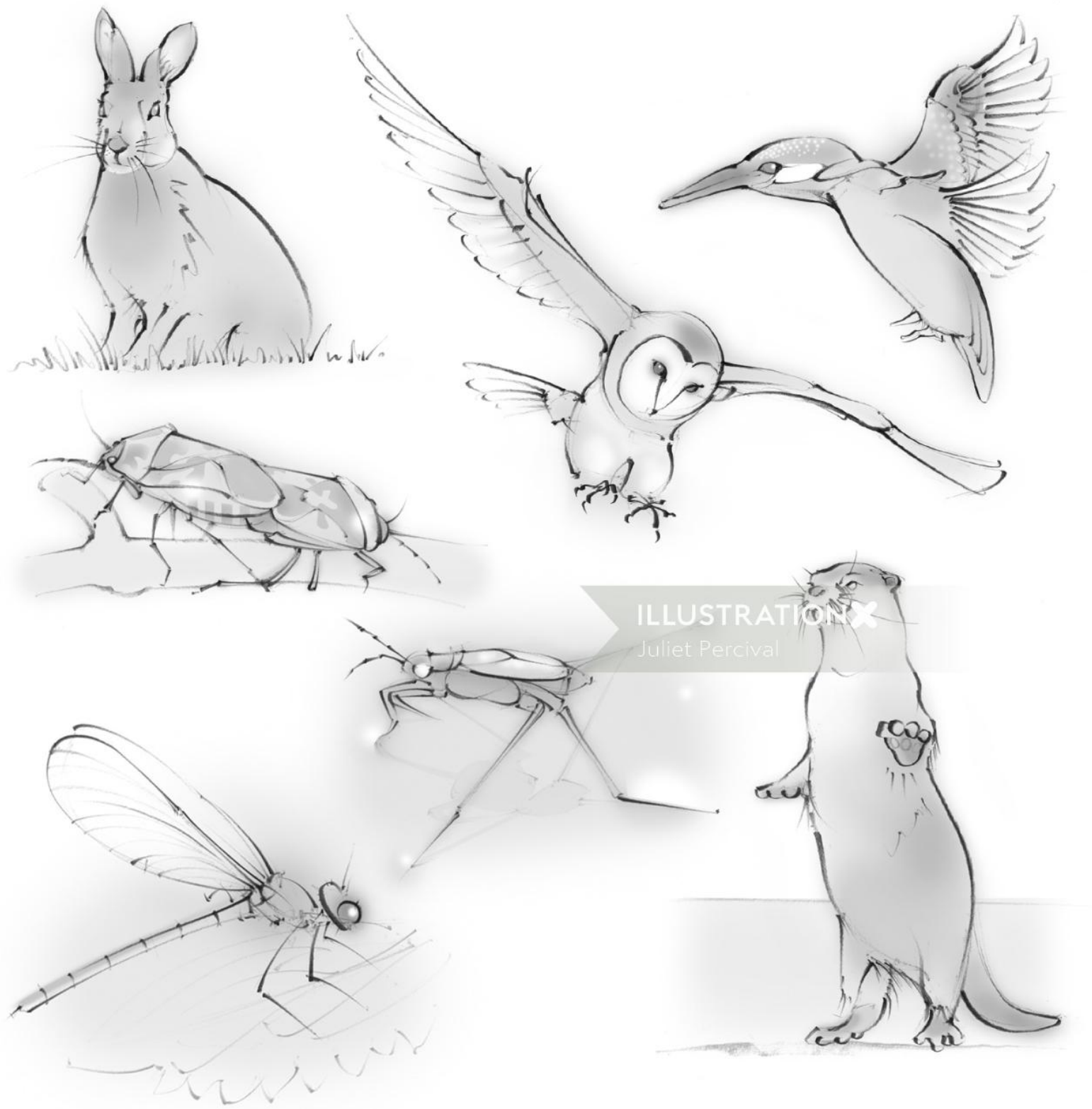
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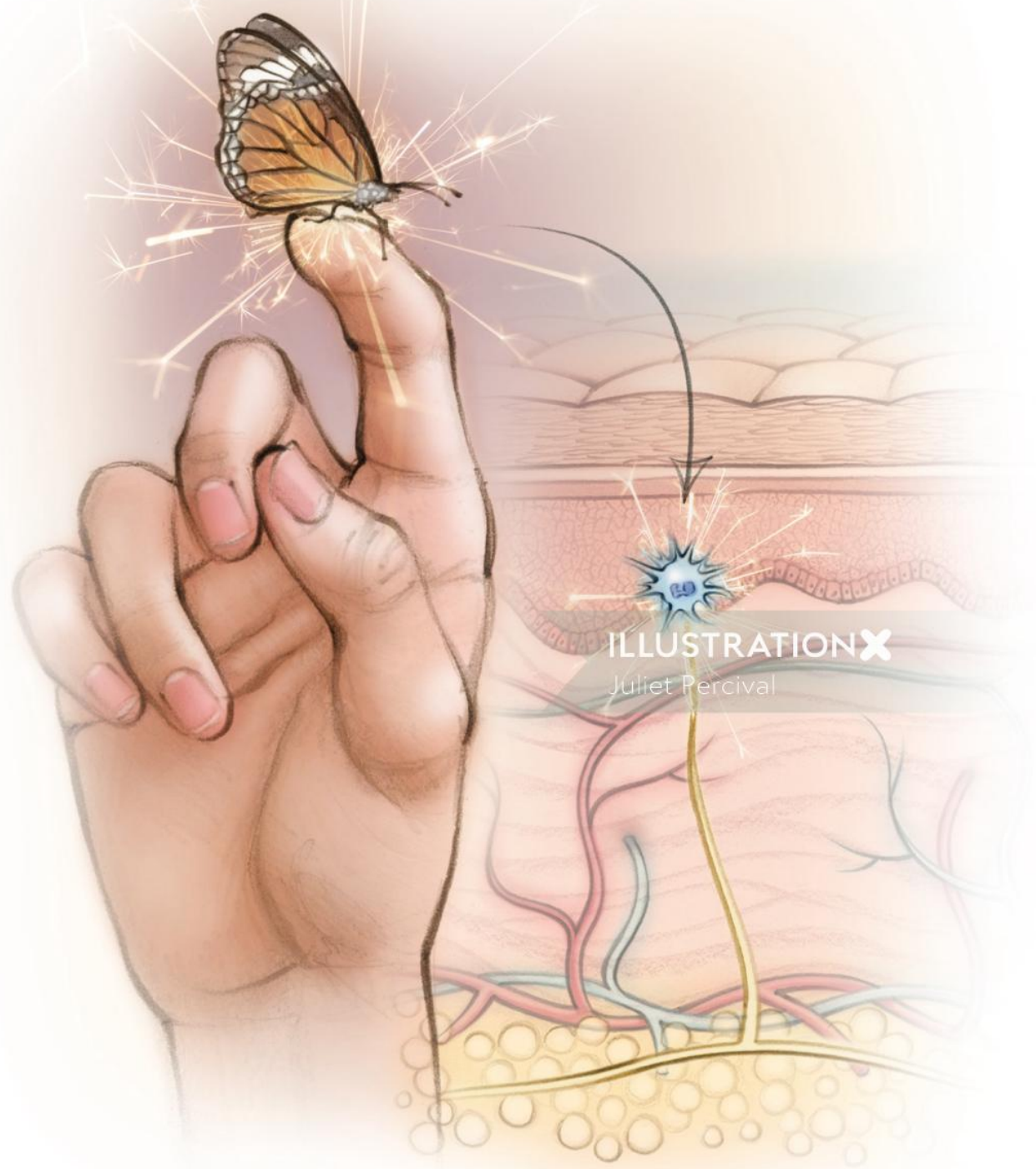
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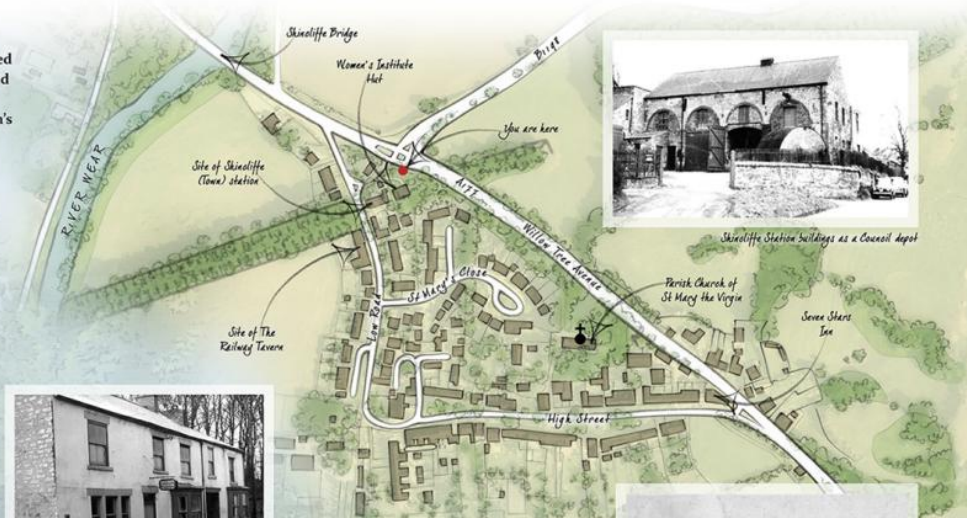
THE SHINCLIFFE WOMEN'S INSTITUTE HUT



The Shincliffe Memorial Hall, as it was initially known, was opened in 1922 to commemorate local men who had died in the First World War. The building was destroyed by a fire in 1923 but was quickly rebuilt that same year. It has been the home of Shincliffe Women's Institute ever since.

The hall was built on the approach to Shincliffe's first railway station. When it was opened by the Durham and Sunderland railway company in 1839, it was the nearest station to the city of Durham. Closed in 1893, it was turned into a Council depot, making use of the warehousing which had been built beneath the platforms. More recently it was redeveloped as housing. The nearby Railway Tavern in Low Road closed in the early 1990s and has been converted to flats.

Shincliffe W.I. and Shincliffe Local History Society, with support from Durham County Council, have produced this information board to mark the centenary of the hall. There are memorial plaques in St Mary's Church listing the names of those who fell in the two world wars. For more information about Shincliffe's Roll of Honour and Shincliffe W.I., go to www.shs.uk or scan the QR code below.



Shincliffe Station buildings as a Council depot



The former Railway Tavern in Low Road

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The WI Hut under construction, 1925



St Mary's Church, 1910



Looking towards The Seven Stars, c 1920



SHS
SHINCLIFFE
LOCAL HISTORY
SOCIETY



Design and illustration: [juliet Percival](http://www.julietpercival.co.uk) Our thanks are extended to Durham County Council for supporting the installation of this board.



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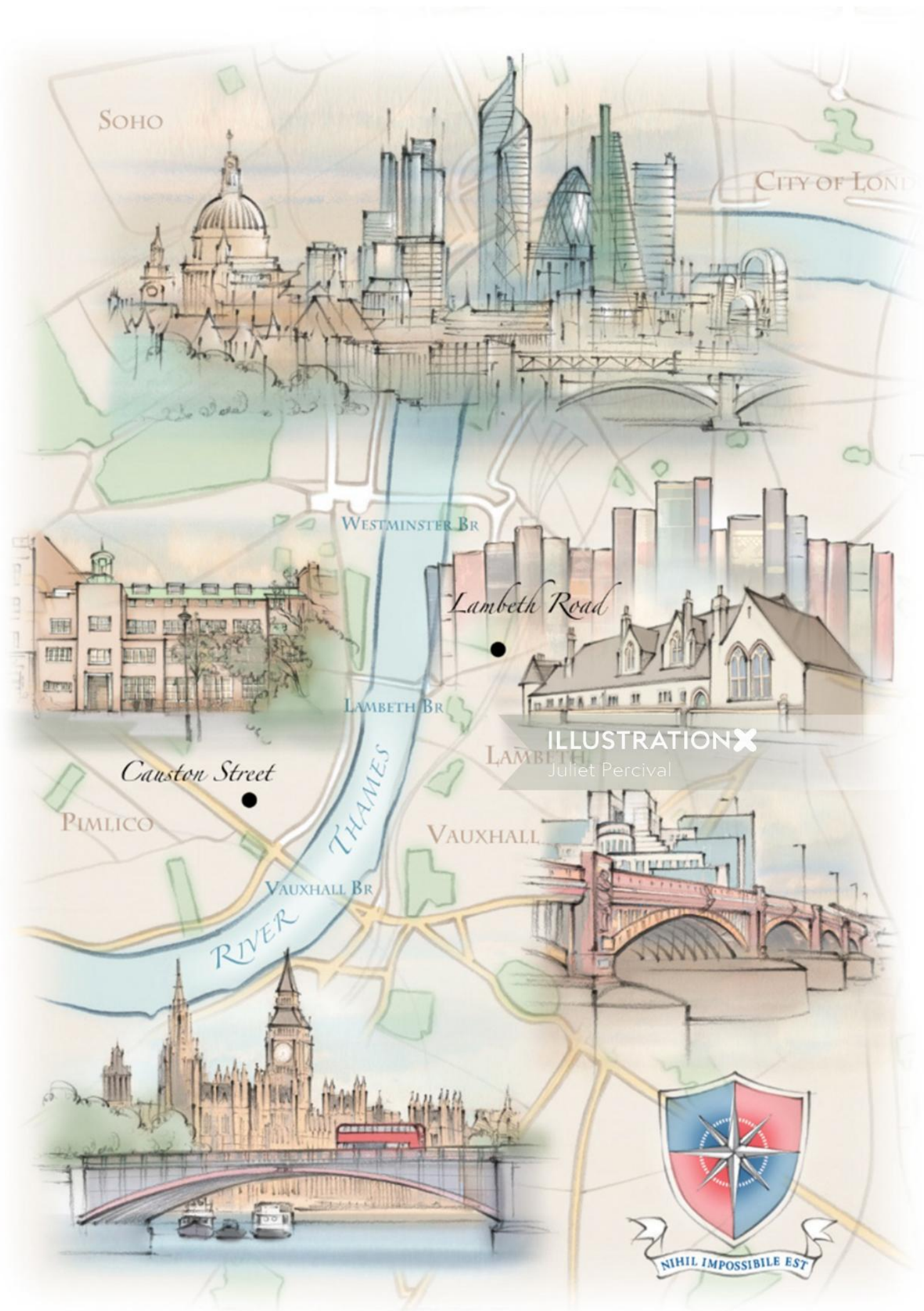
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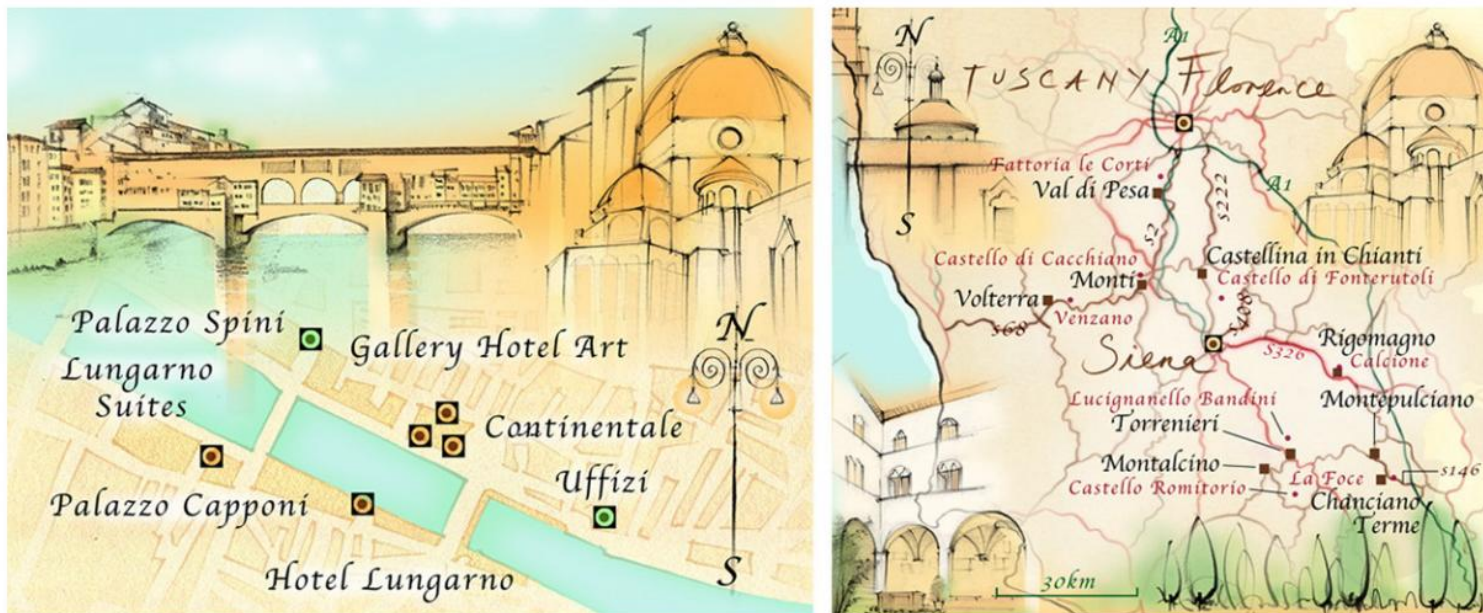
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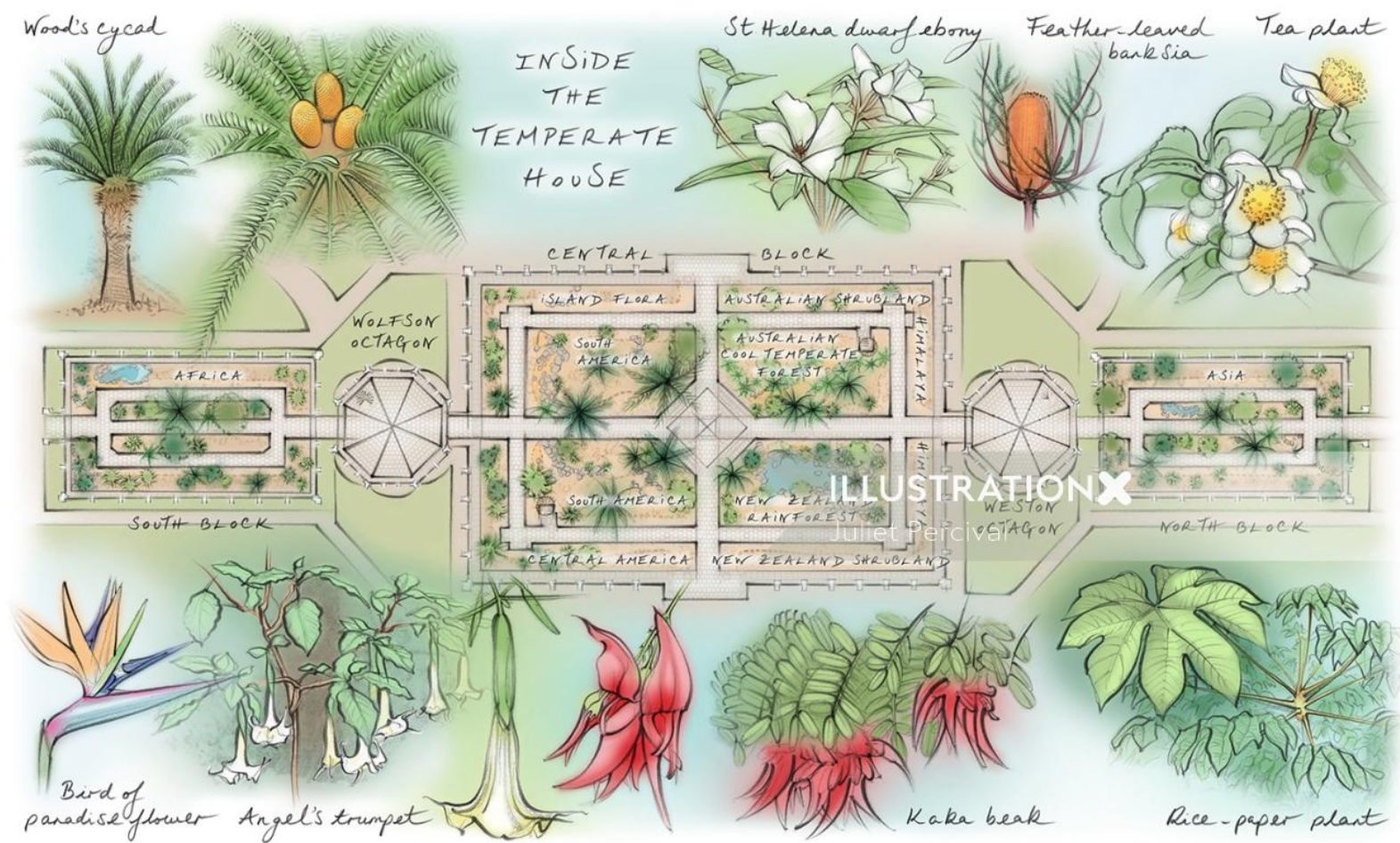
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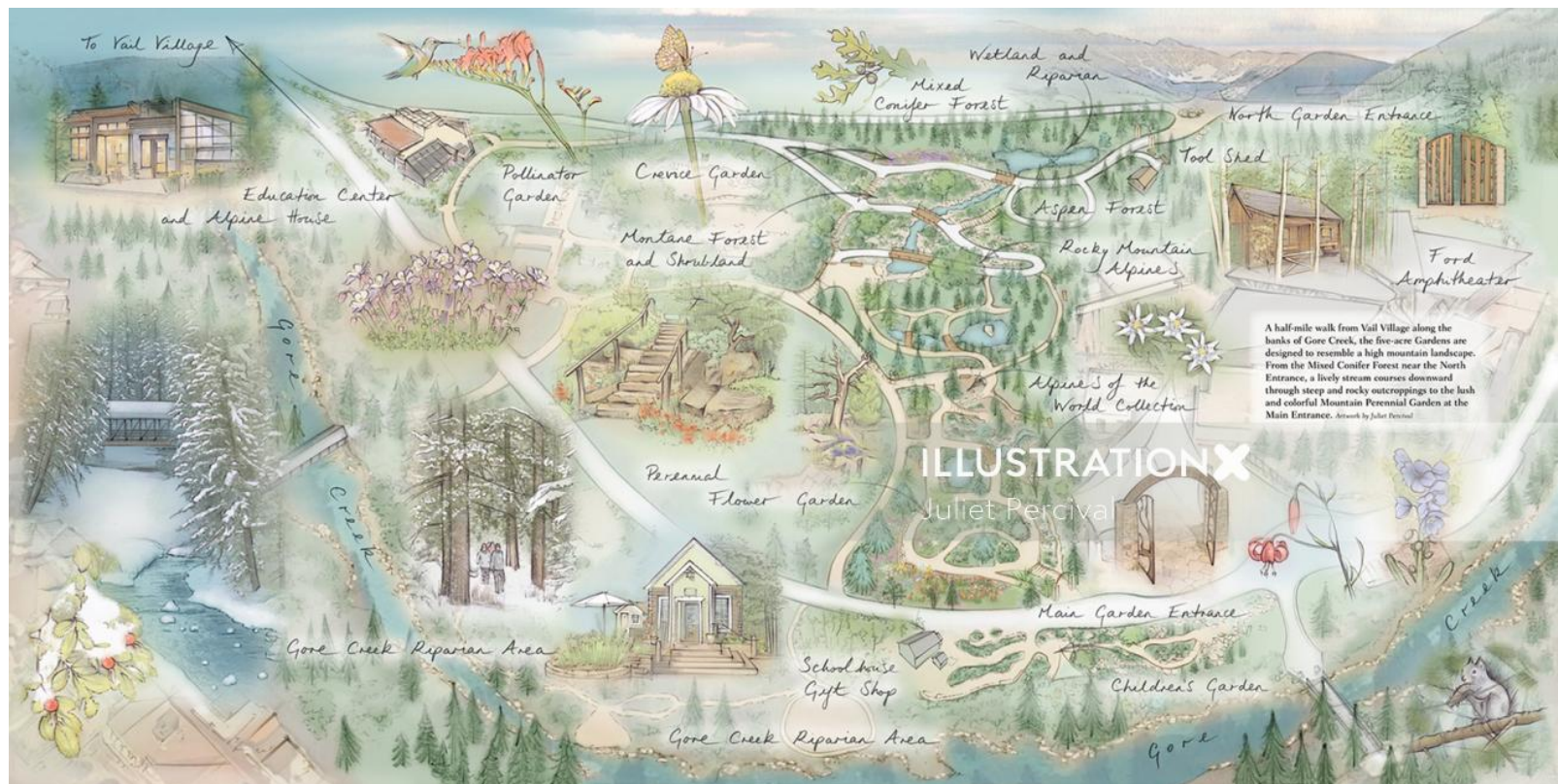
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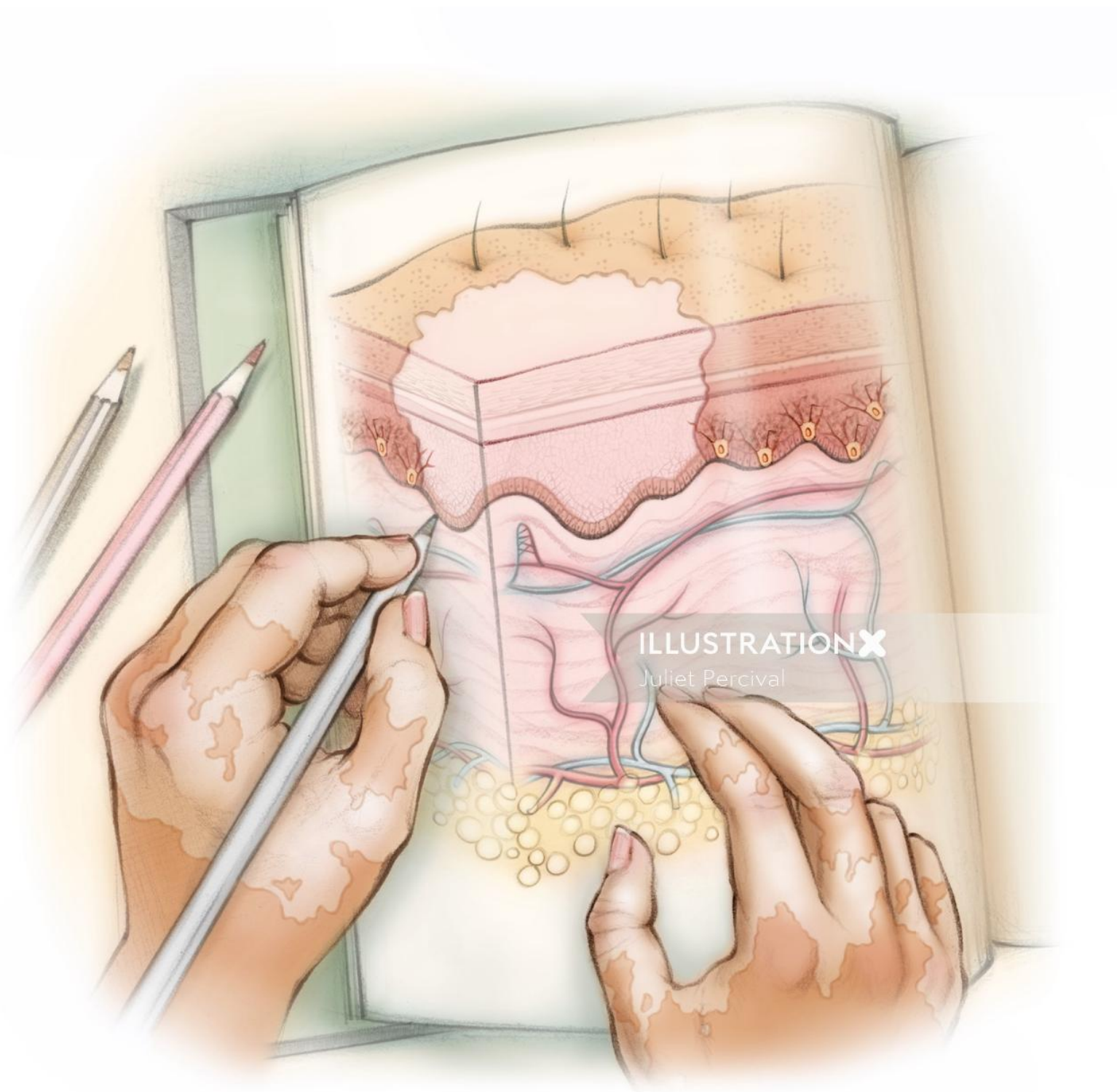
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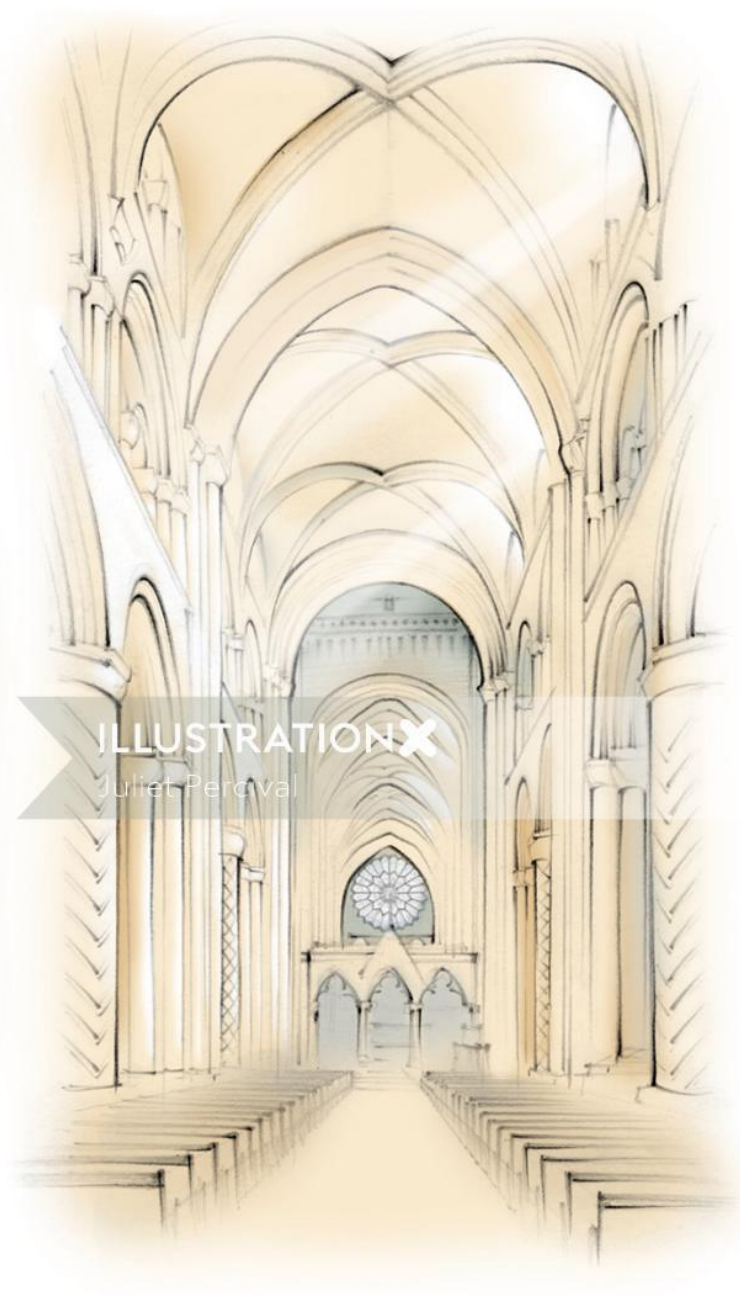
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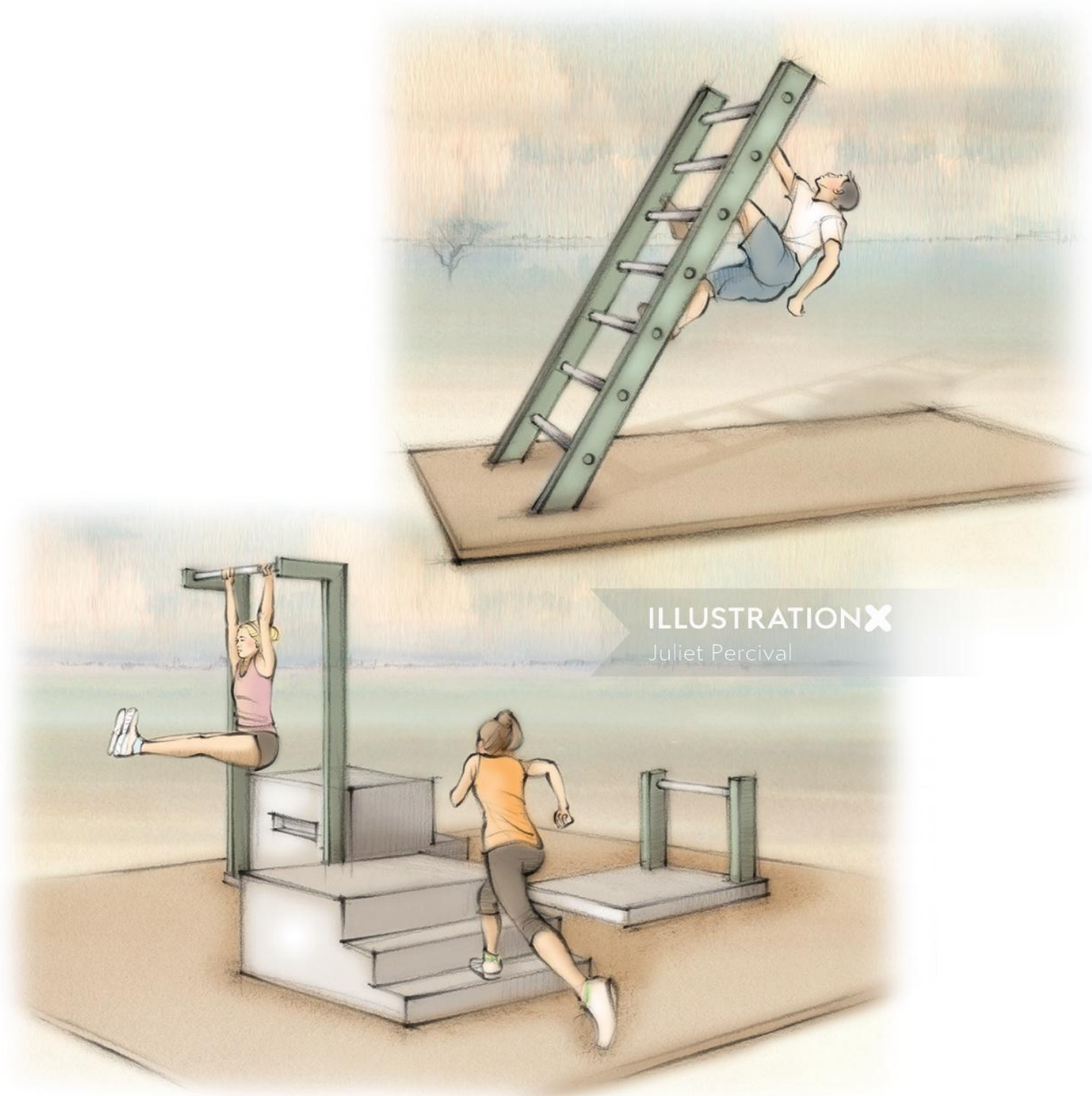
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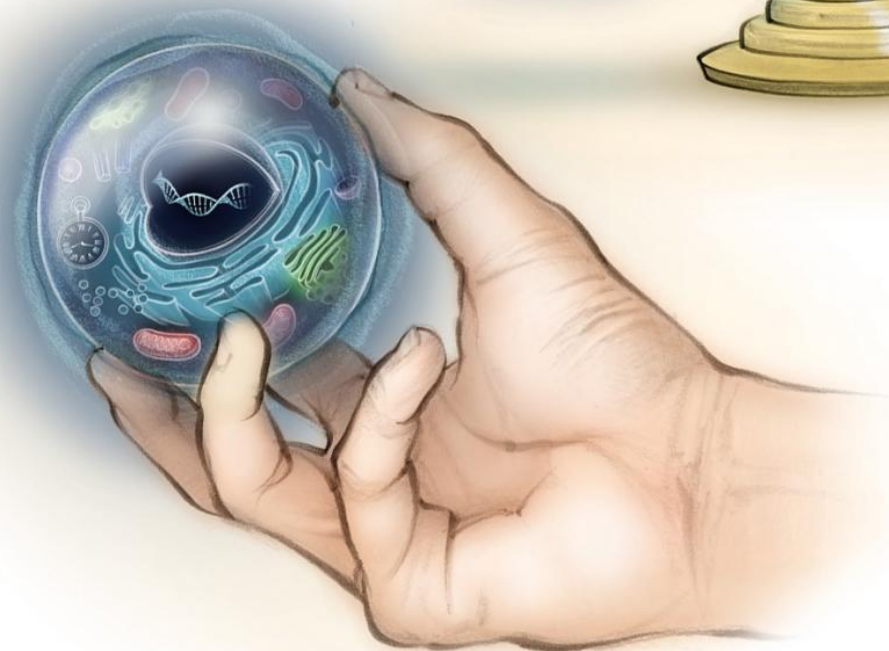
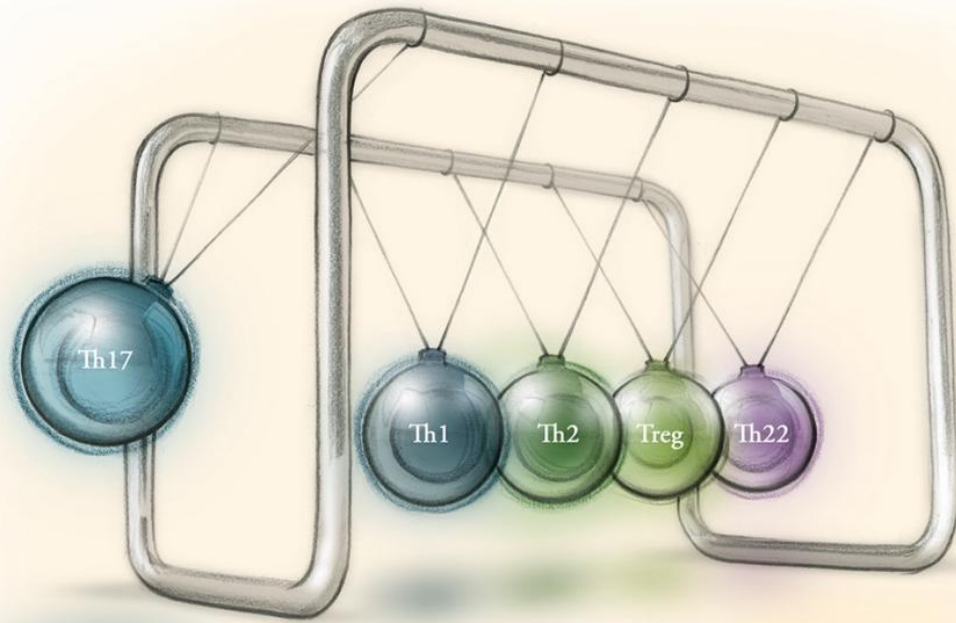
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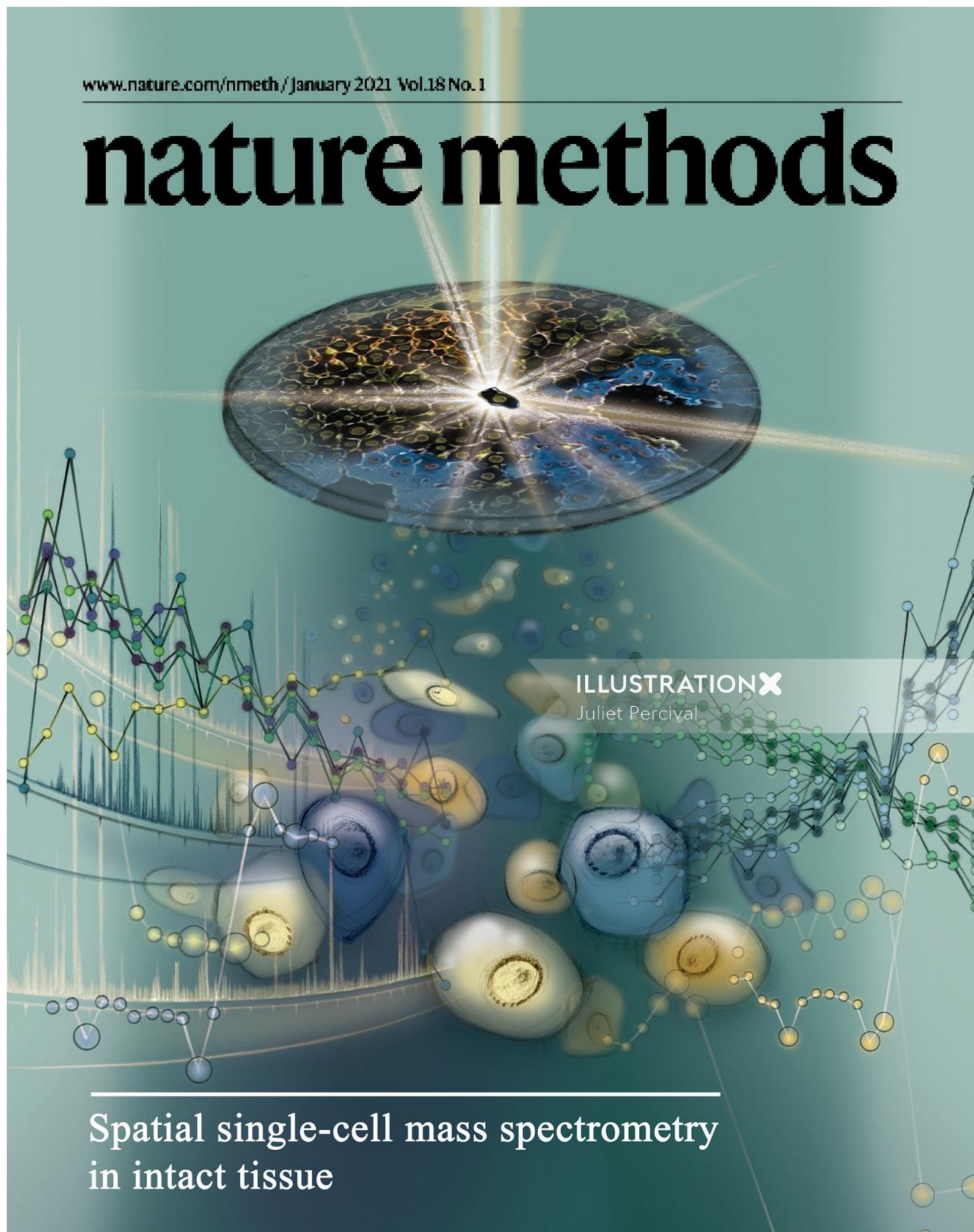
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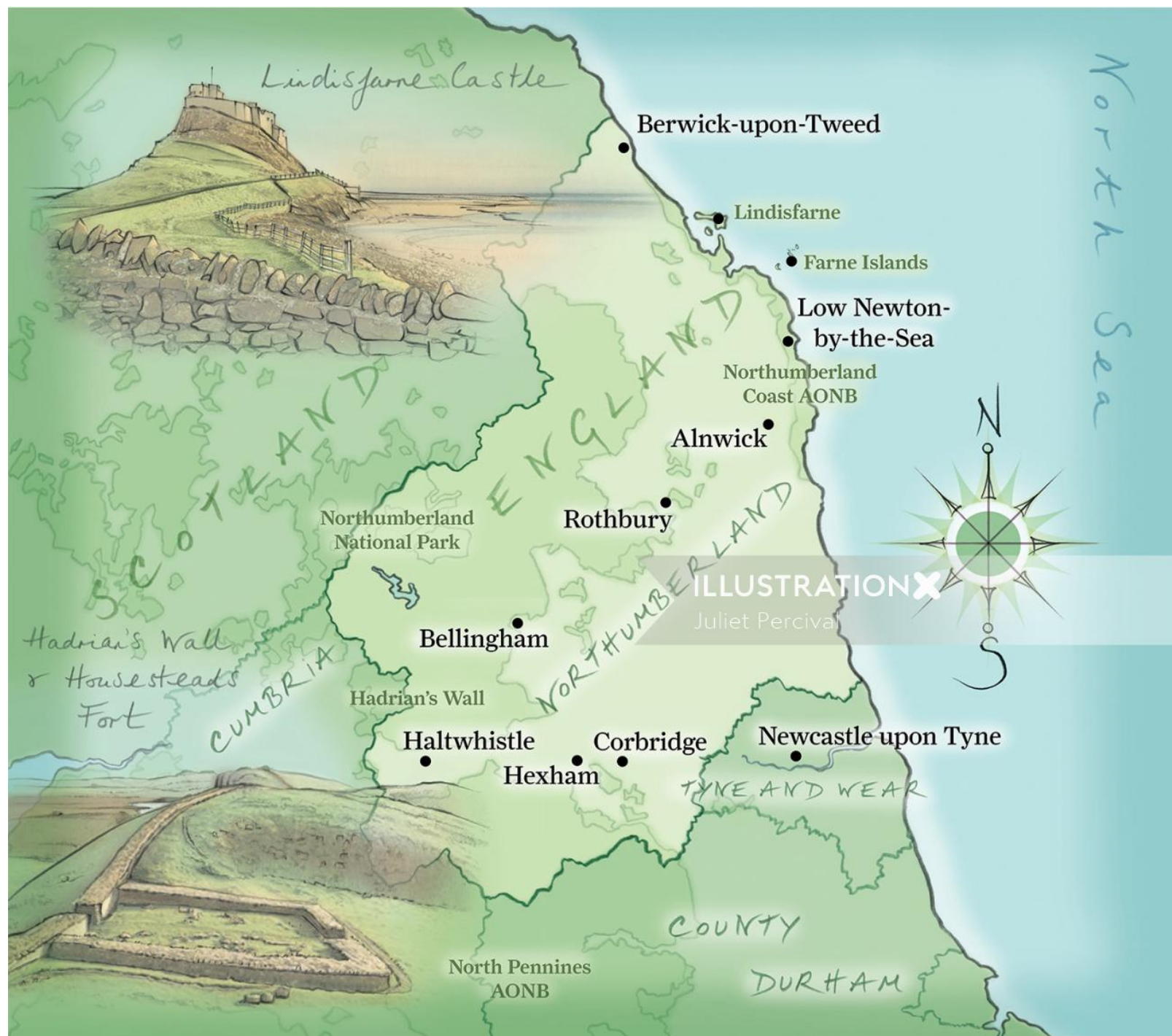
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