

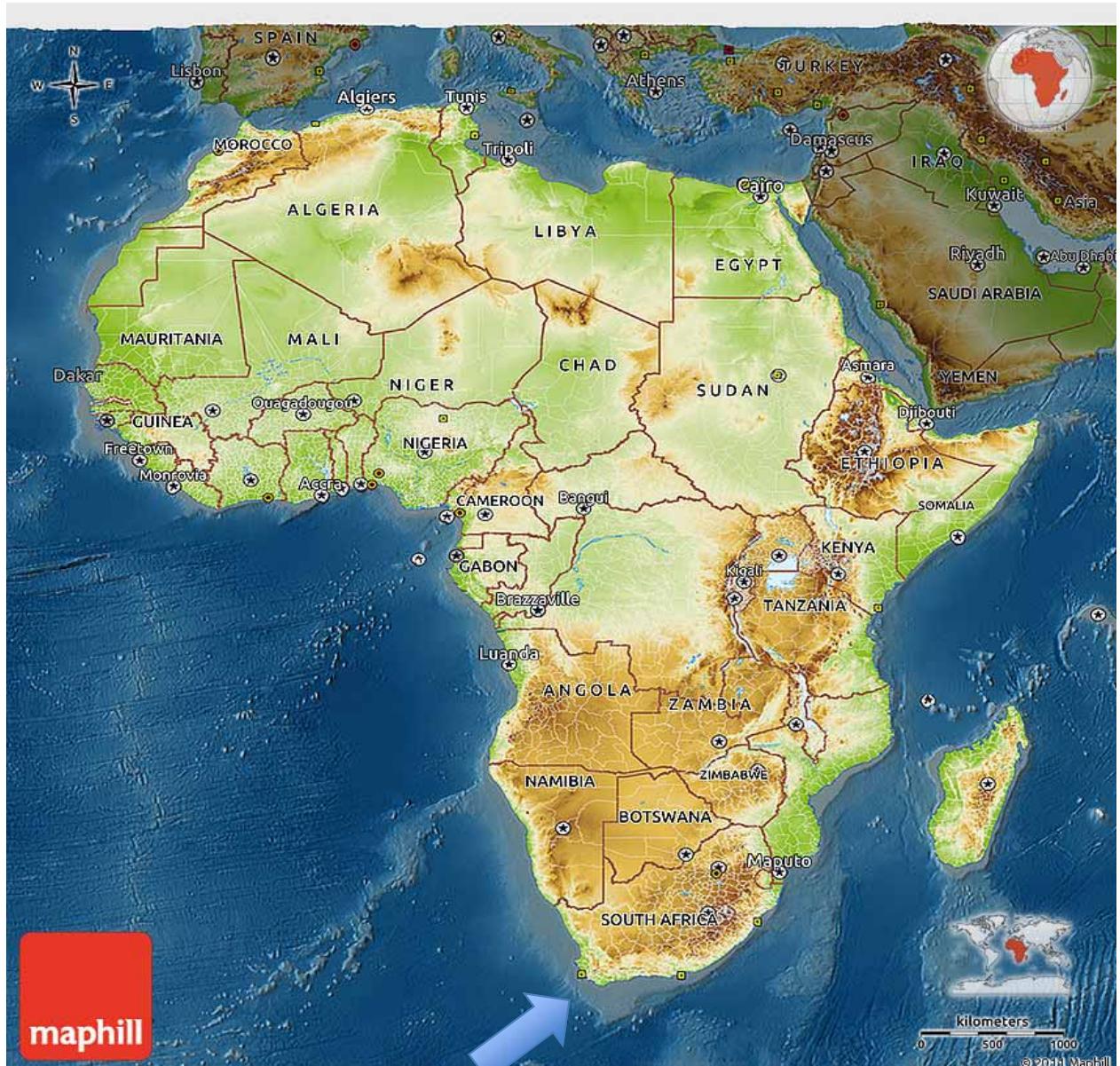


Cape Town to Port Louis

Dr Shaunagh Emanuel

Cape Town





CT

M

New Seven Wonders of Nature



2010 FIFA soccer world cup



University of Cape Town



Primary care allergy and asthma clinic



Synopsis Research



Allergy and Asthma Primary Care Course for Health Professionals





ALLSA

ALLERGY SOCIETY OF
SOUTH AFRICA



**25th ANNUAL CONGRESS
OF THE ALLERGY SOCIETY
OF SOUTH AFRICA**

Final Programme

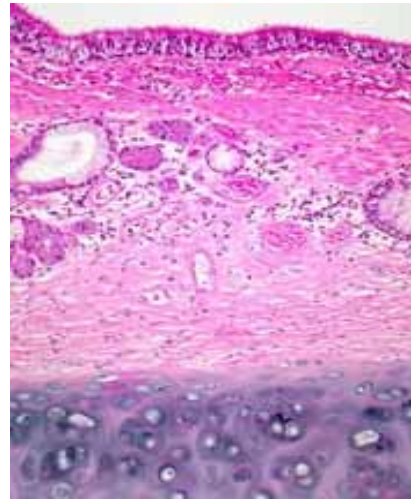
www.allergysa.org

Different, but the same...



Let us take a moment...

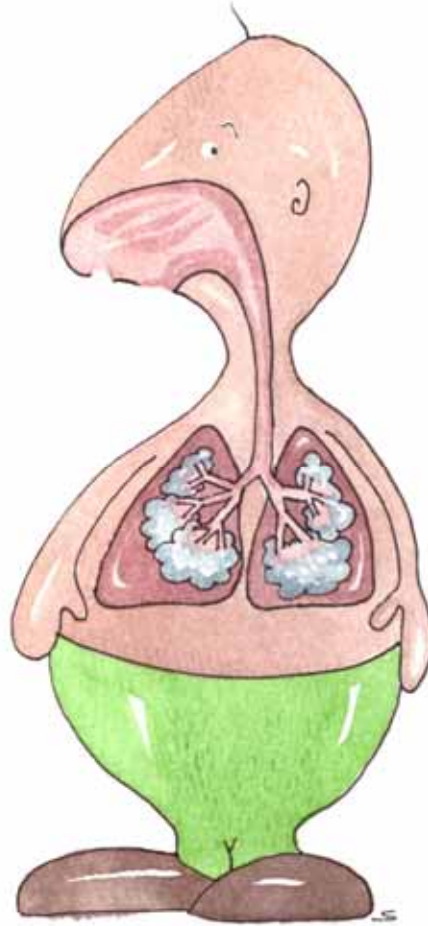
To consider the membrane...



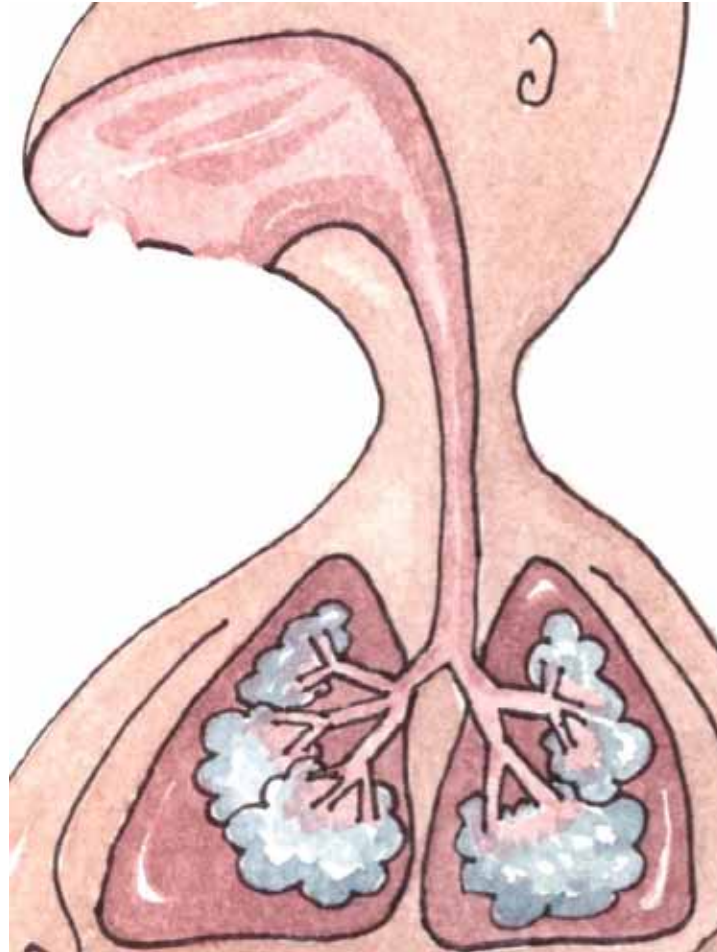
Meet Sam



Let us look inside Sam



Lets look at Sam's respiratory membranes



Nasopharynx

Turbinates

Trachea

Bronchi

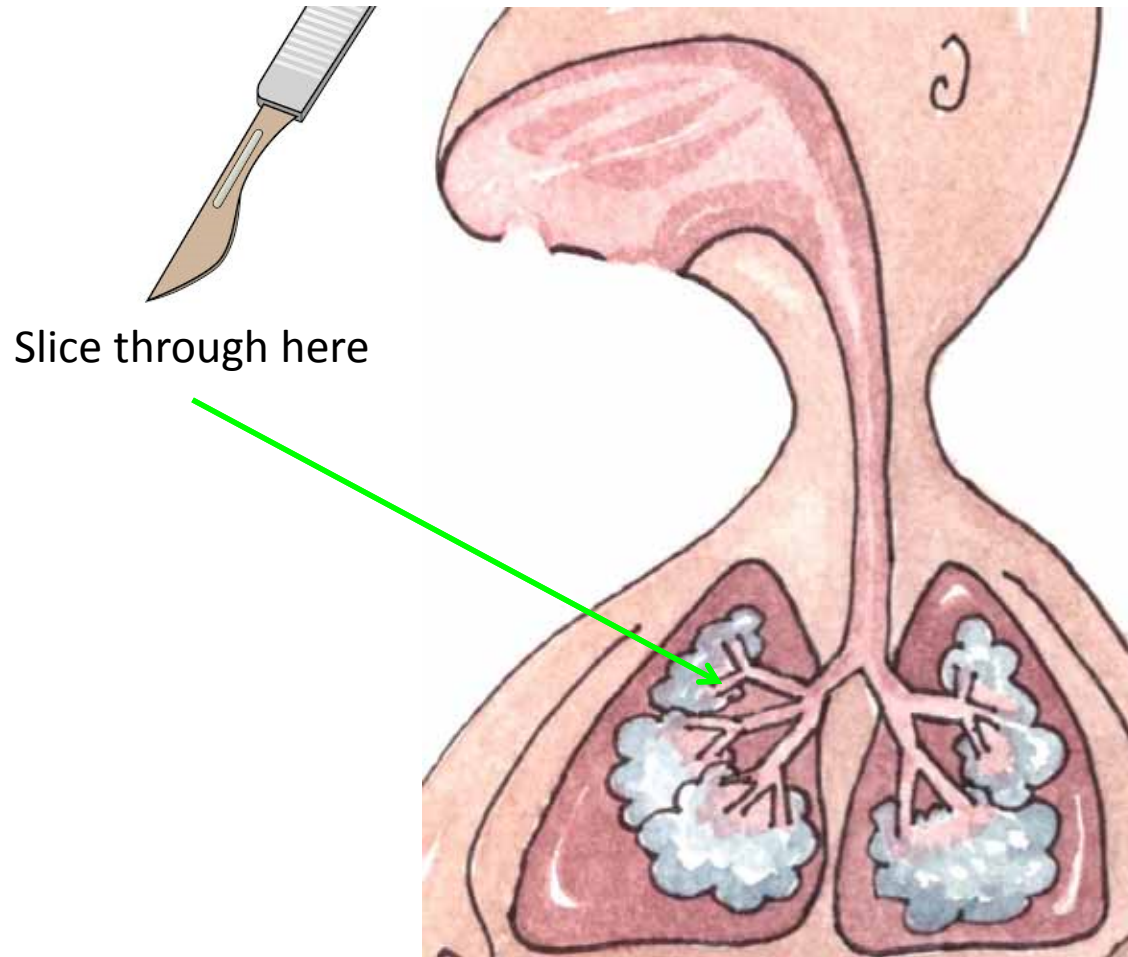
Bronchioles

Alveoli

Lungs

Pleura

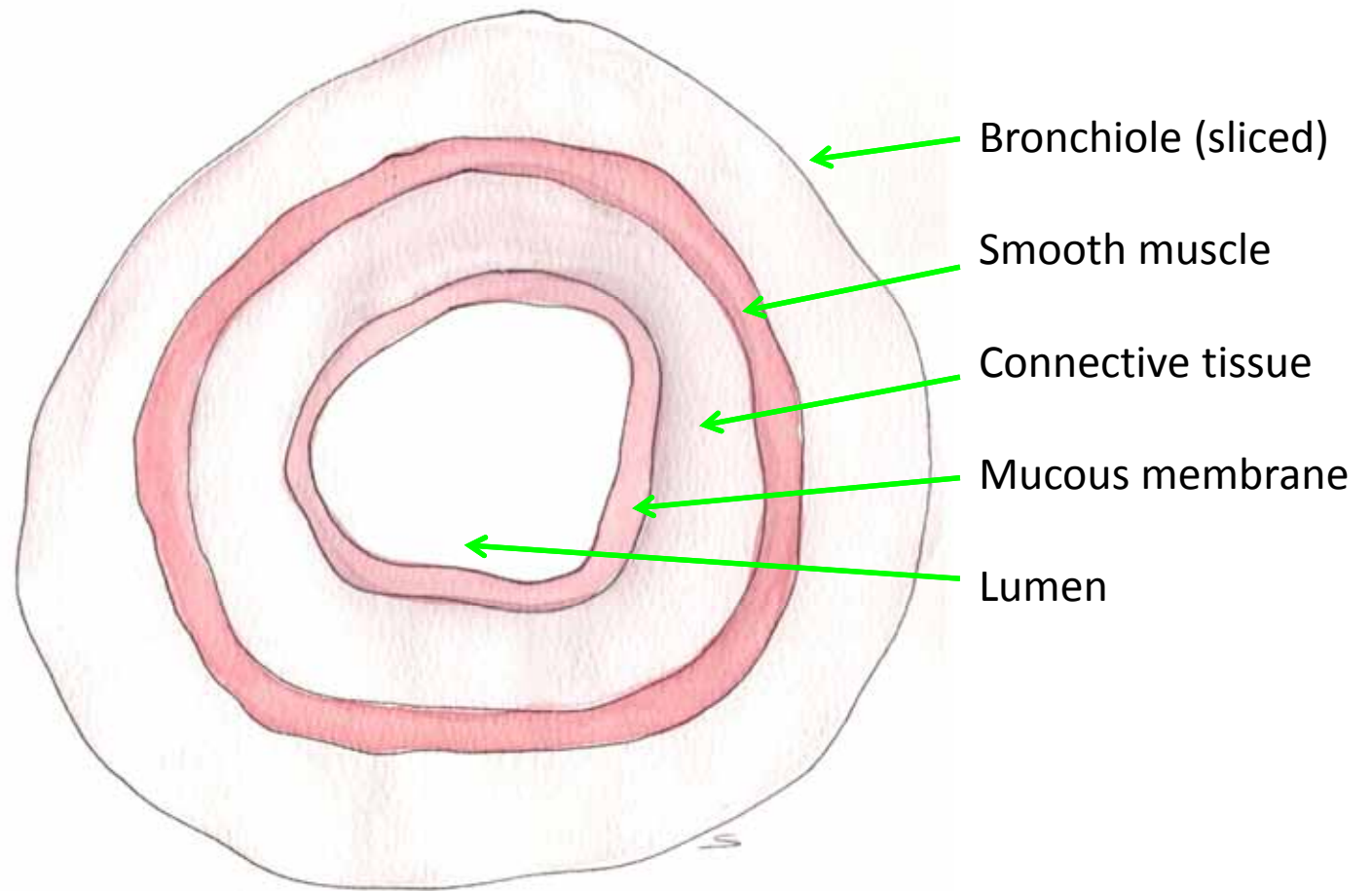
Let us take a cross section on one of Sam's bronchioles



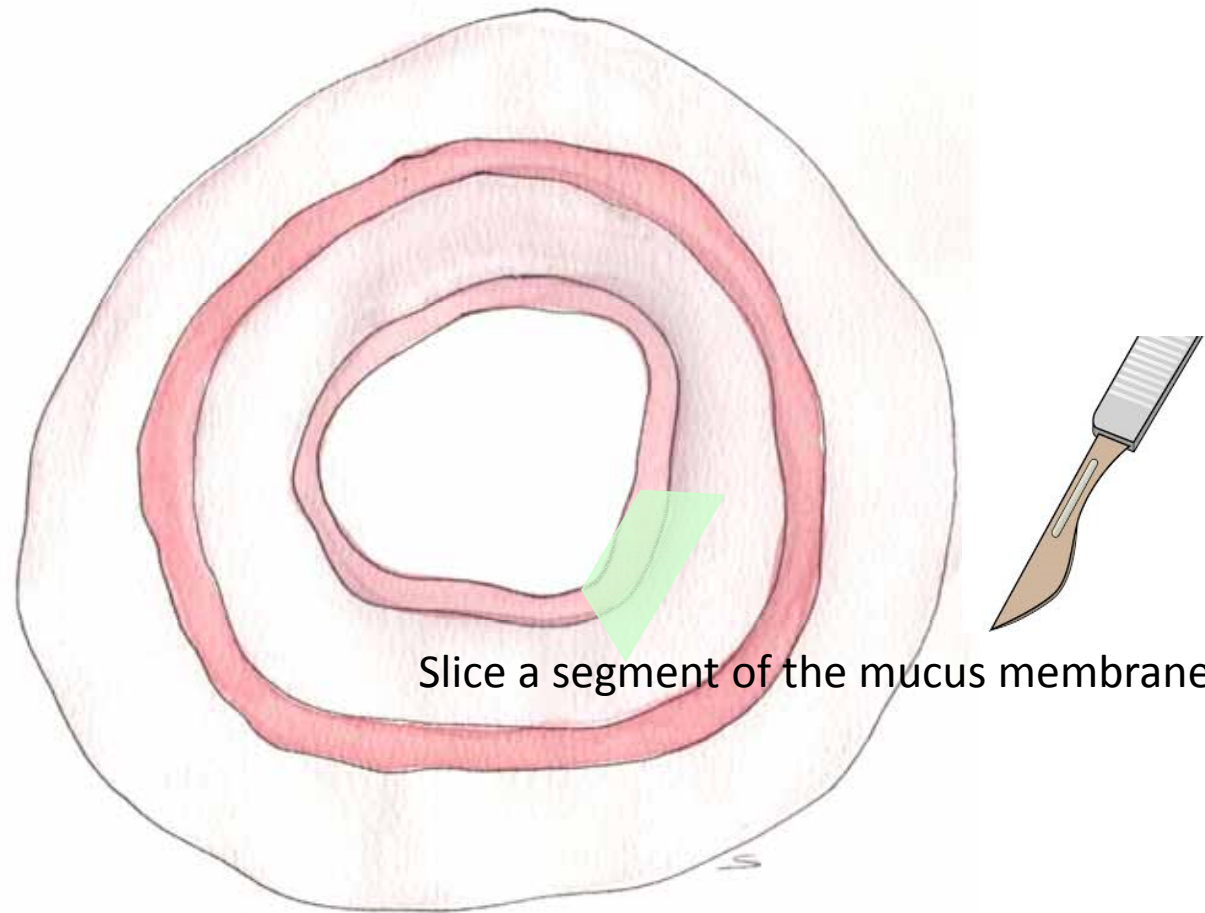
Cross section of a bronchiole



Looking at the bronchiole straight on...

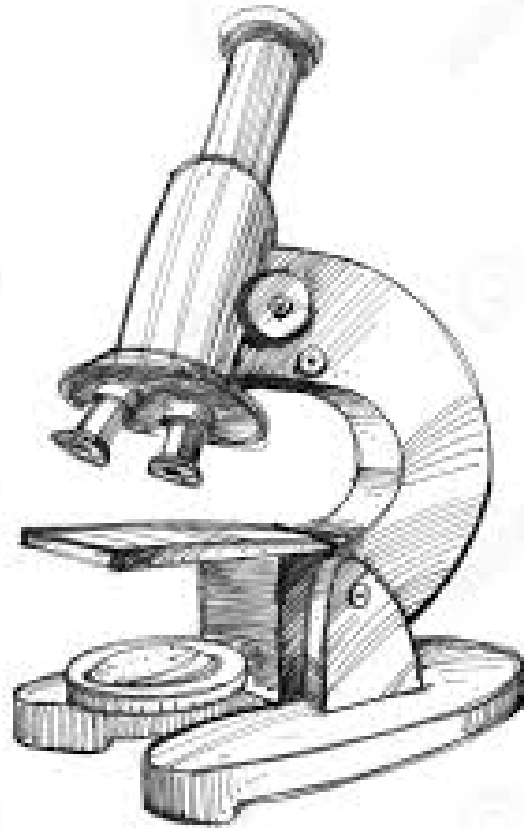


Let us look at the membrane that lines the inside of the respiratory tract...

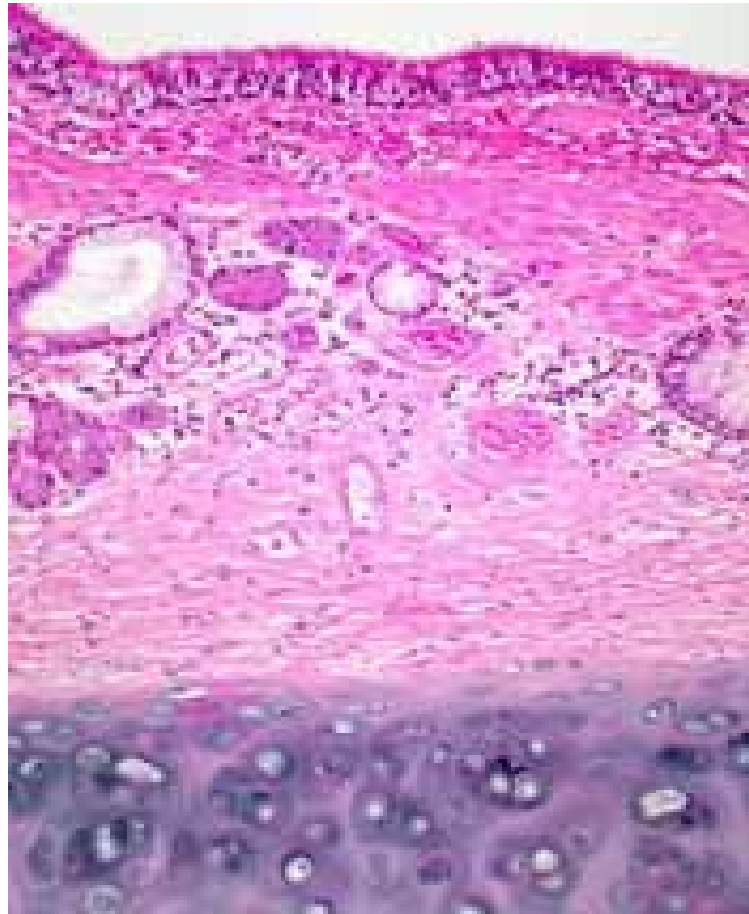


Slice a segment of the mucus membrane

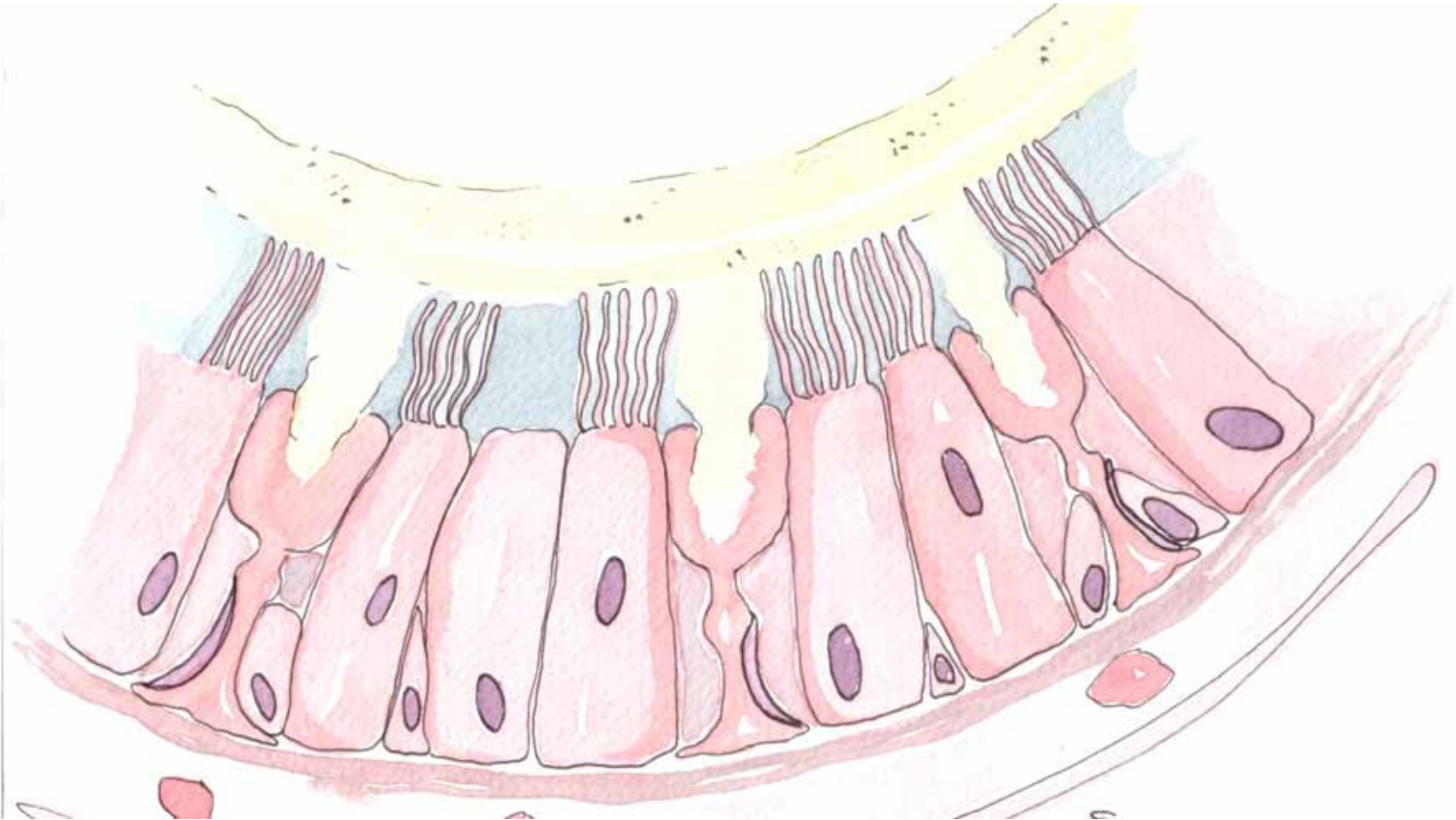
Look at it under a microscope



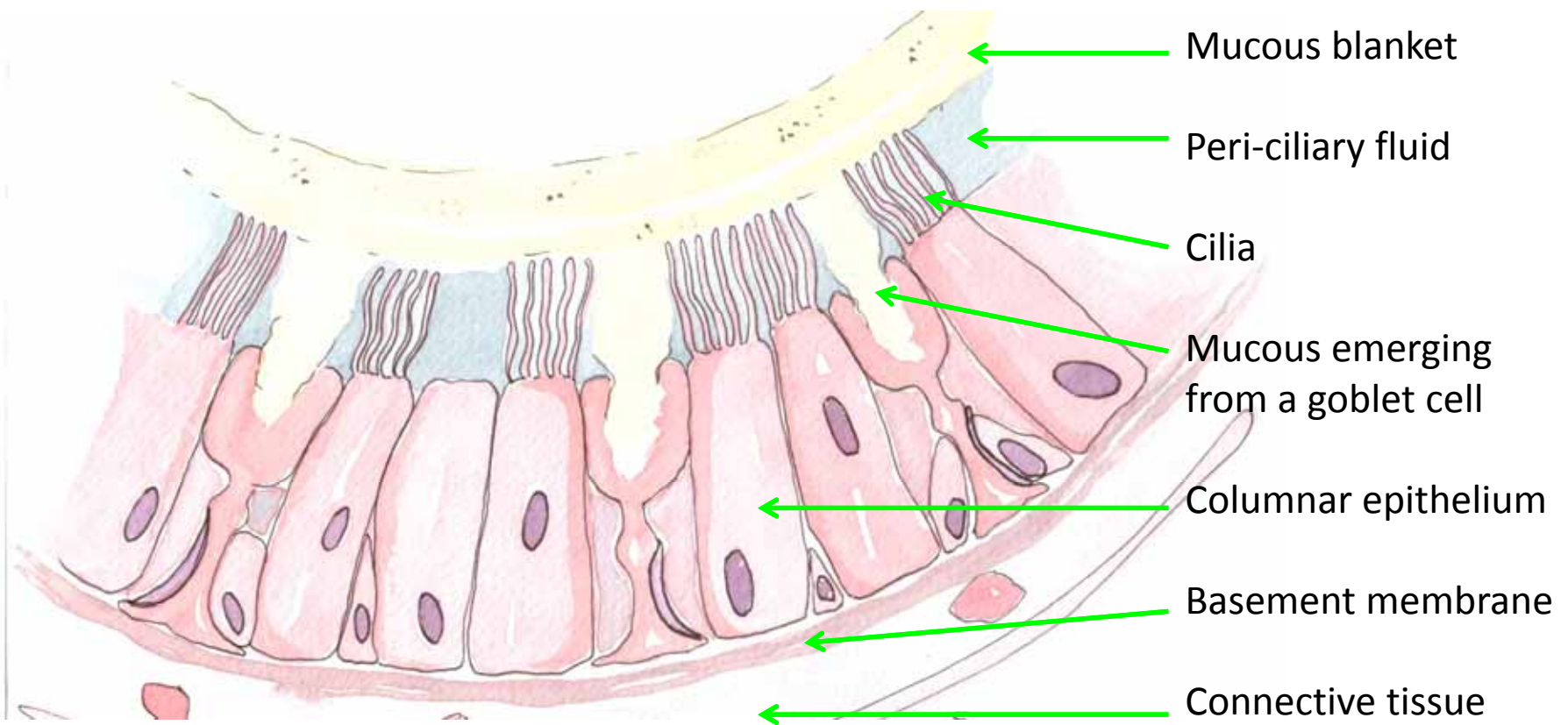
A small section of the mucous membrane lining the bronchiole



Pseudo-stratified ciliated columnar epithelium with goblet cells

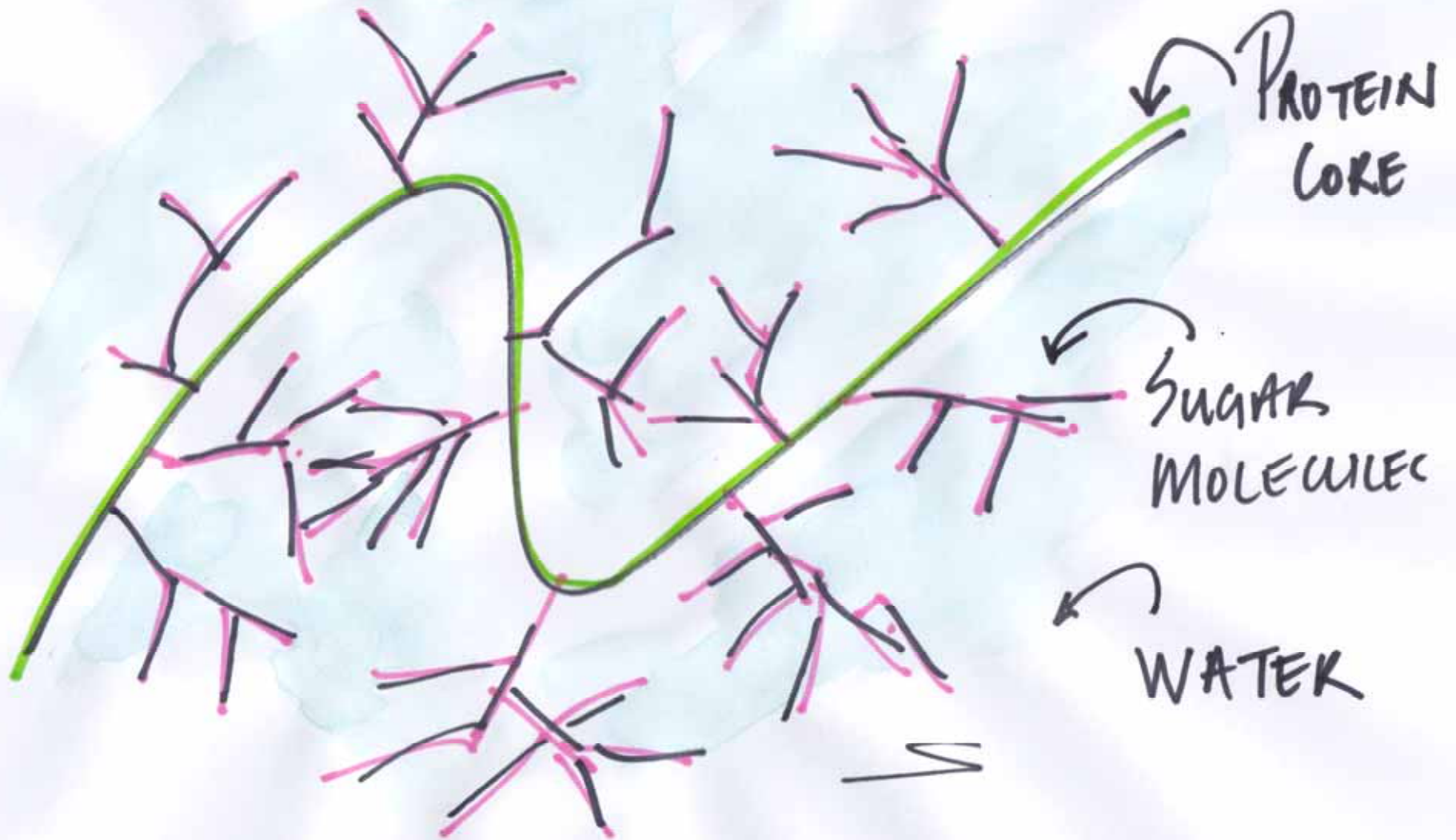


How does it work?



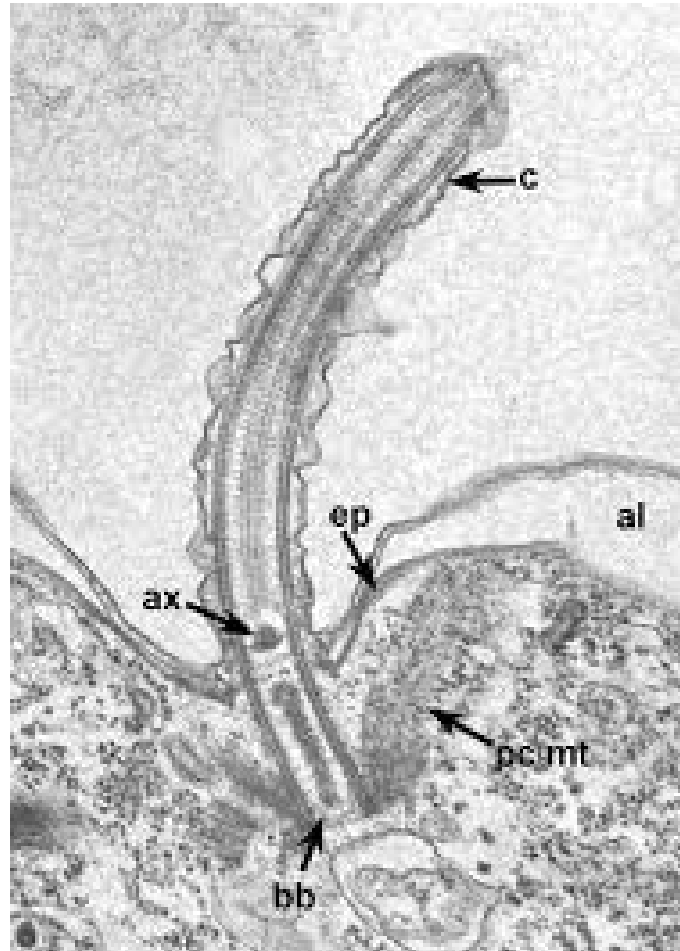
This is what the surface looks like
under an electron microscope





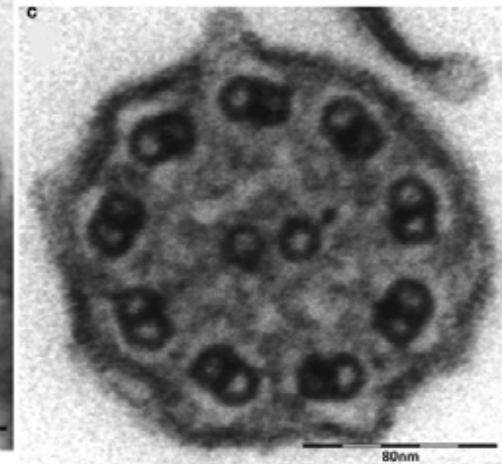
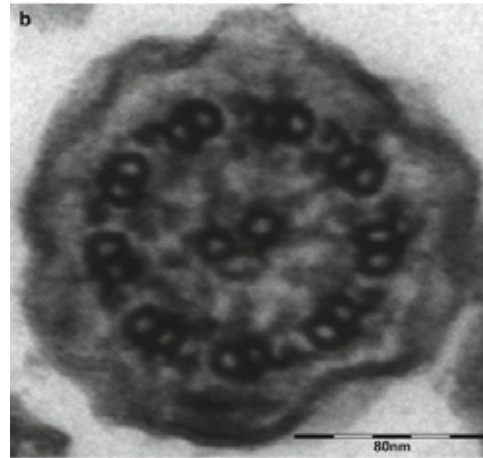
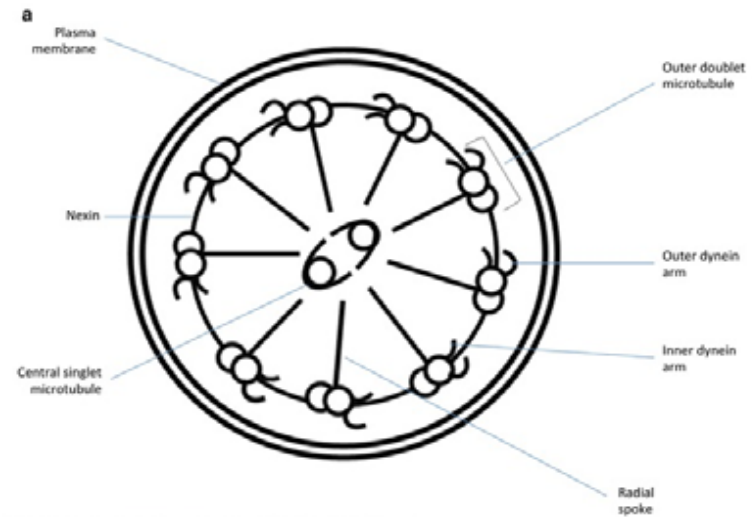
MUCIN ATTRACTS WATER TO FORM A GEL

A single motile cilium

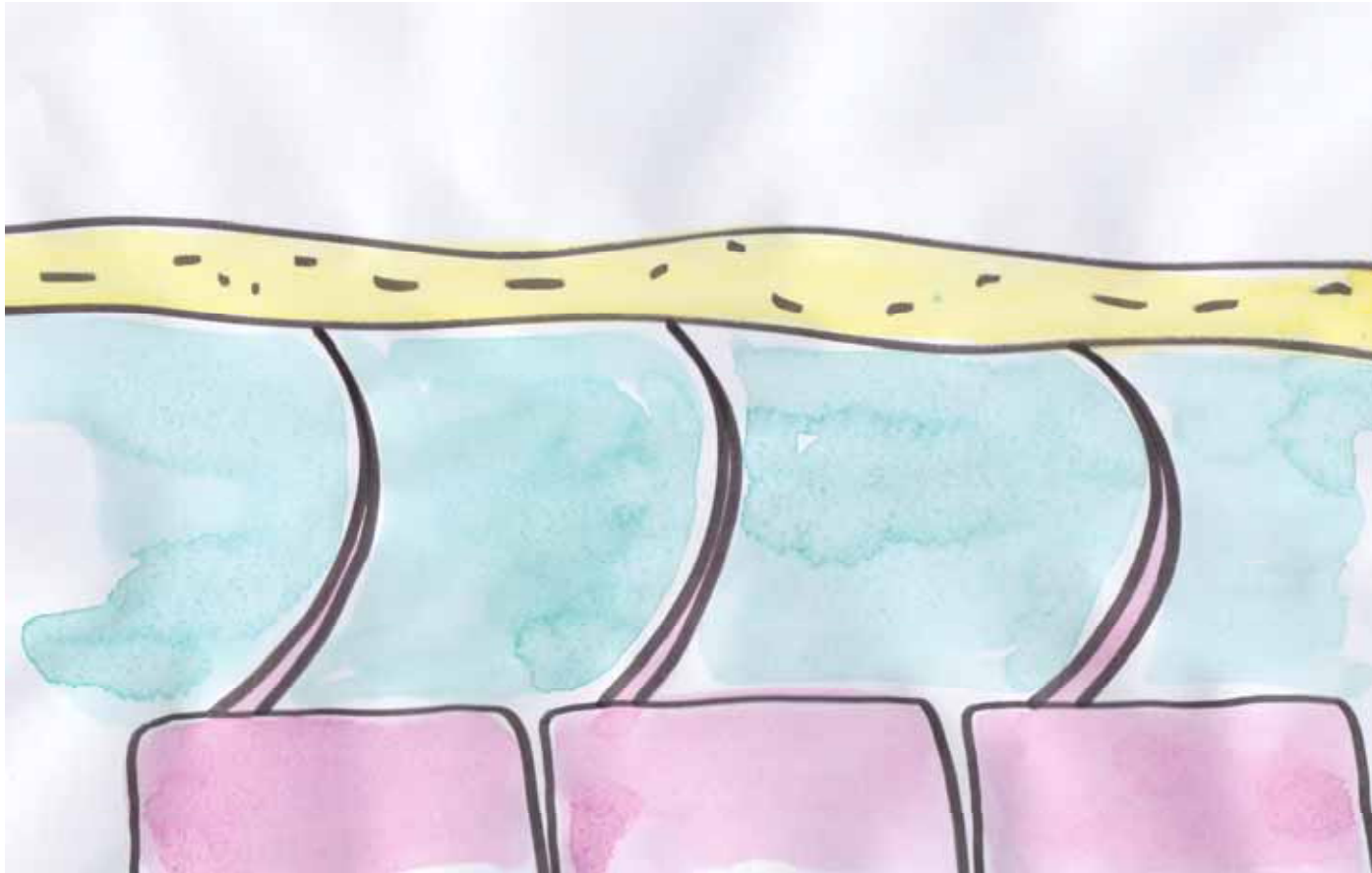


Cross section of a single motile cilium

9 + 2 microtubules
with linking spokes

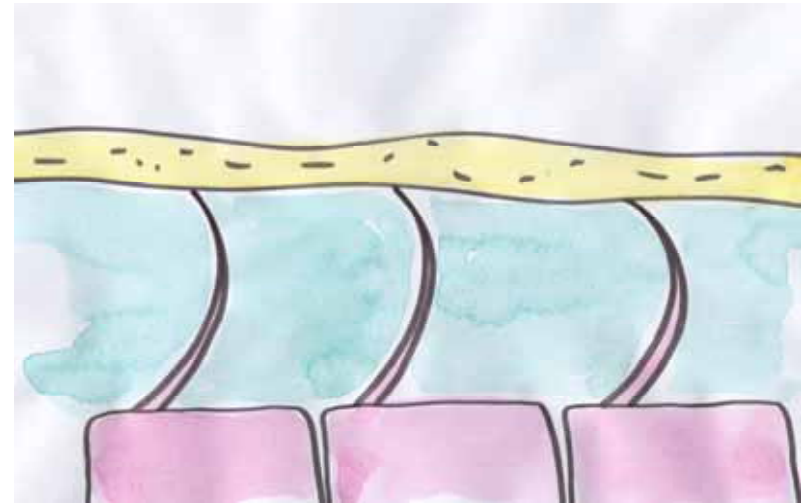


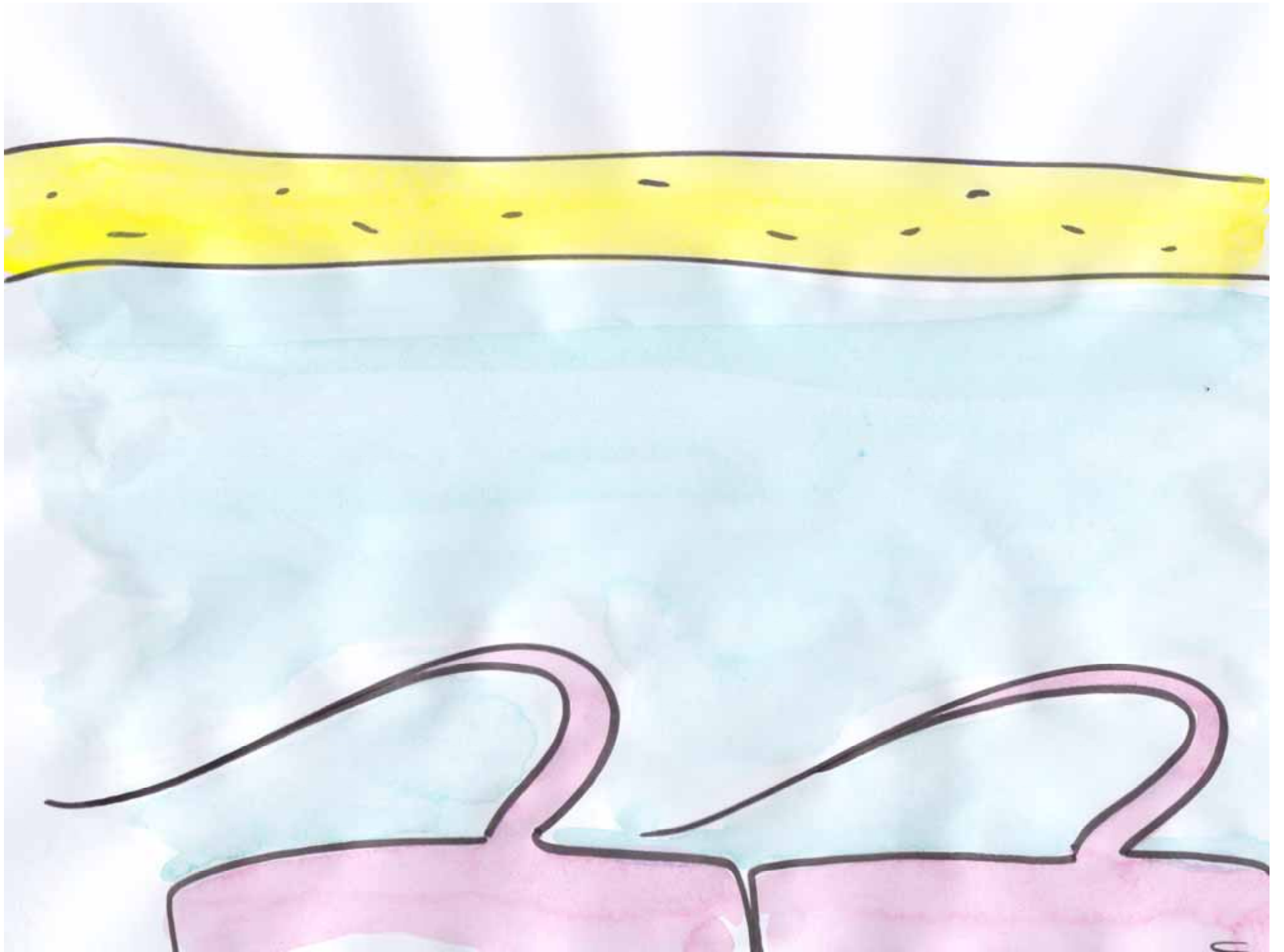
How do cilia move mucous?

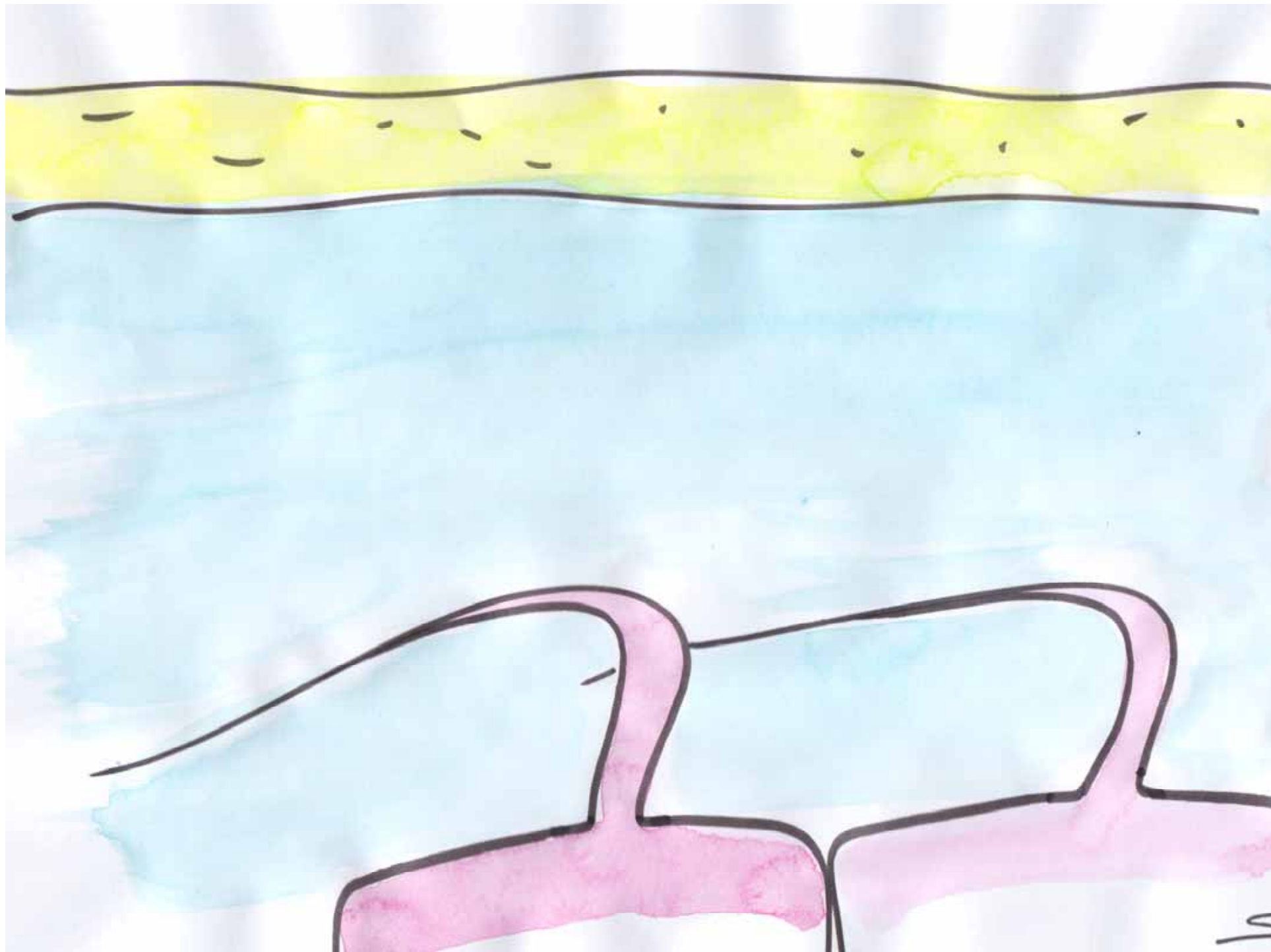


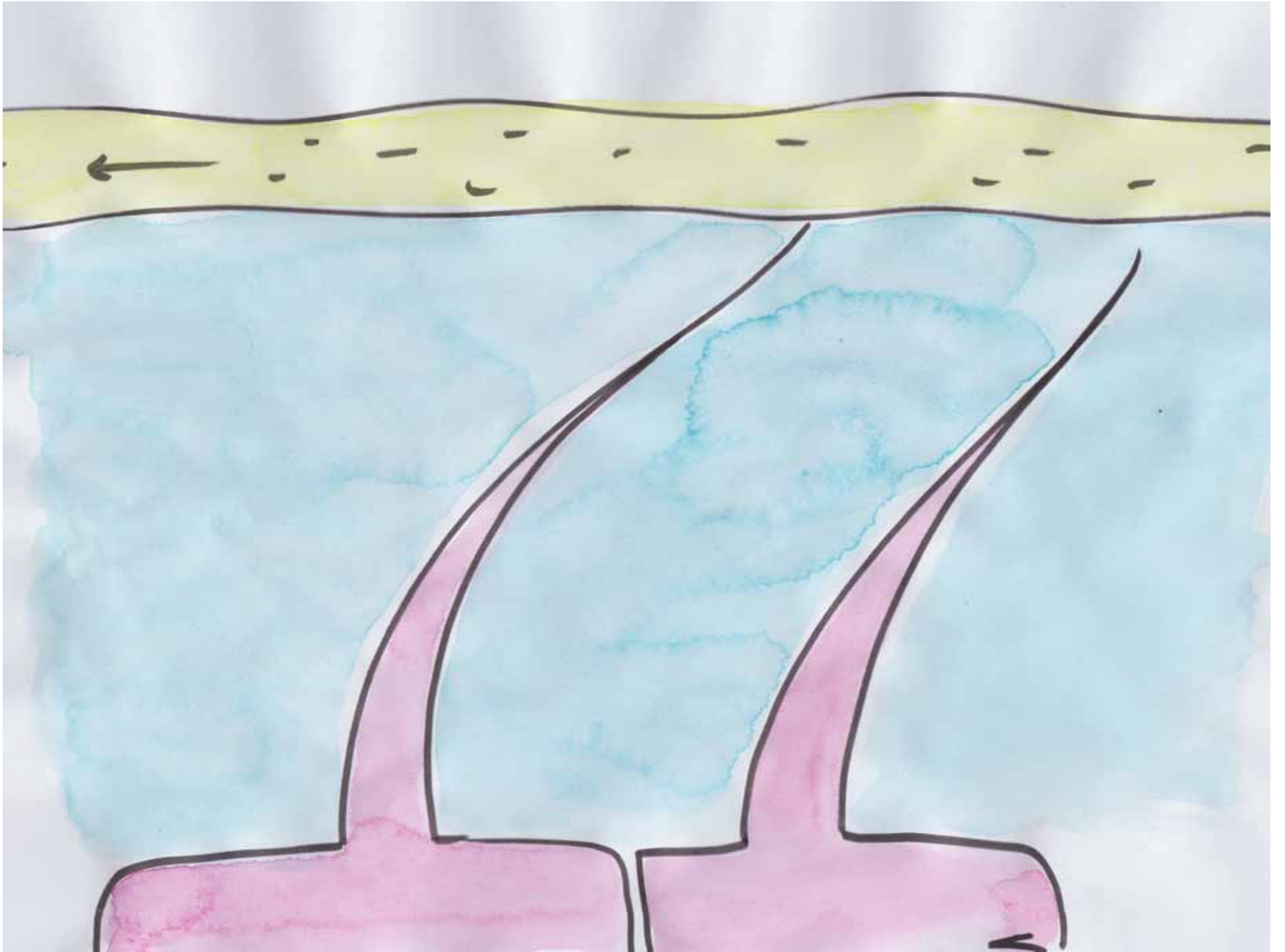
The 'Muco-Mexican wave'

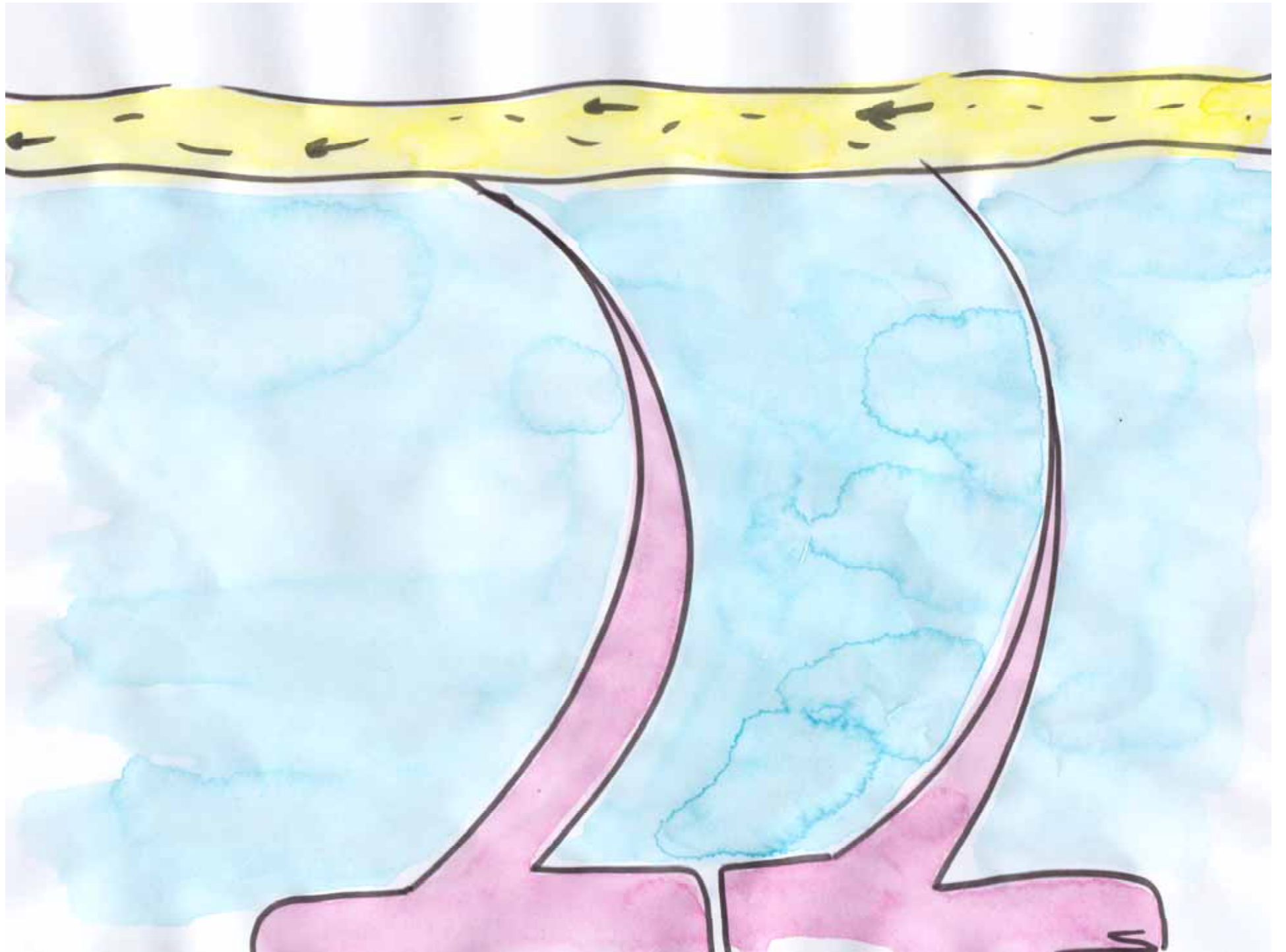
- Forward power stroke
- Fully extended
- Tip transfers force to the mucous blanket
- Tip bends back into the thin peri-cilliary fluid on a recovery stroke
- There is a quiescent phase
- Before the cilium extends and the tip reconnects with the mucous

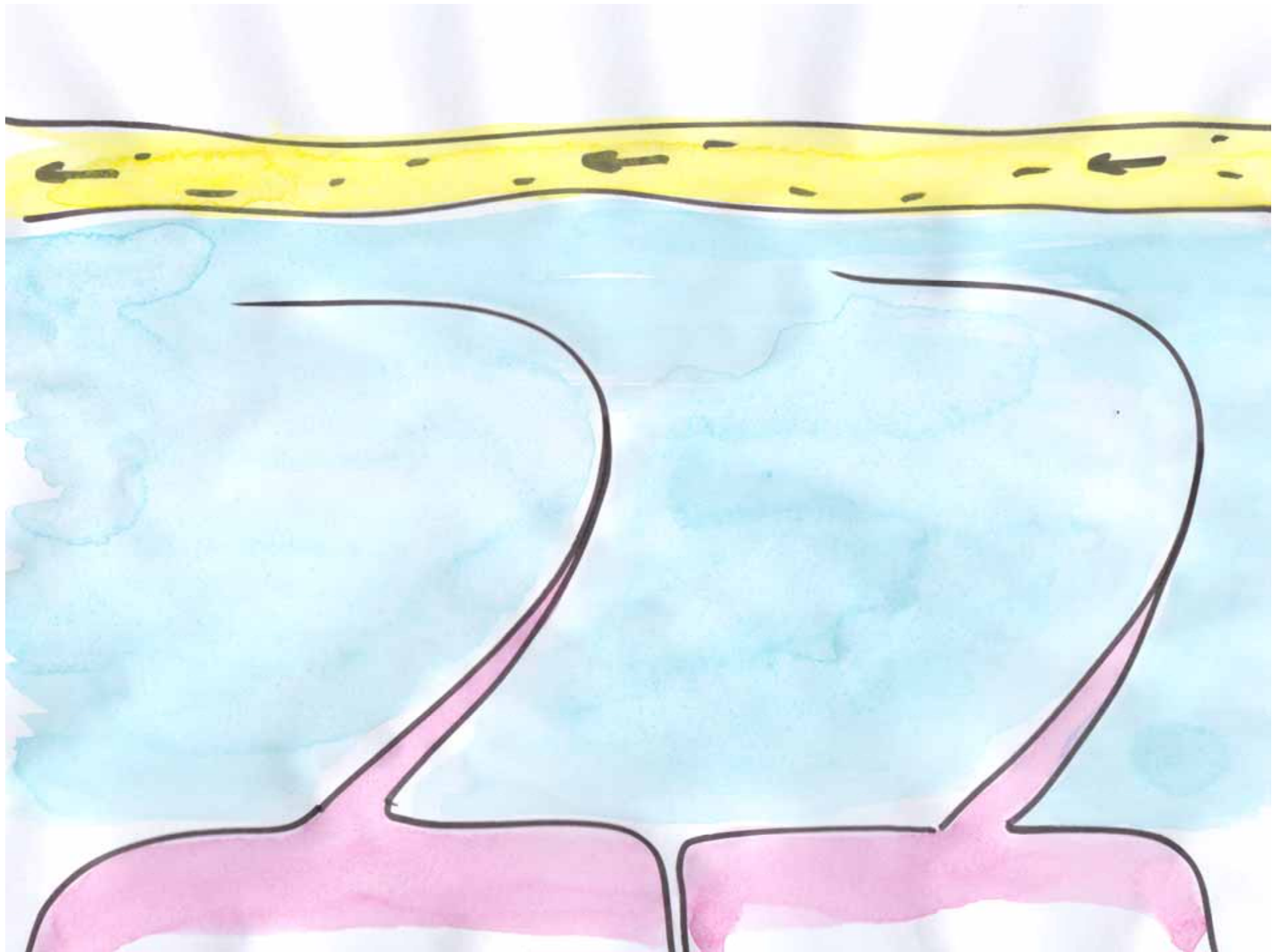


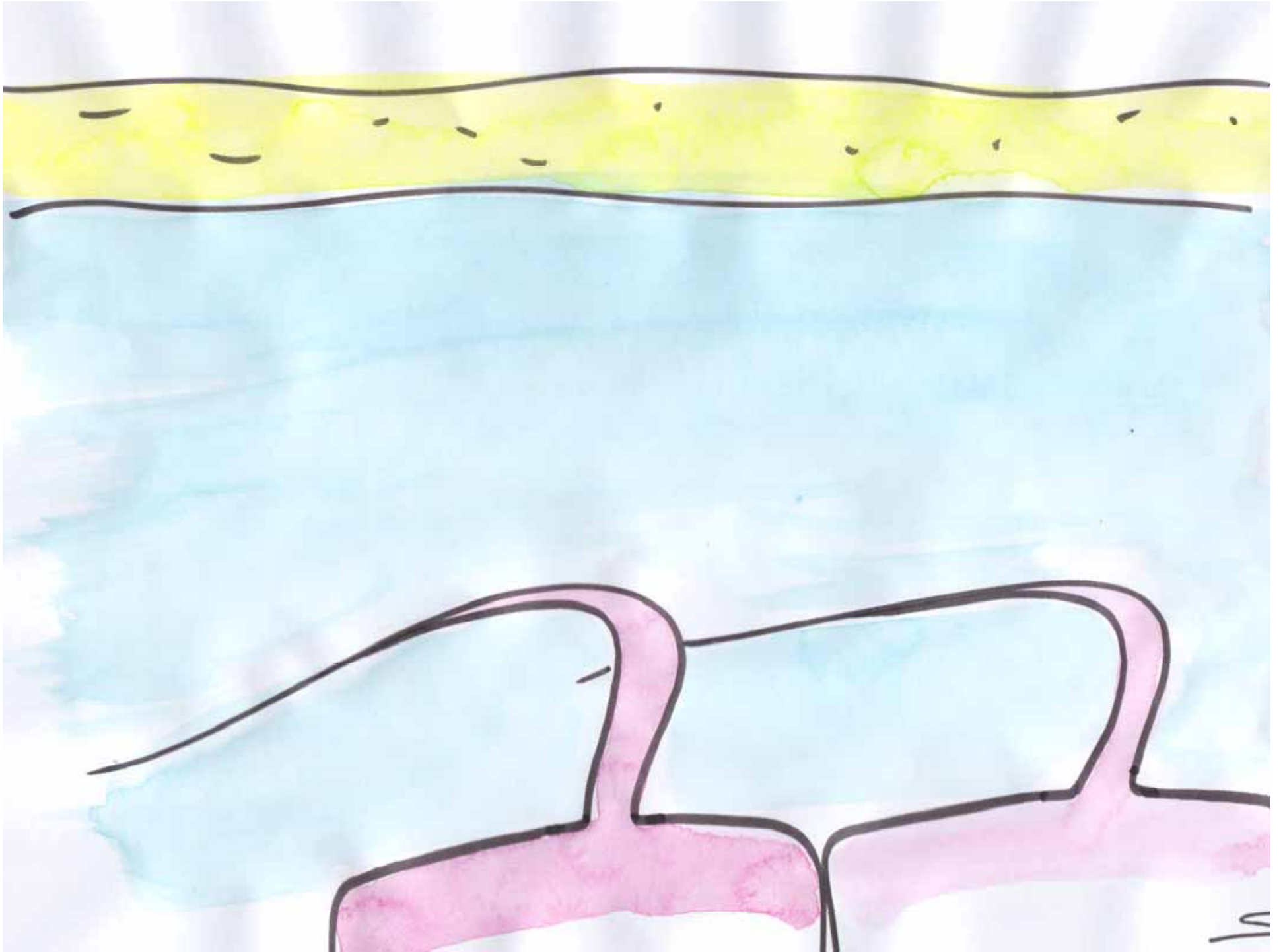


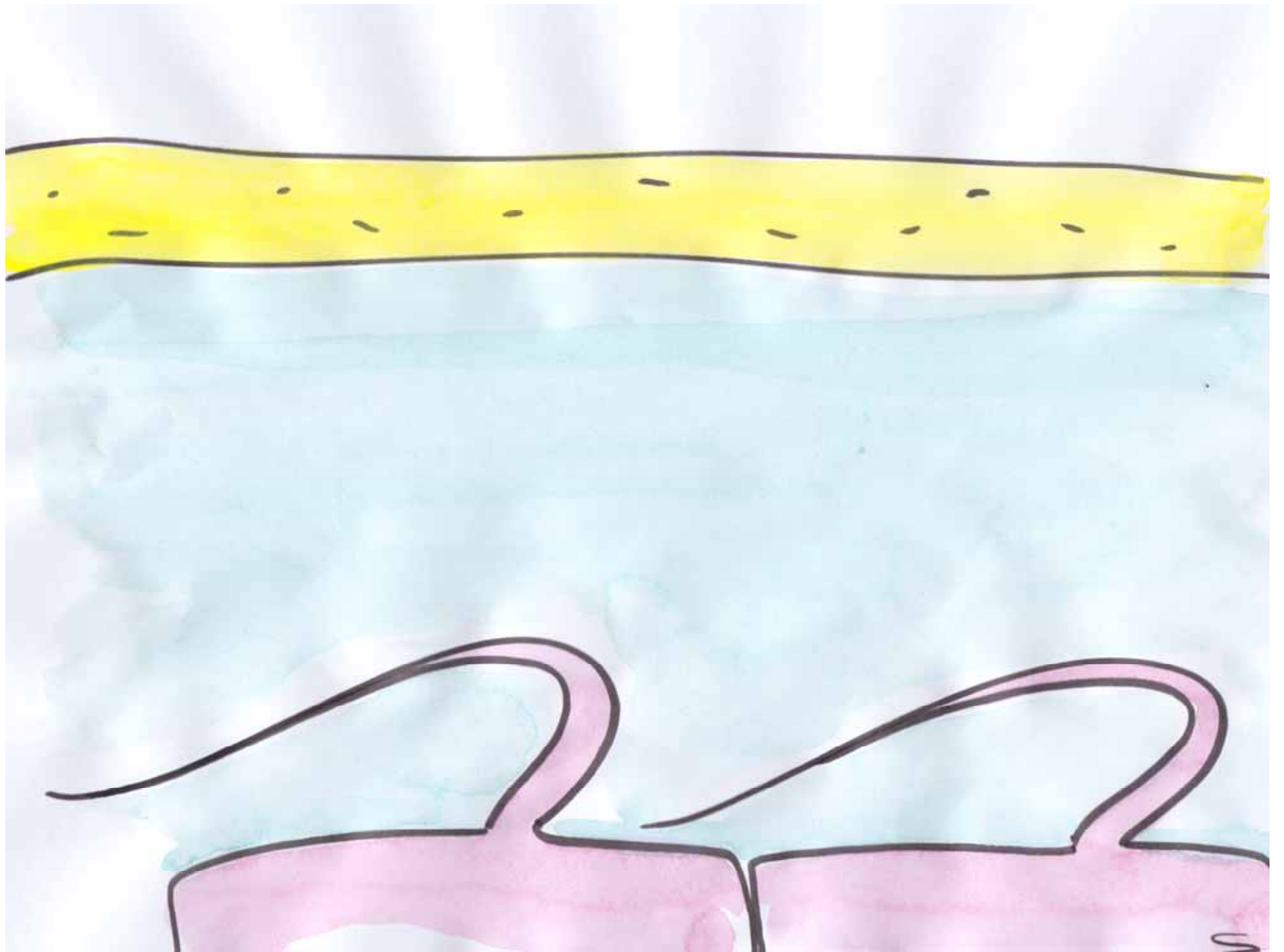


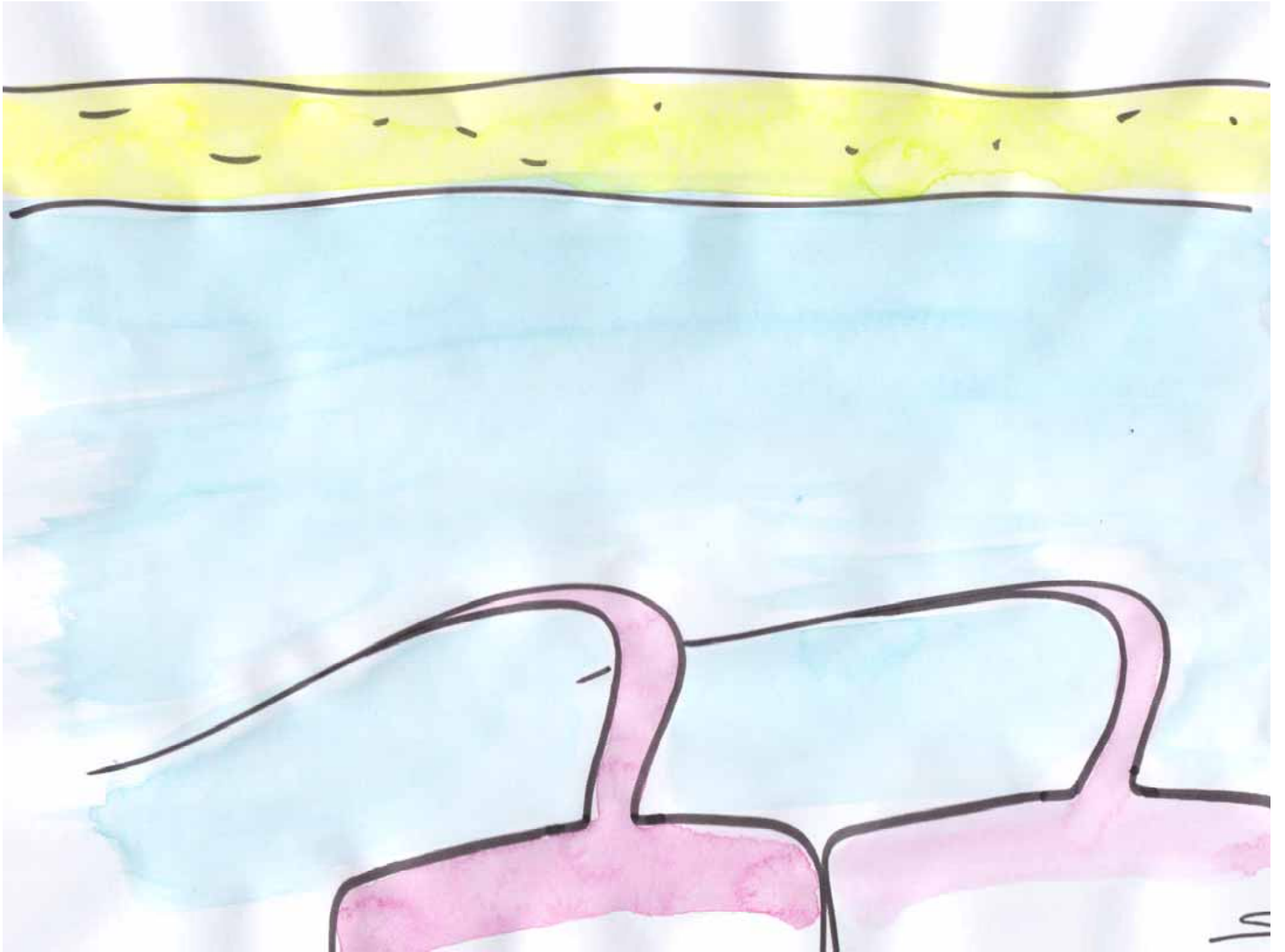


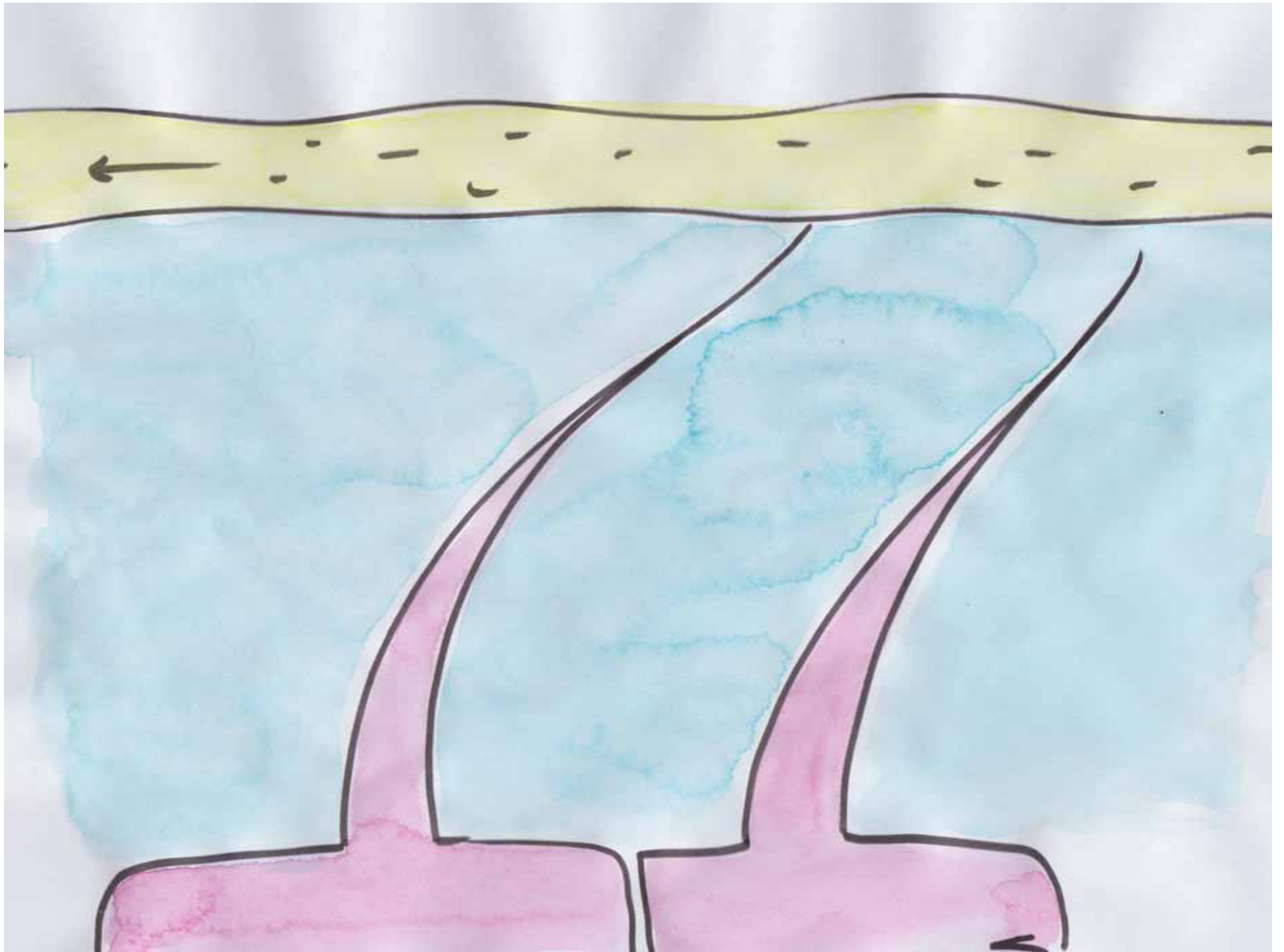


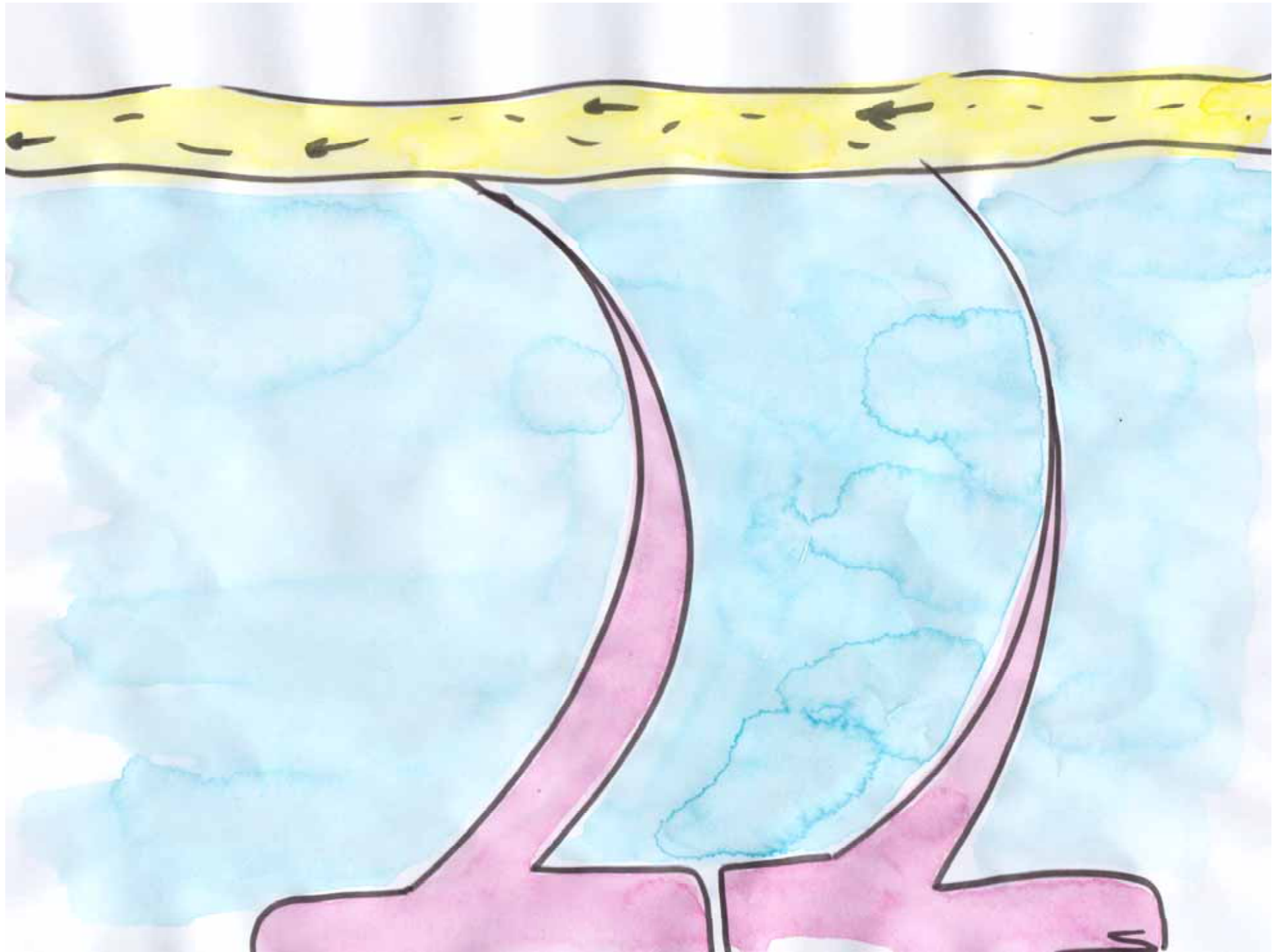


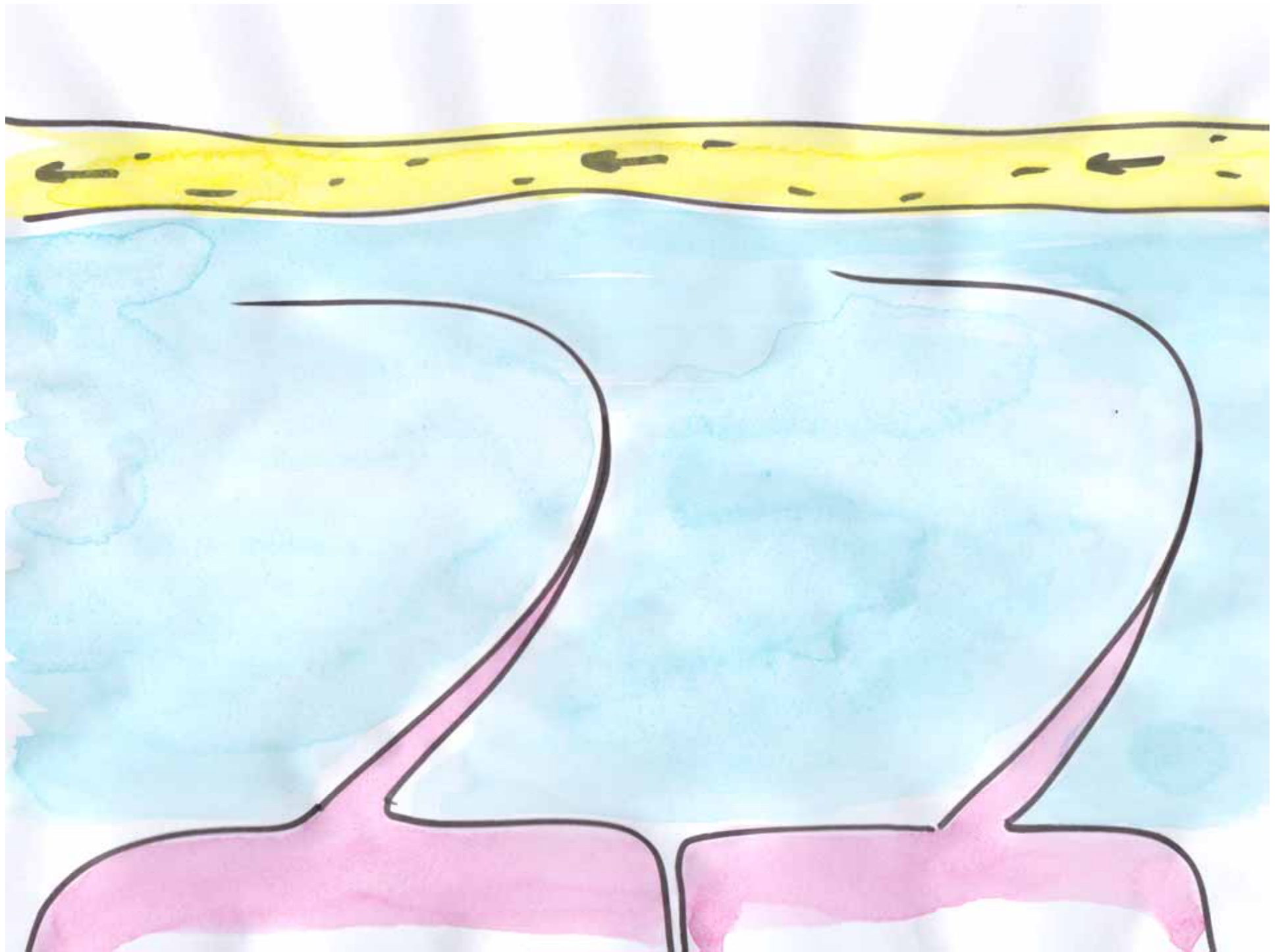


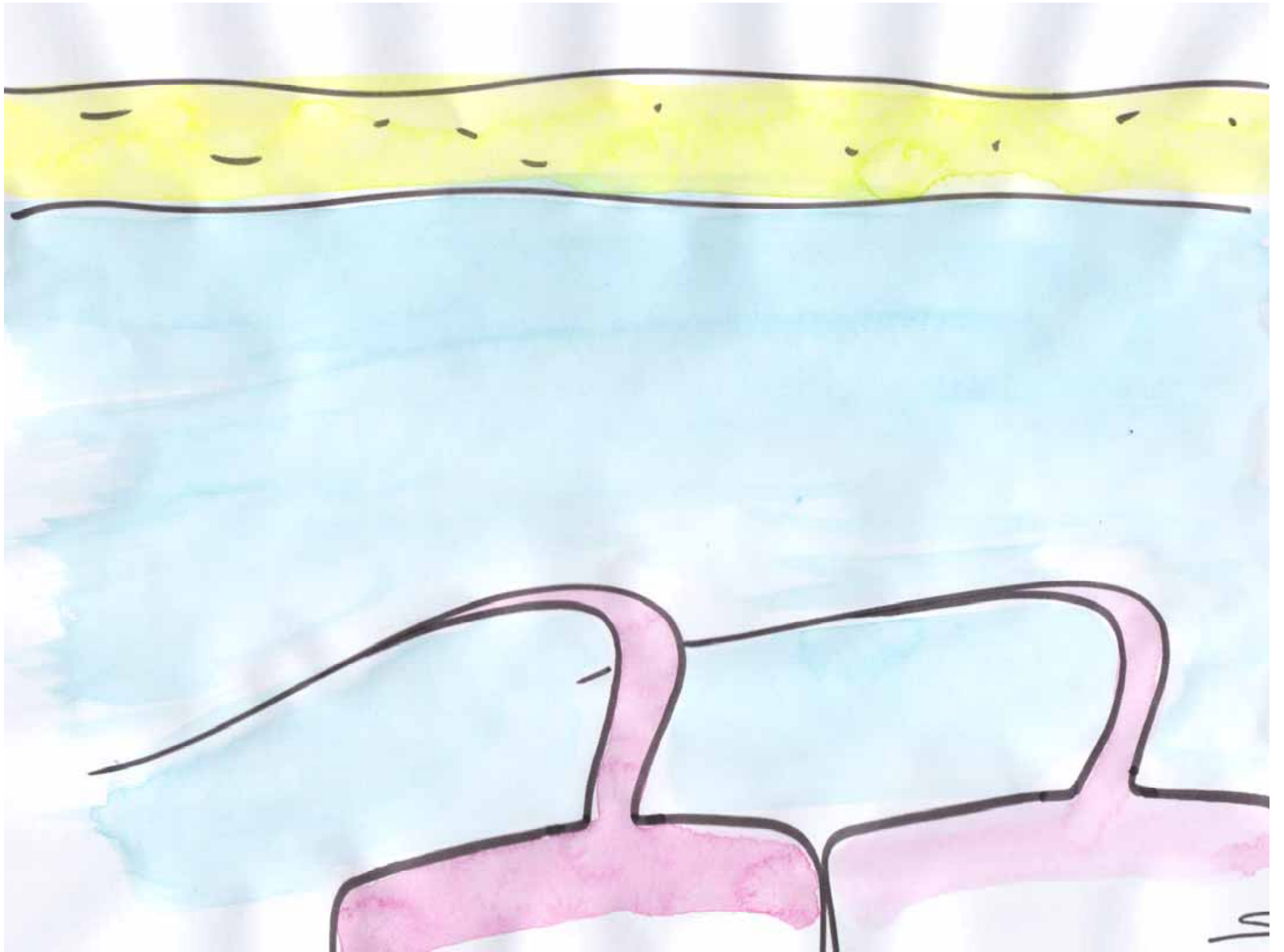


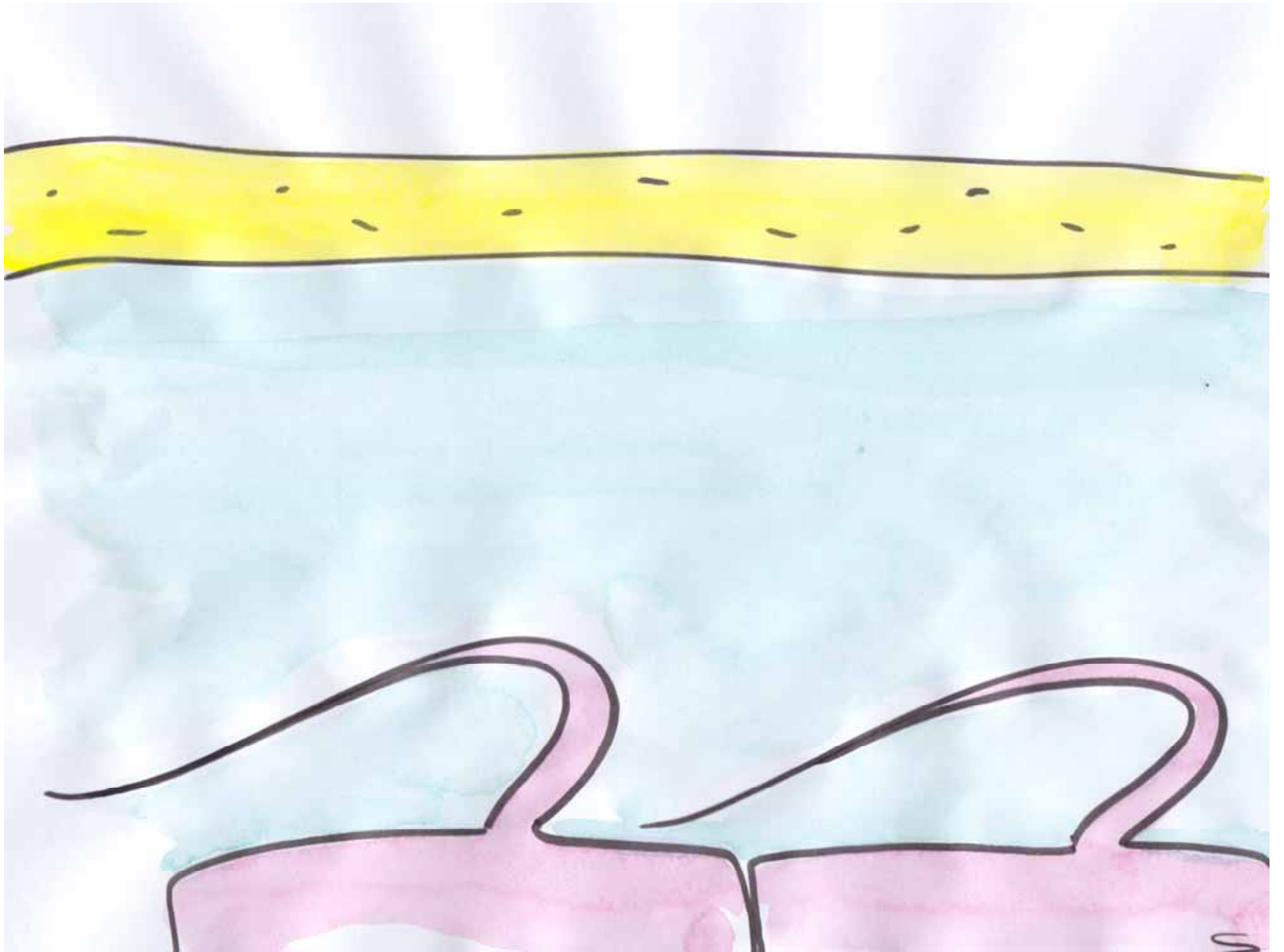


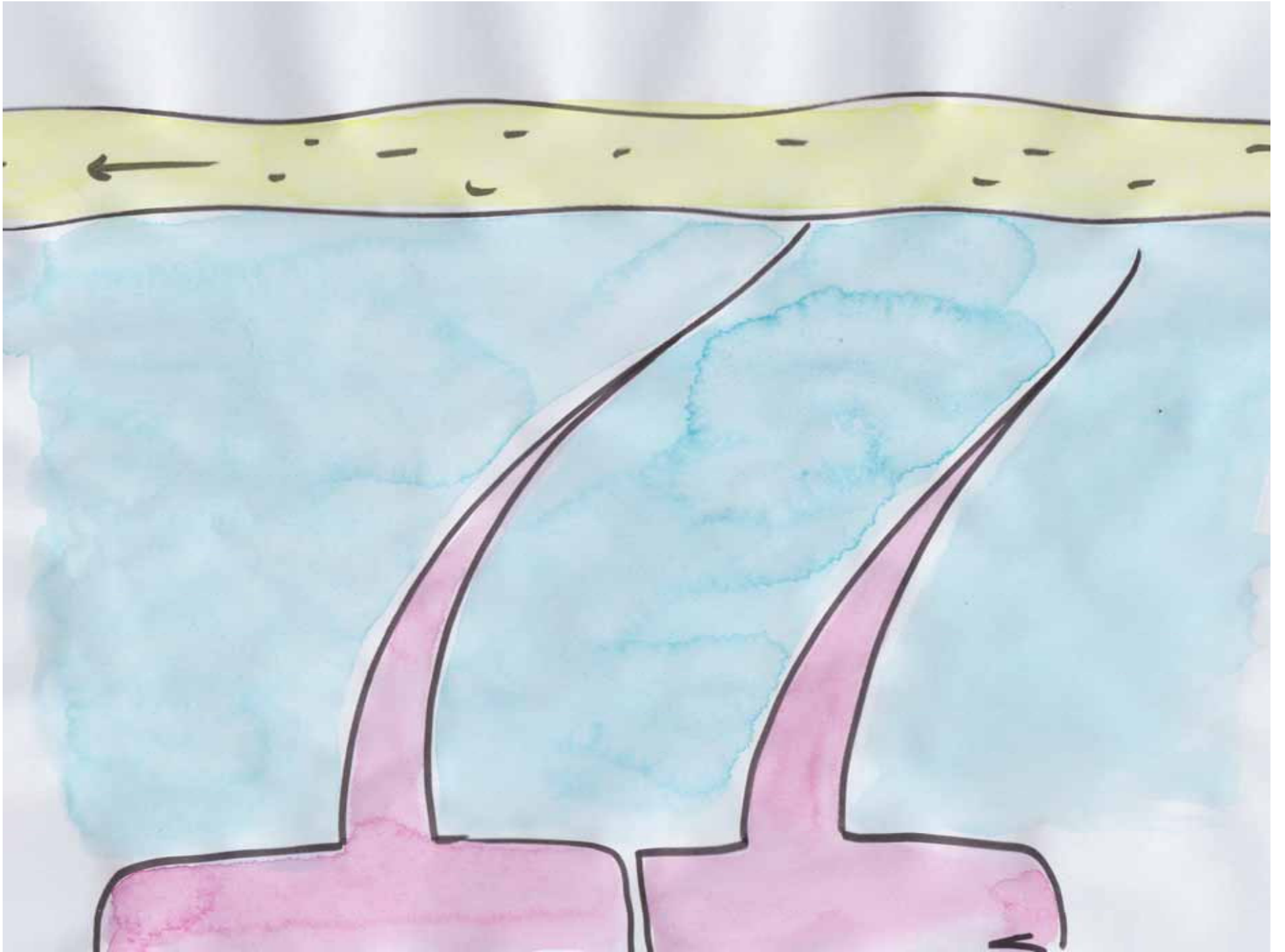


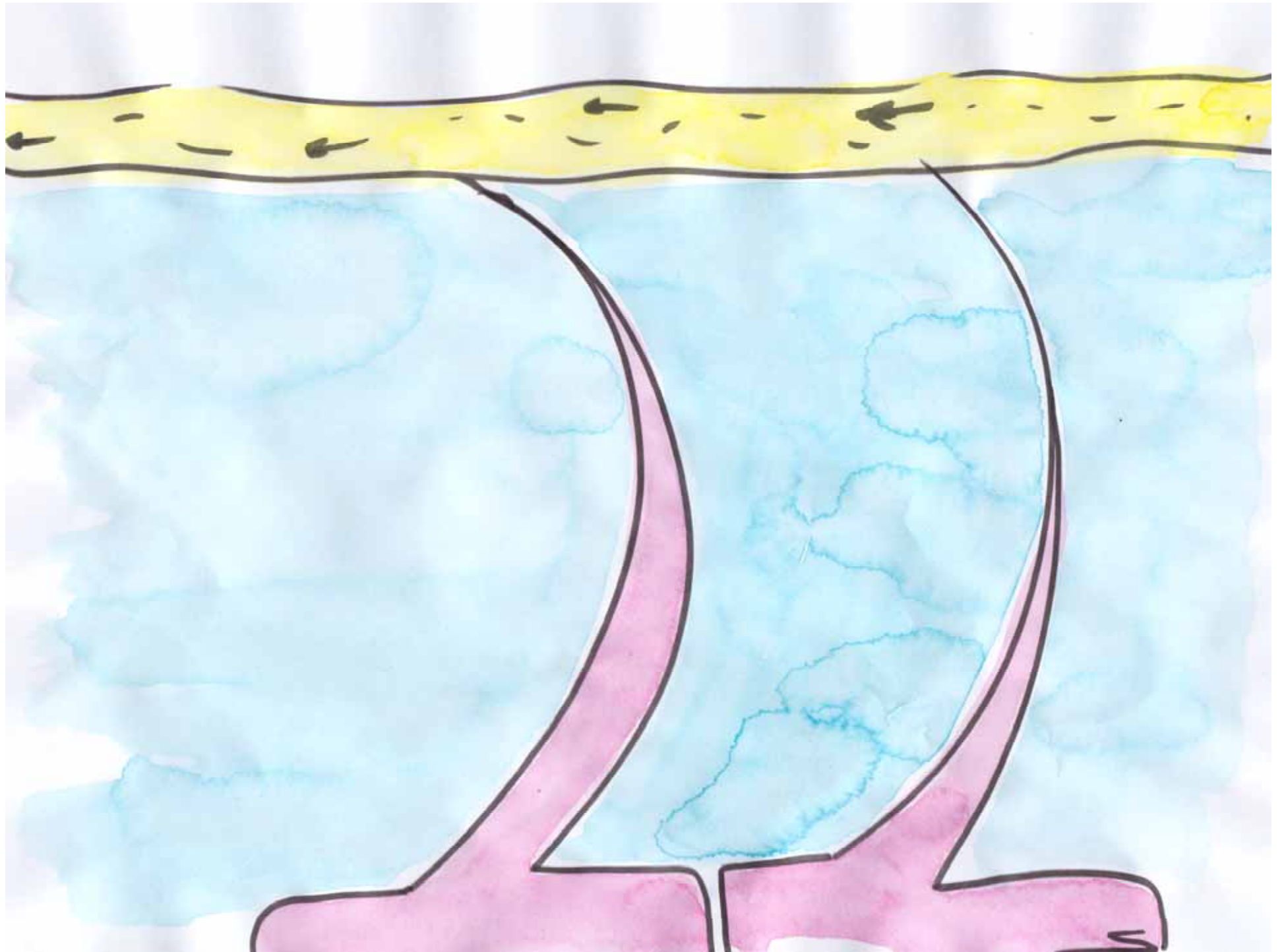


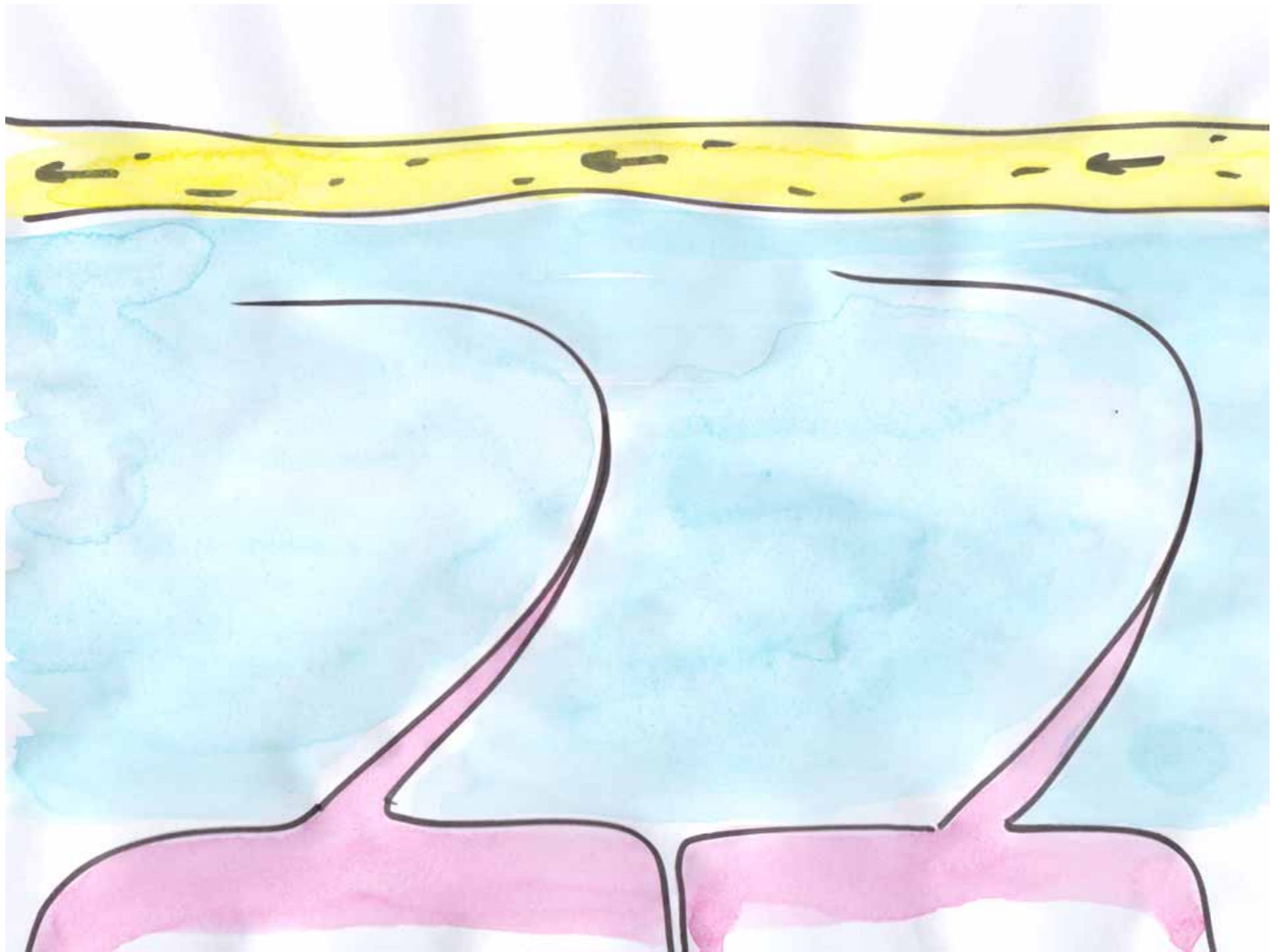


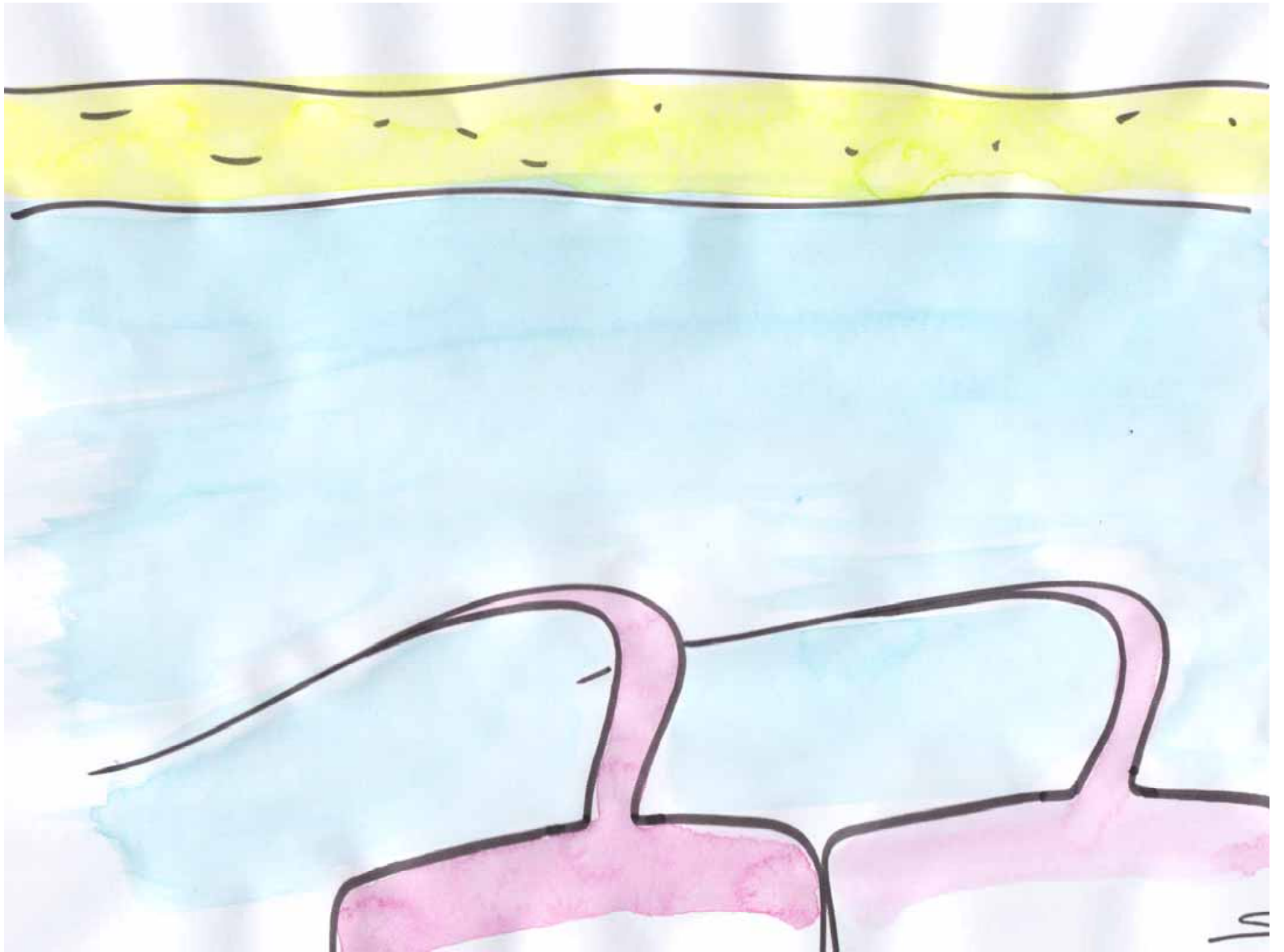


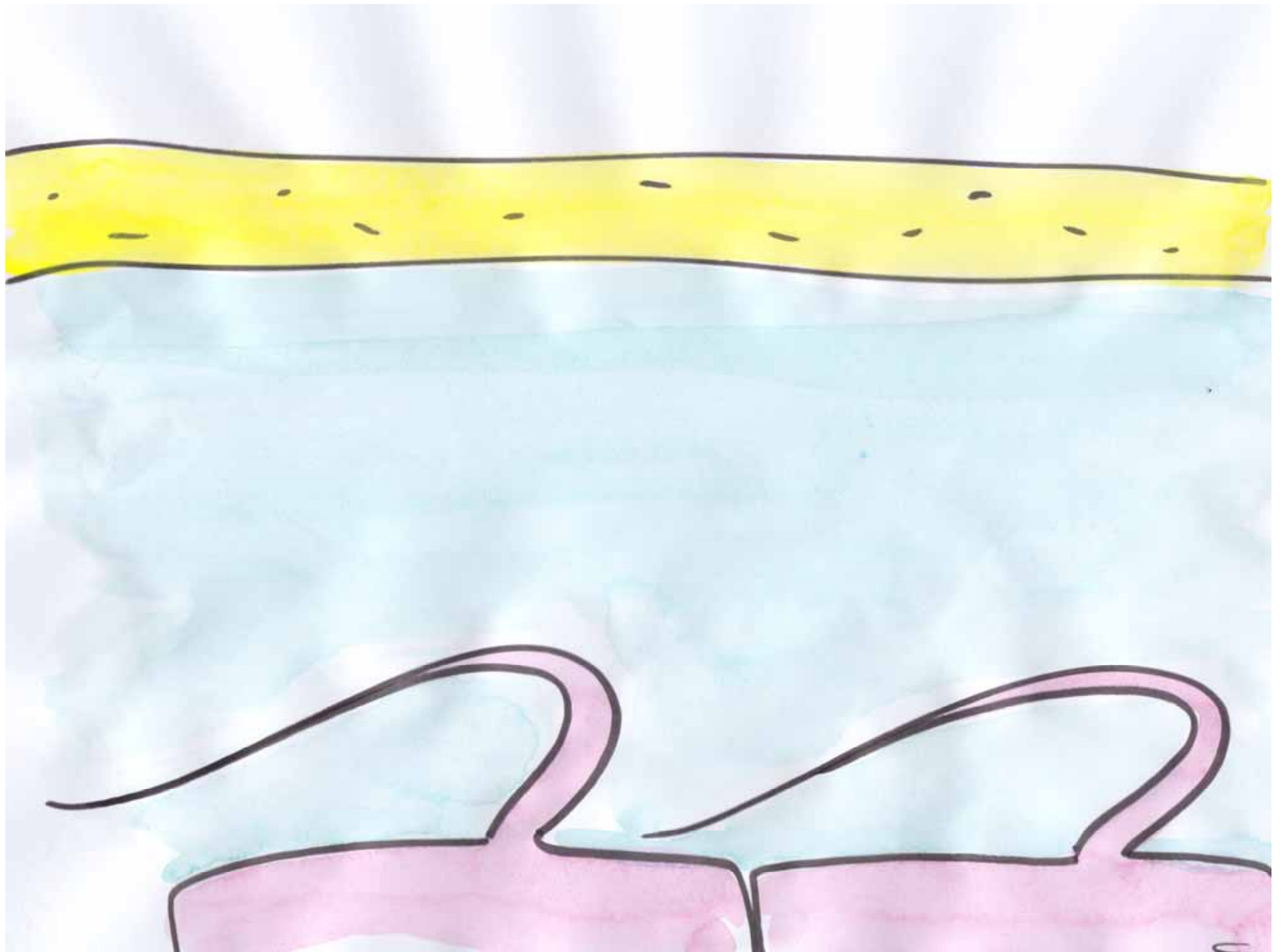










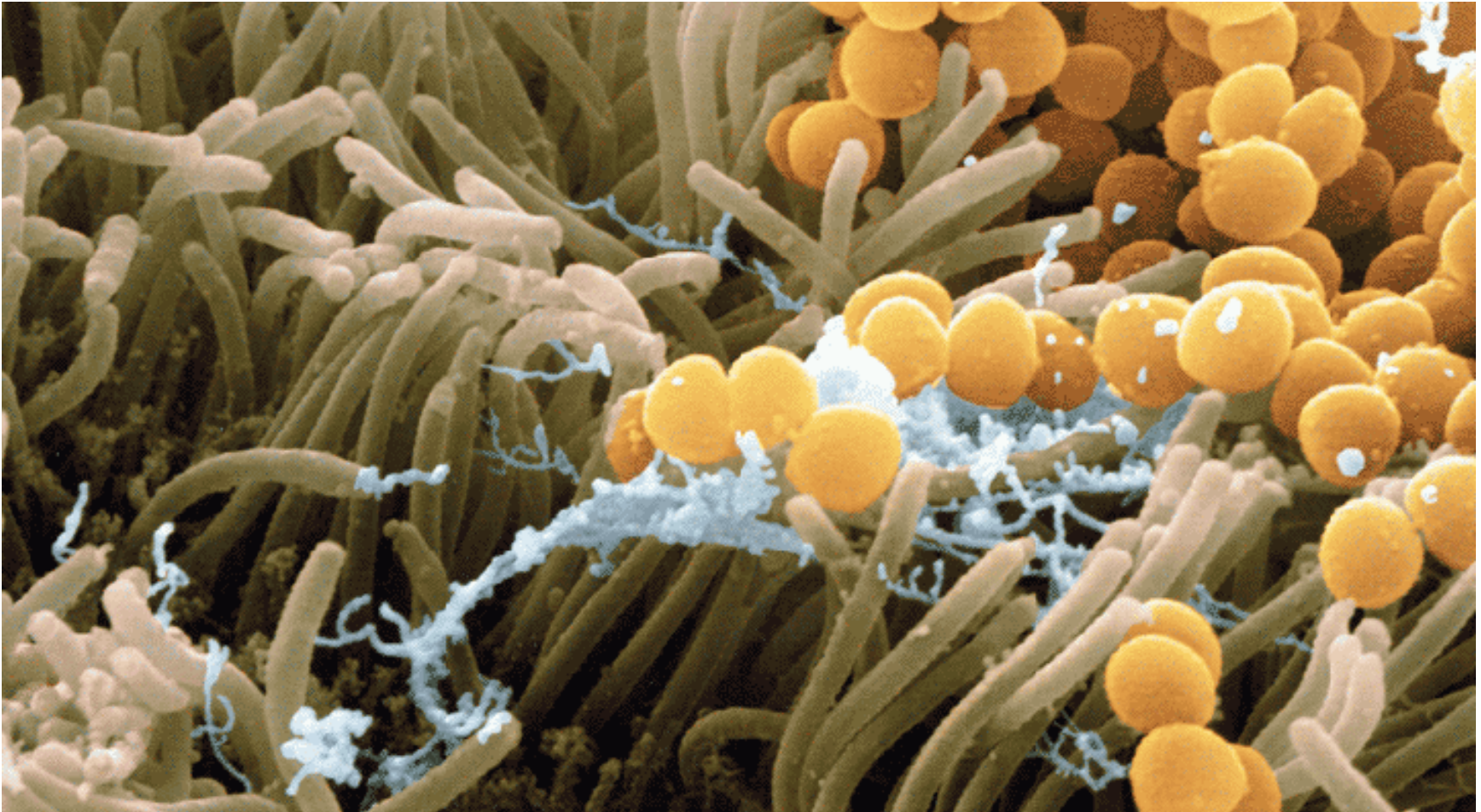


A dynamic process

Beat frequency
responds to
environmental
change like cold air,
exercise or
inflammation

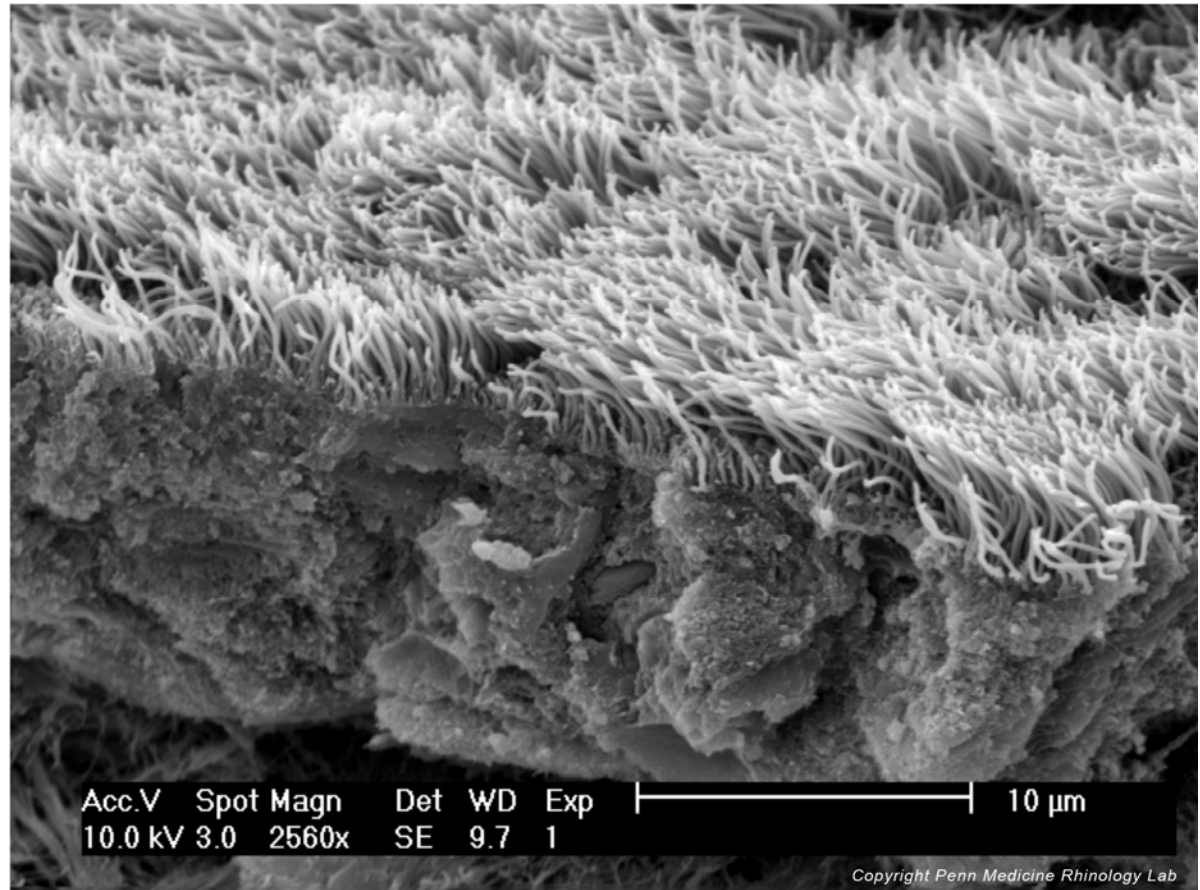


Staphylococcus sticking to the mucous on the cilia of the respiratory epithelium



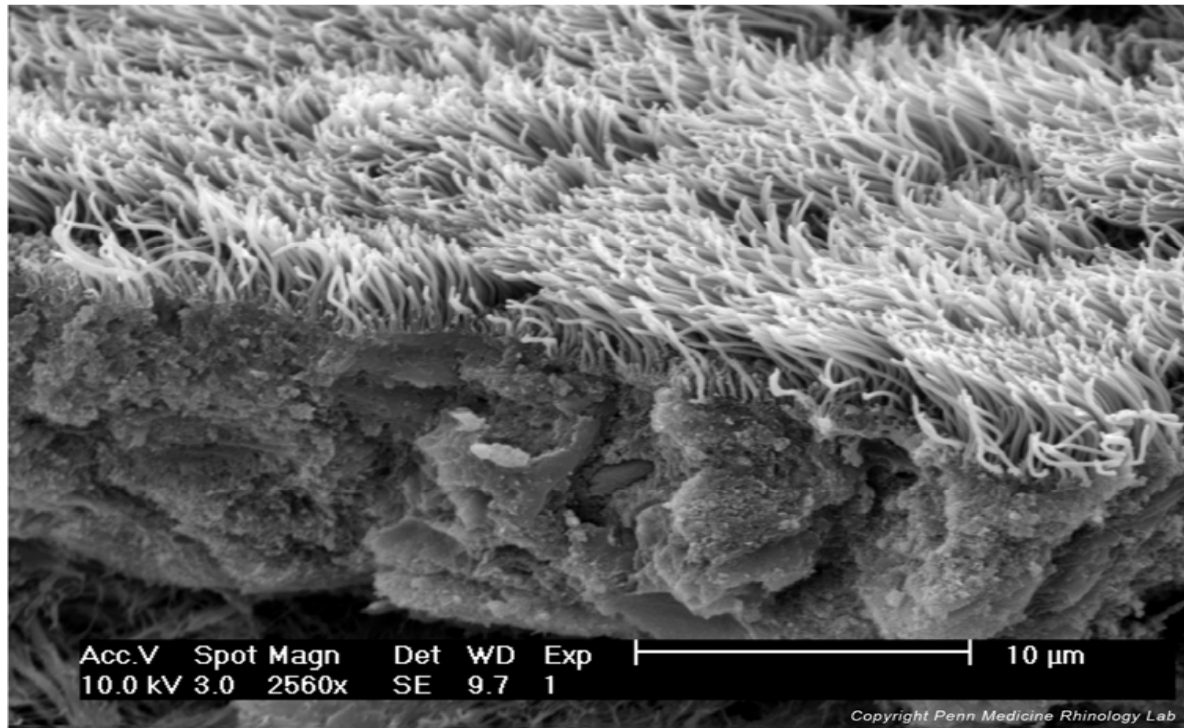
MCC

This remarkable phenomenon of muco-ciliary clearance is designed to keep allergens and pathogens from coming into contact with the membrane thereby decreasing membrane inflammation and infection.



Can you imagine what would happen if...

- the mucous was too thick and sticky to move
- or the cilia didn't work in unison?



Cystic Fibrosis

Primary Ciliary Dyskinesia

Other conditions resulting from the disturbance of the mucous membrane



Asthma and allergic rhinoconjunctivitis

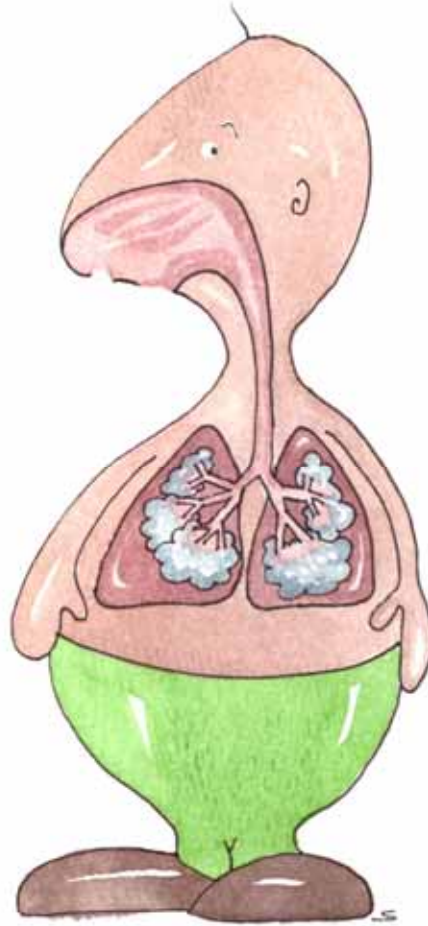
Smoking

Affects ciliary beat frequency and secretions
which results in reduced muco-ciliary clearance

Back to Sam



What does the membrane lining the nasopharynx look like?

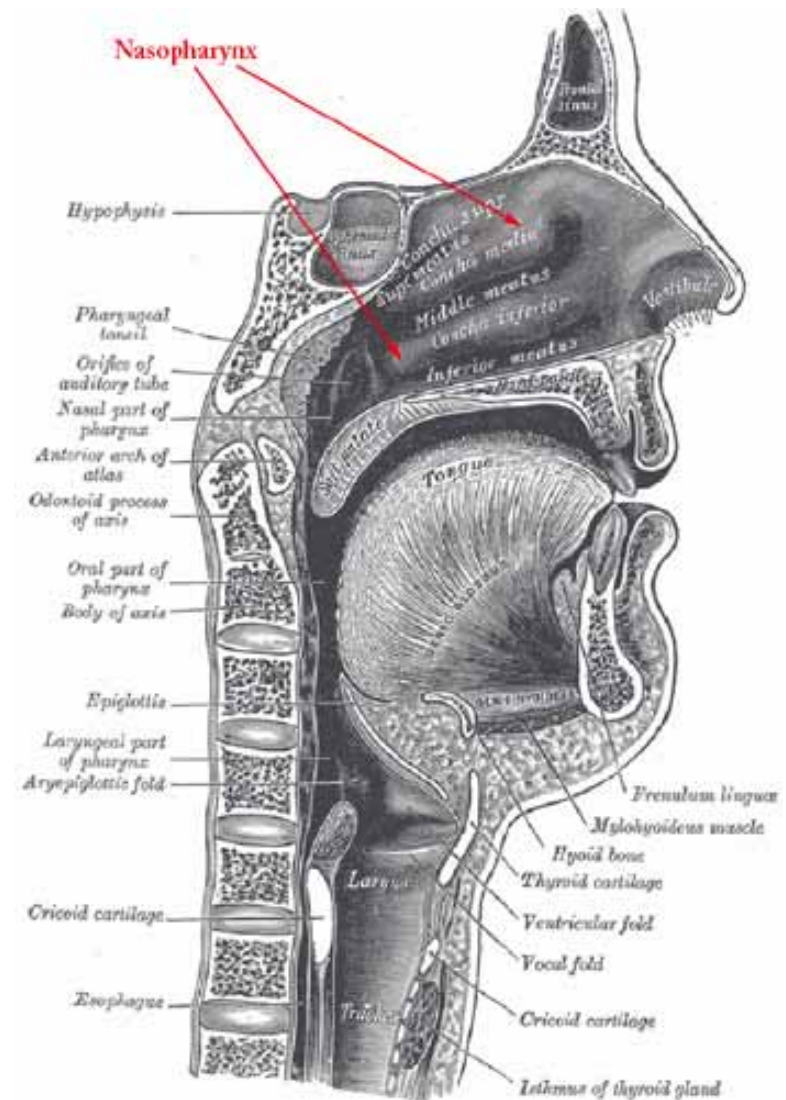


This is Sam's nasopharynx



The nasopharynx

The nasopharynx is that part of the nasal passage that lies above the free border of the soft palate.



The nasopharyngeal lining is made up of...



Two main types of epithelium...

Stratified squamous epithelium



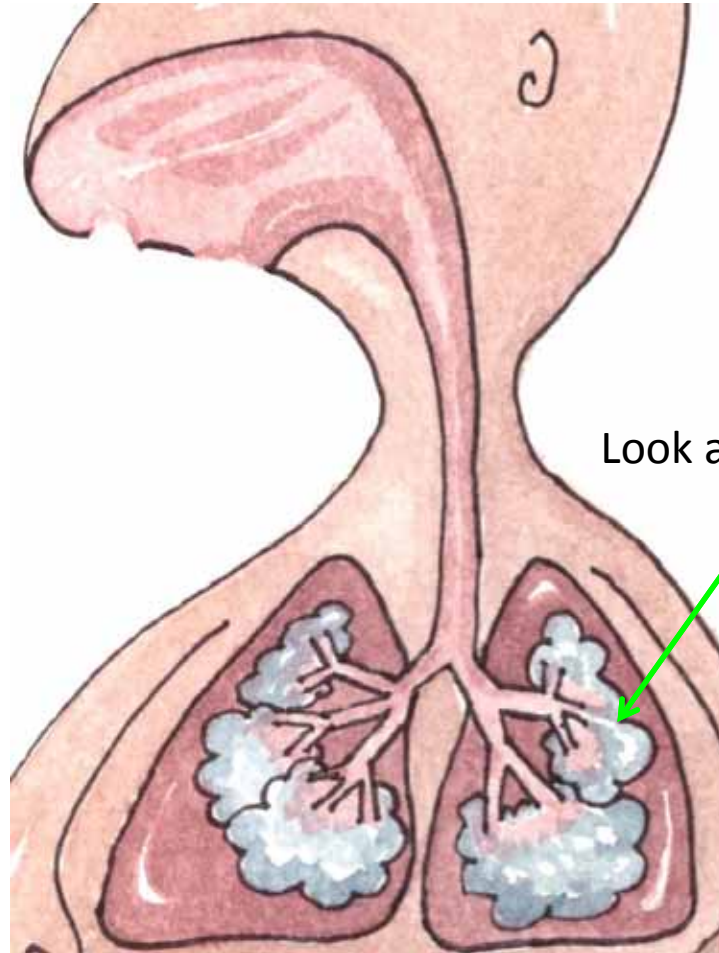
Also found lining the mouth and oesophagus

Pseudostratified ciliated columnar epithelium with goblet cells



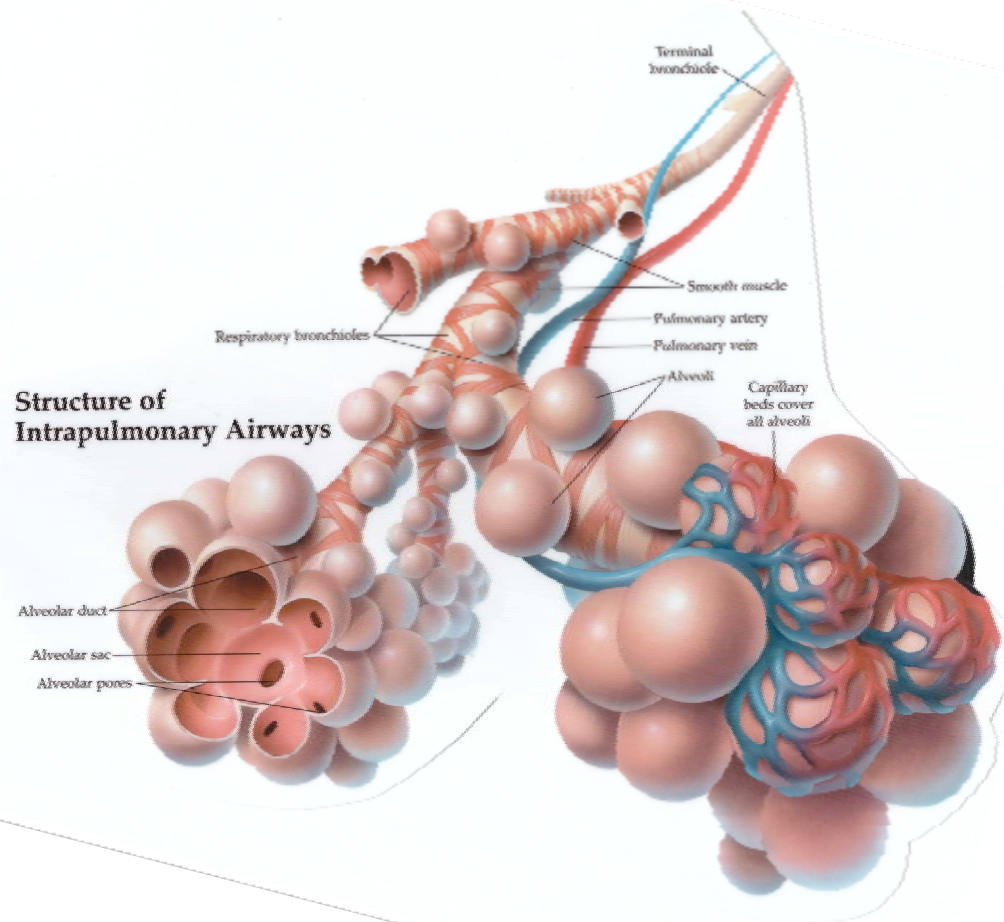
Like that found lower down the respiratory tract in the bronchi

Let's look a little further down his respiratory tract

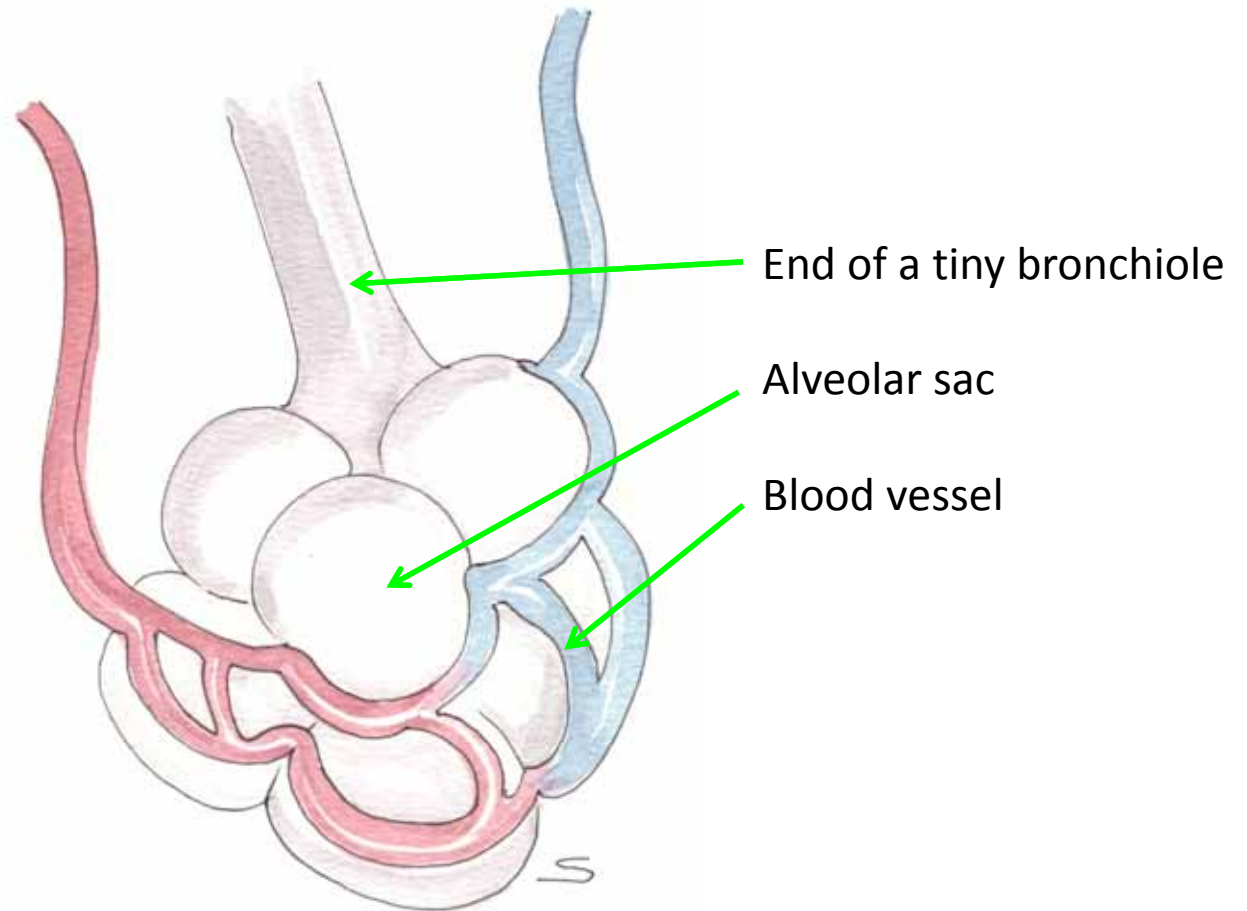


Look at the alveoli under a microscope

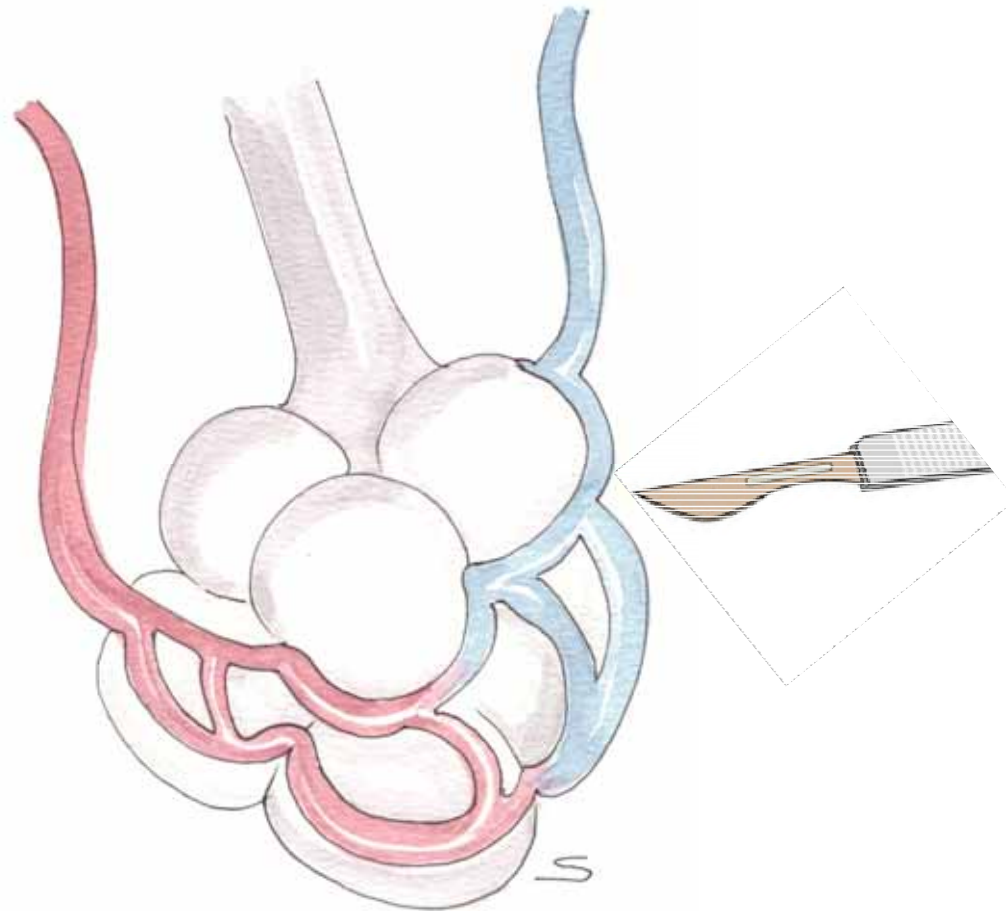
The lower airways



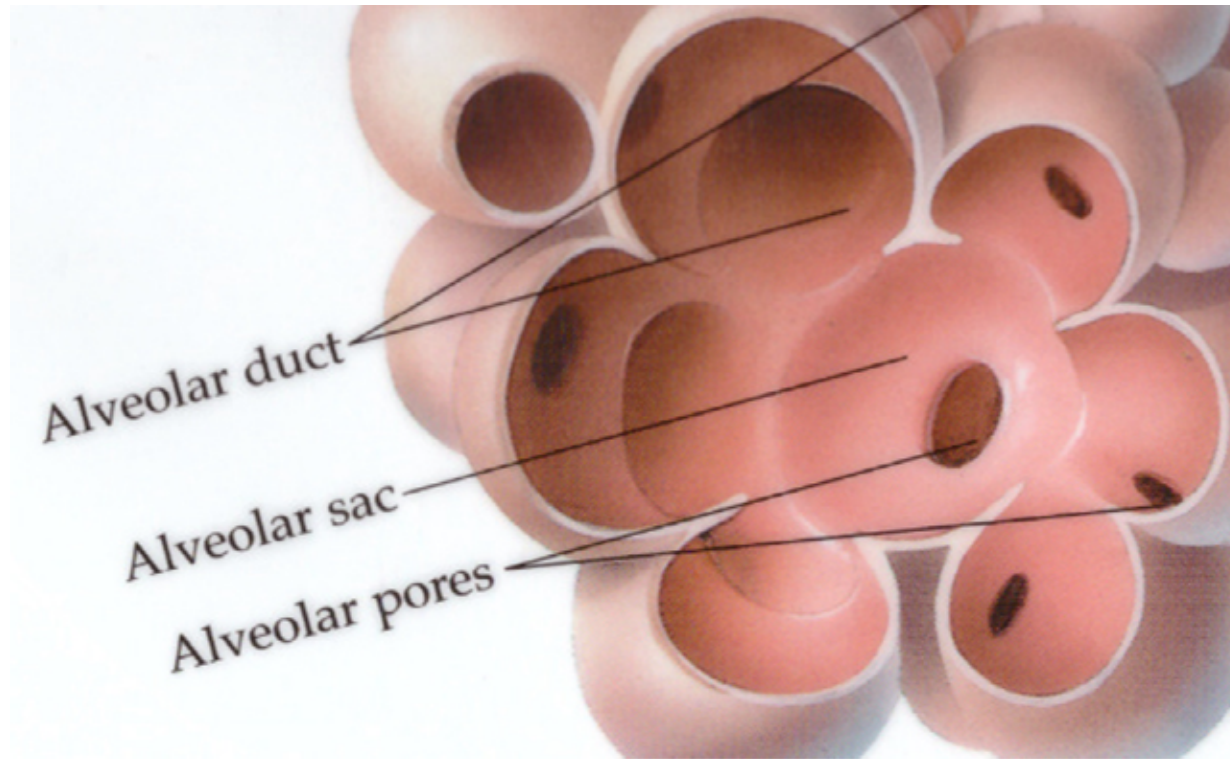
They are very closely associated with the blood vessels in the lung



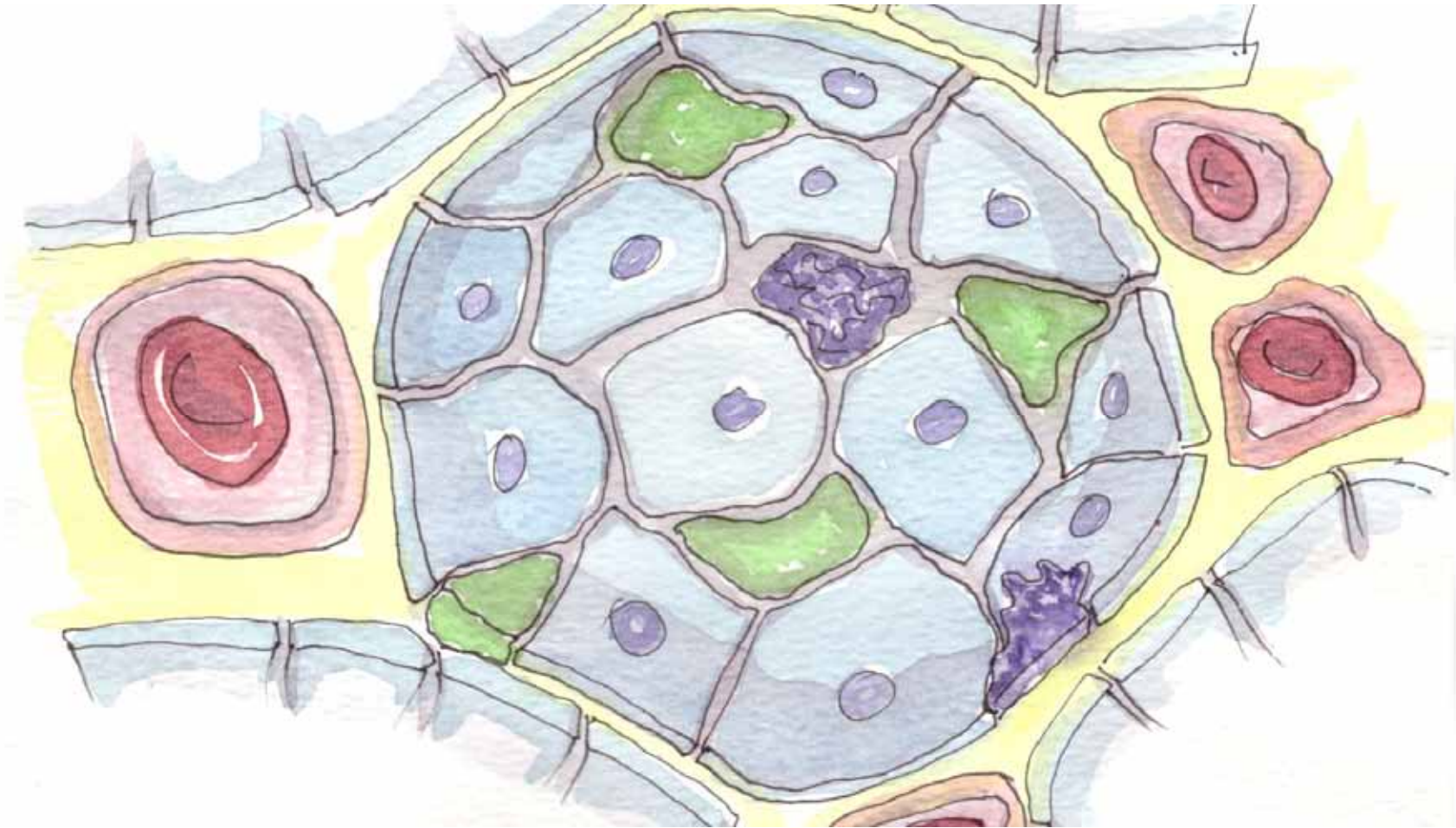
Let us slice across the middle of the alveolar sacs and look at the cells...



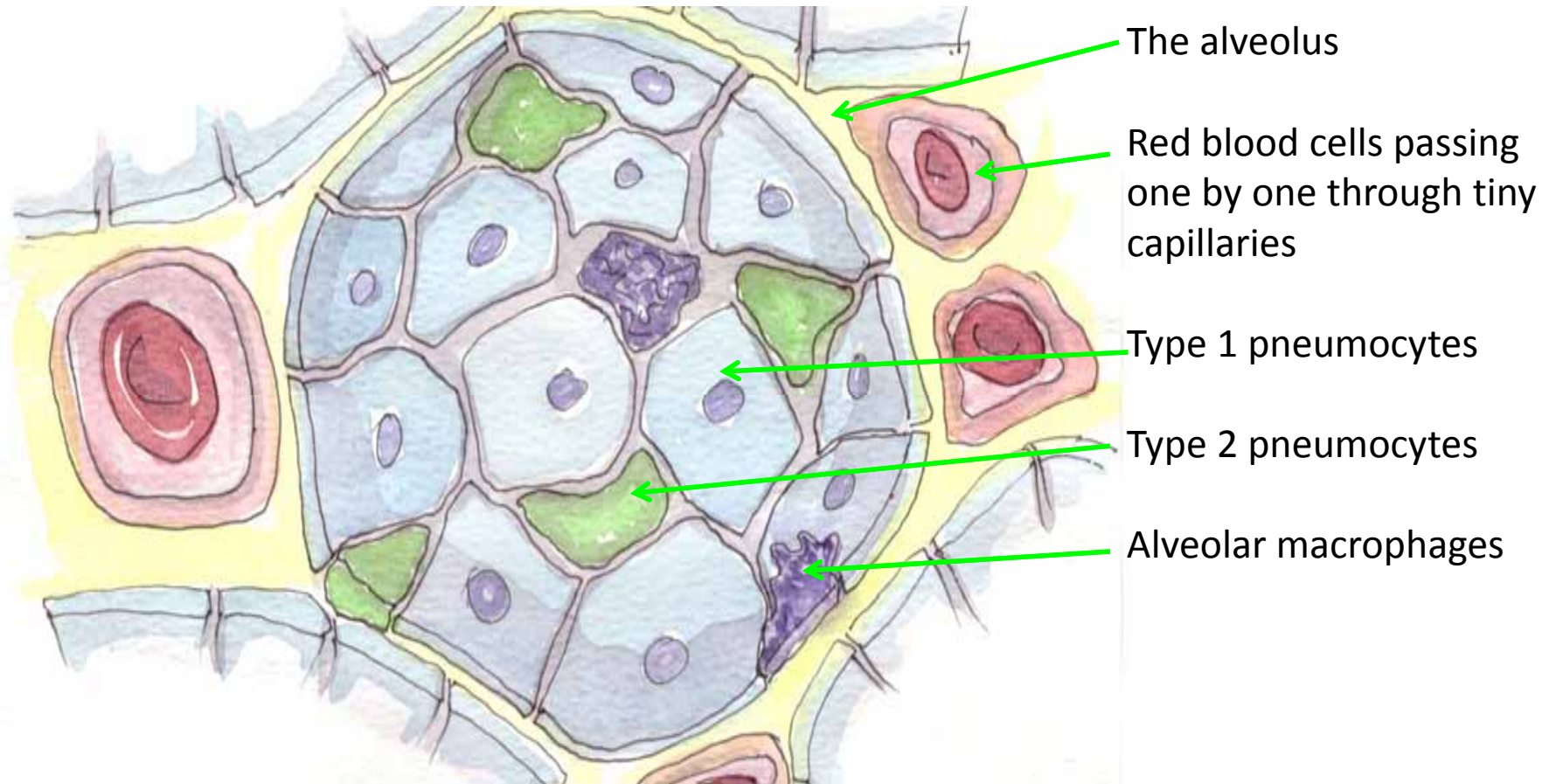
The alveolae



The inside of a single alveolus



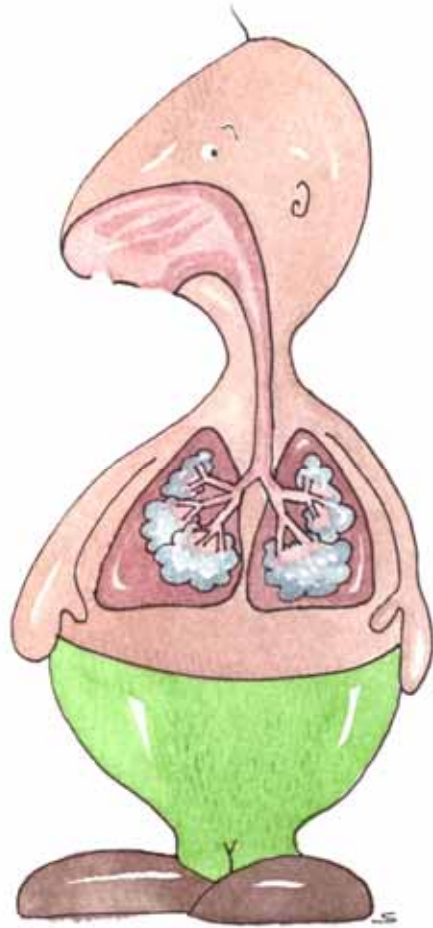
The complexity of a single balloon...



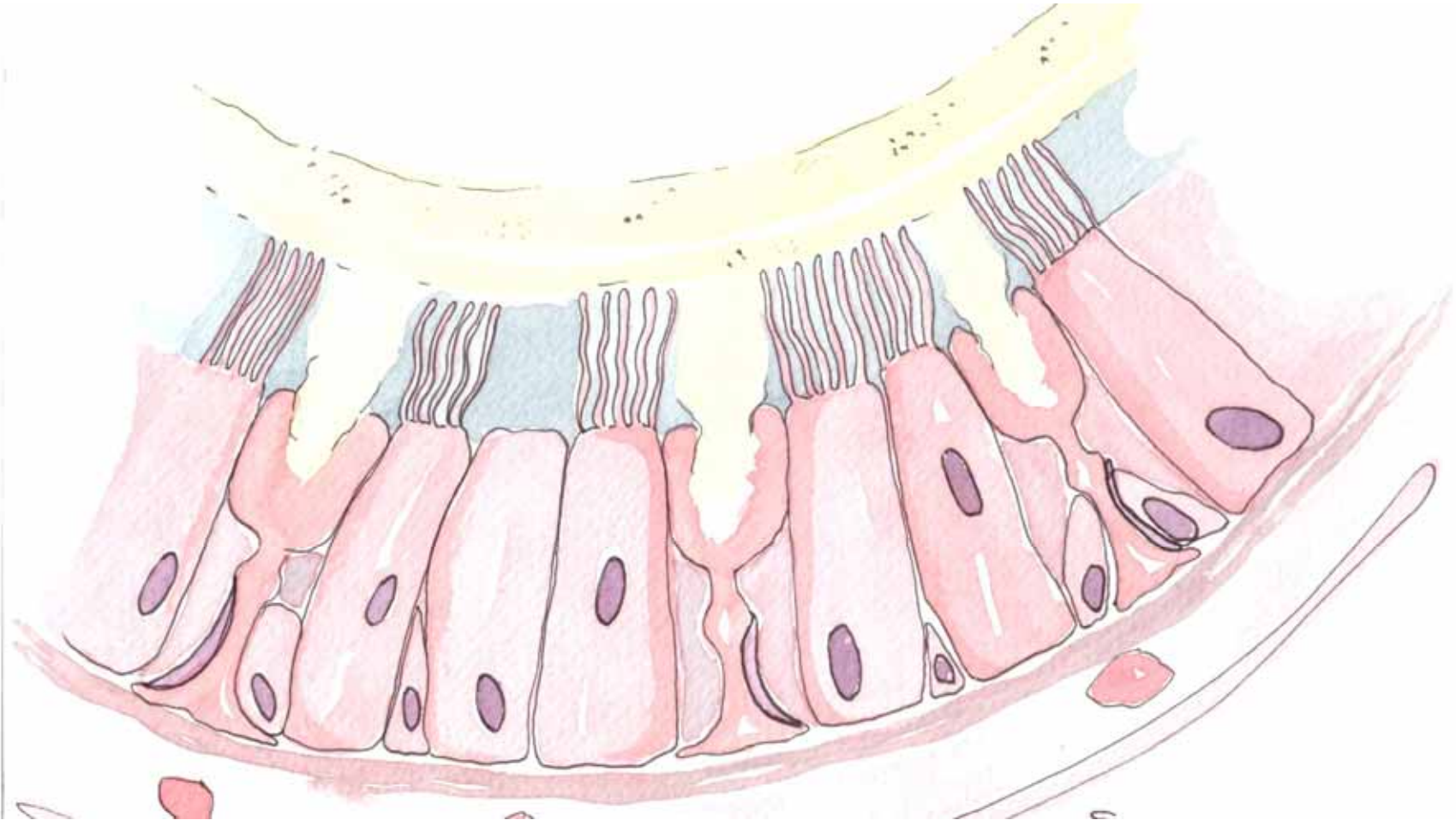
So when we look at Sam



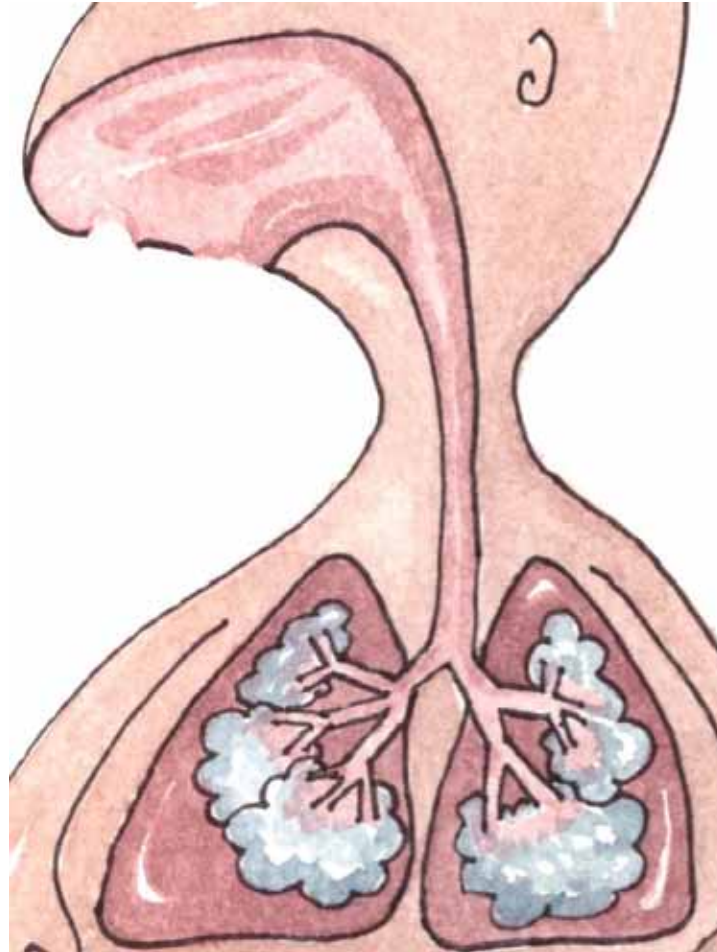
And think about what is inside him...



We have looked at form...



Which informs function...

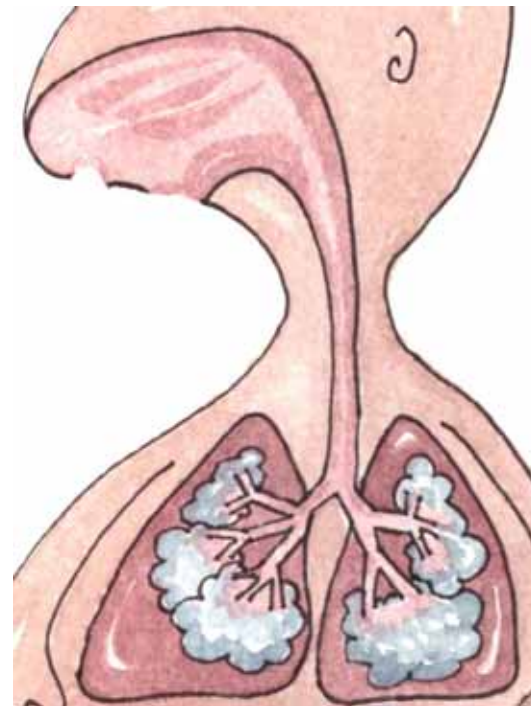


The respiratory mucous membrane...

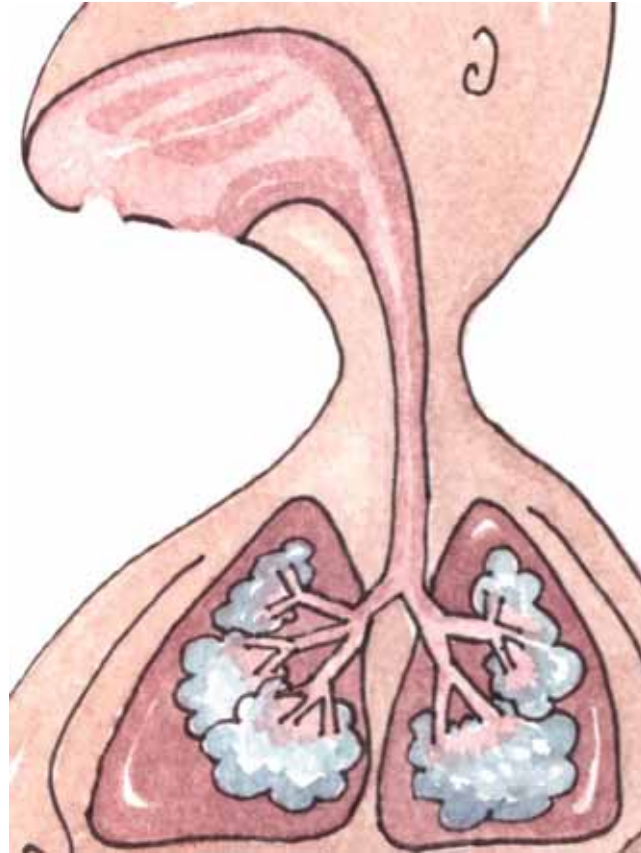
An air conditioner

A barrier

A war zone

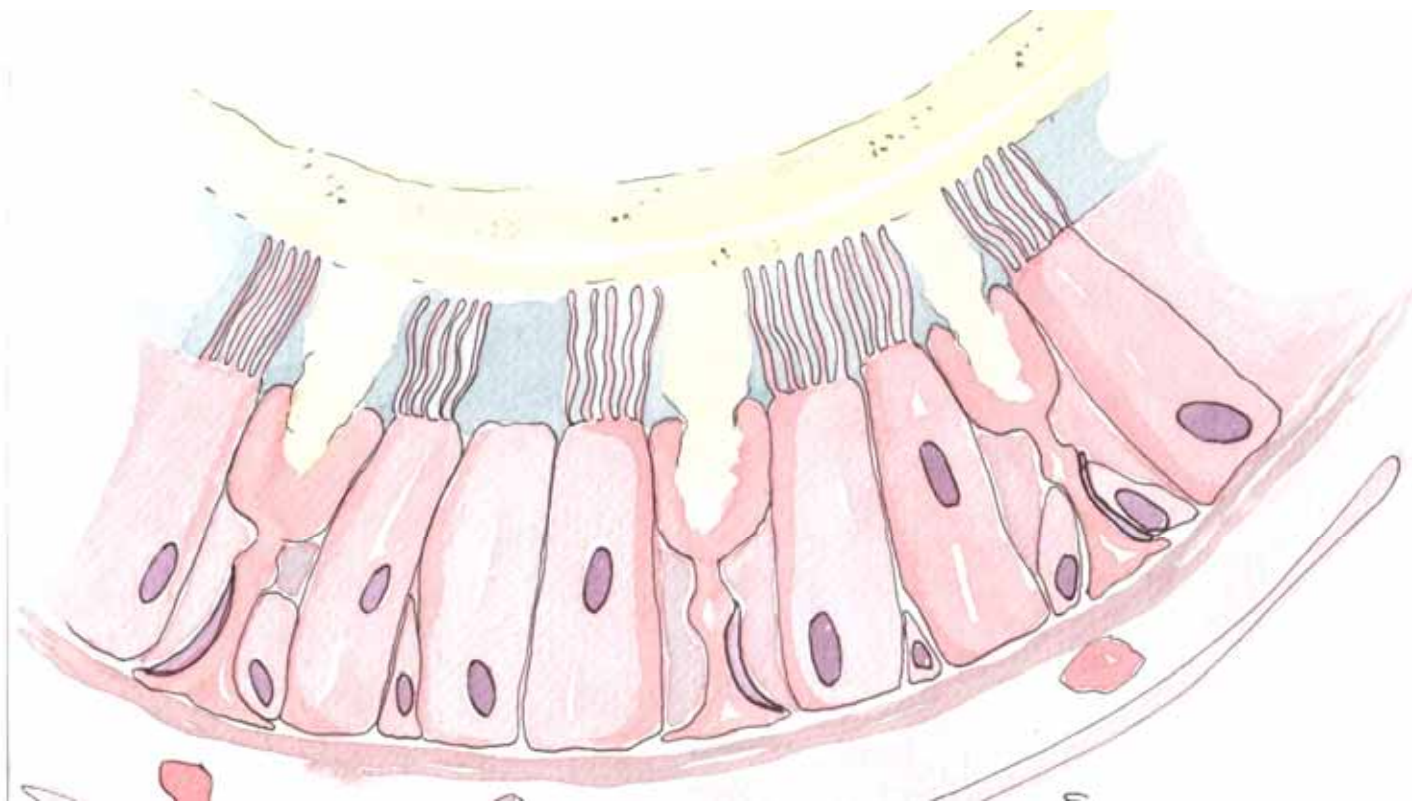


Air conditioner



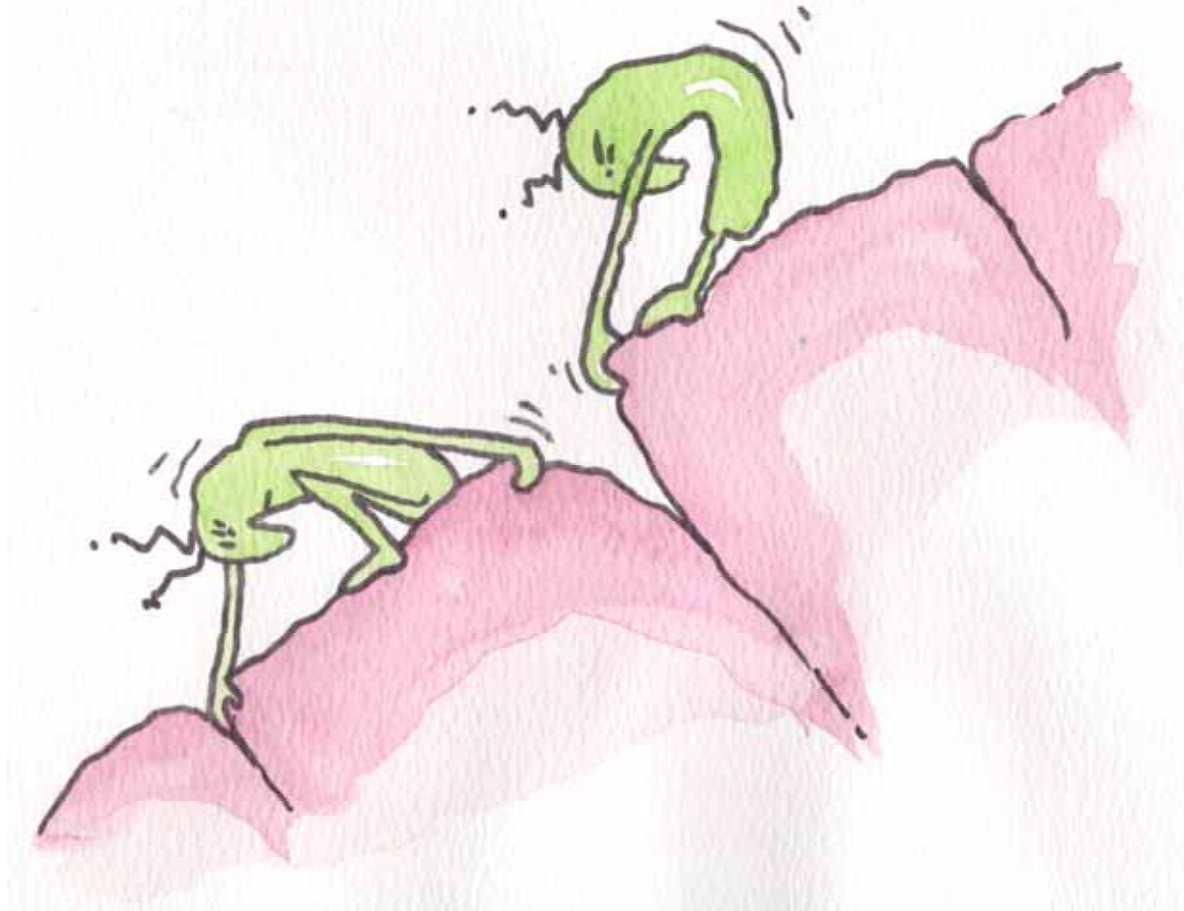
Air is warmed and humidified as it travels down into the lungs.
And particles are trapped by the hairs and mucous in the nostrils.

A barrier

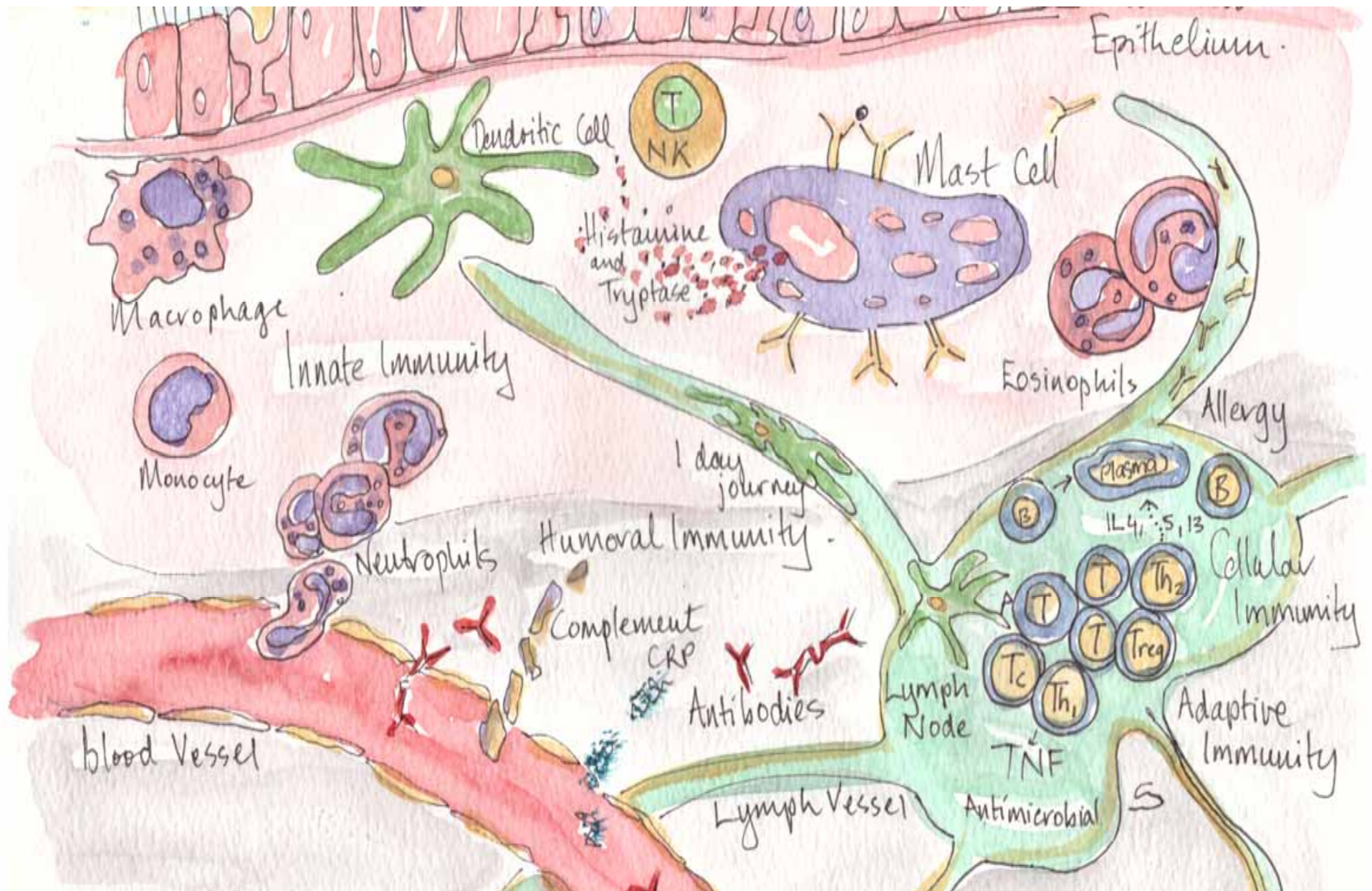


The muco-ciliary apparatus presents an effective barrier to molecules and microbes.

A war zone



Microbes relentlessly attempt to gain entry



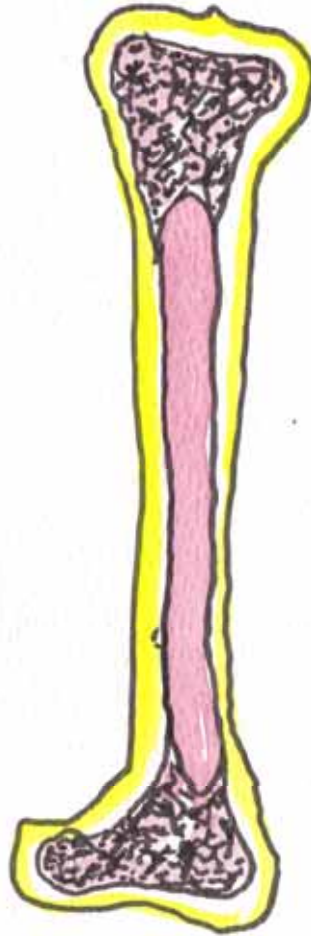
There is a highly sophisticated immune defence system constantly at work at protecting the body from attack.

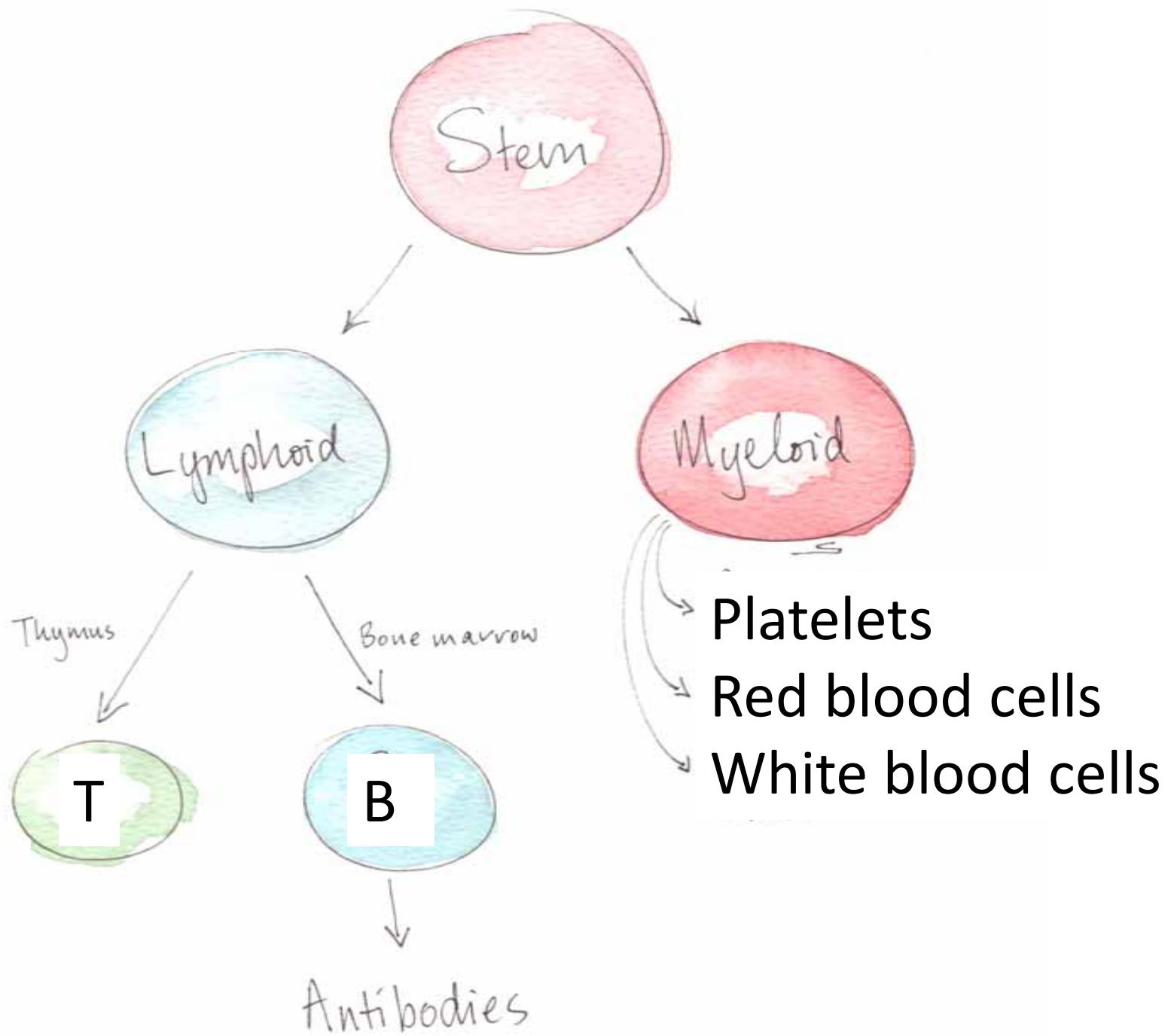
Immune cells involved in the protection of the body at the mucus membrane level include:

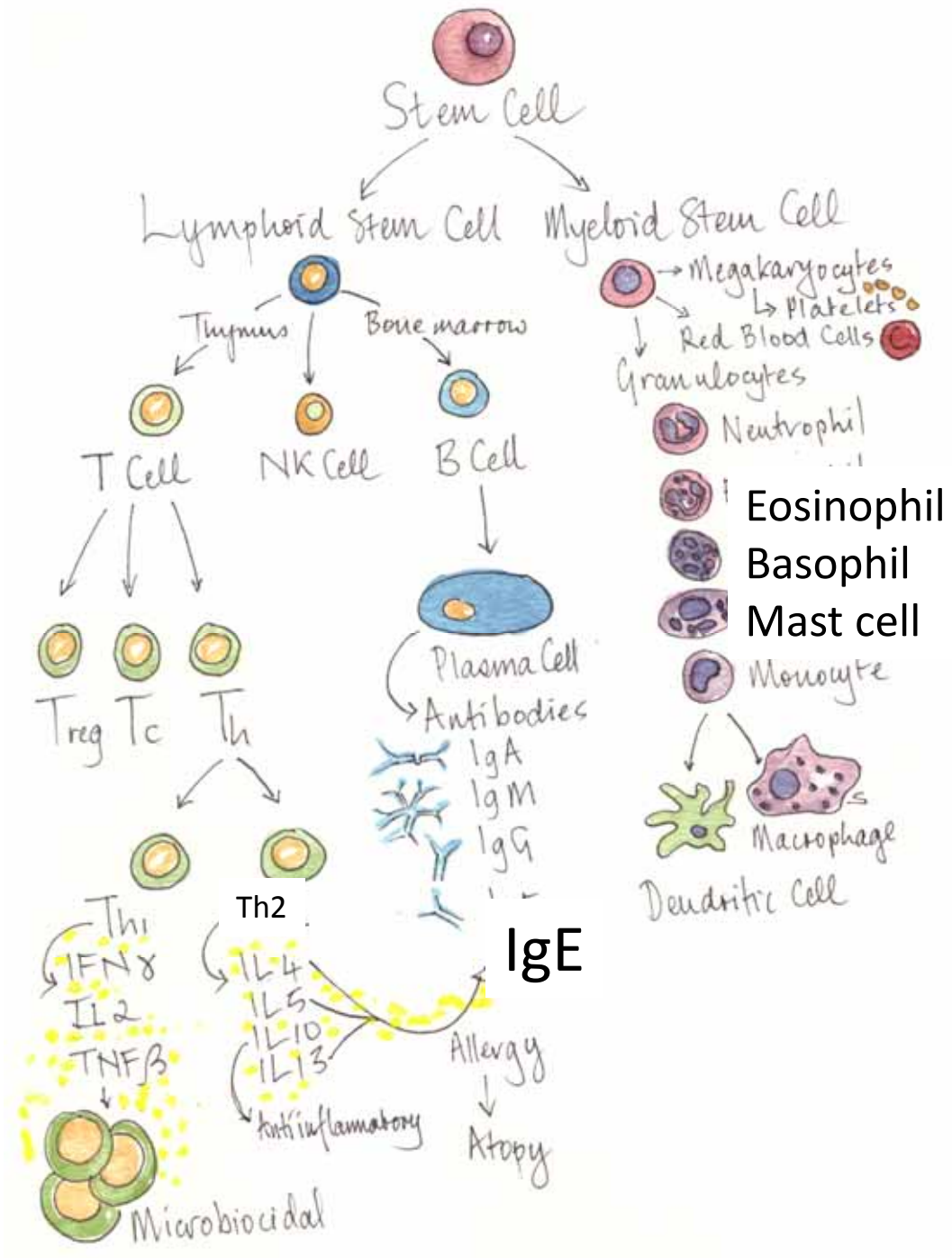
- Alveolar macrophages
- Neutrophils, Eosinophils, Natural killer cells, Mast cells, Basophils
- Interleukins, Complement, C-reactive protein
- T cells and B cells
- Antibodies
IgA- important in defence
IgE – important in allergy



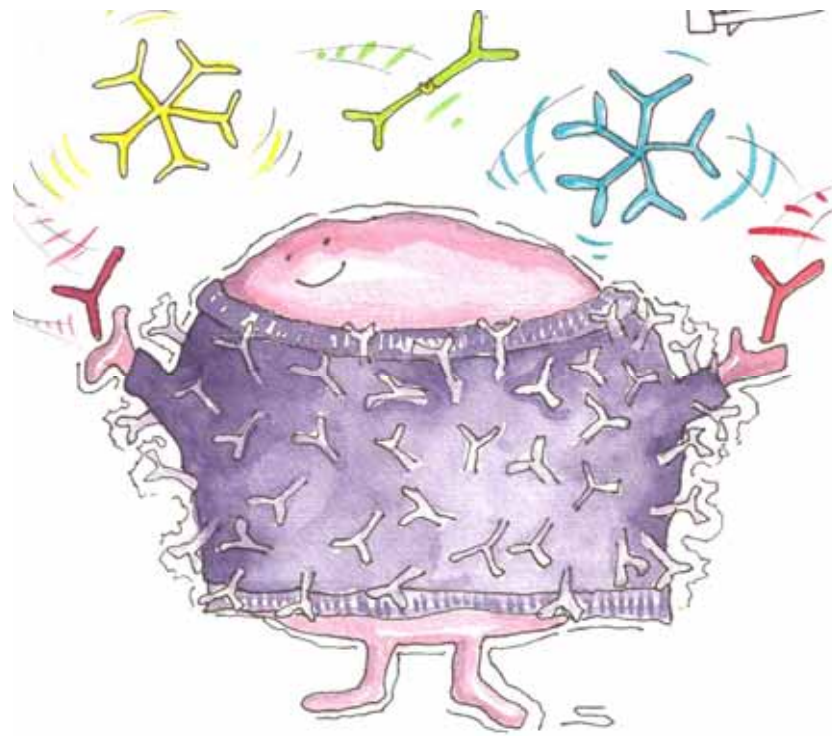
Just a quick reminder of where those
cells come from...





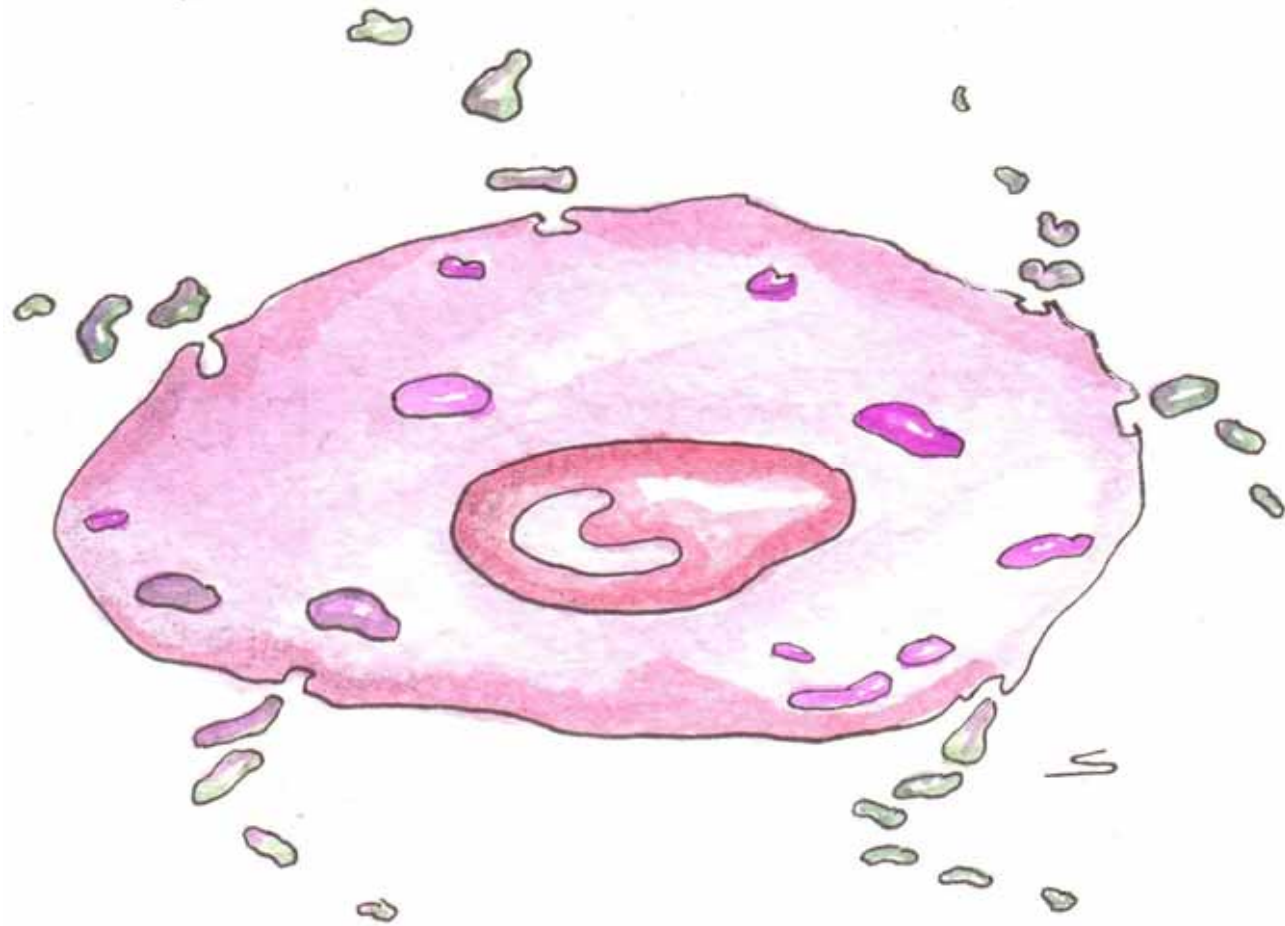


One cell in particular plays a big role in the allergic response..

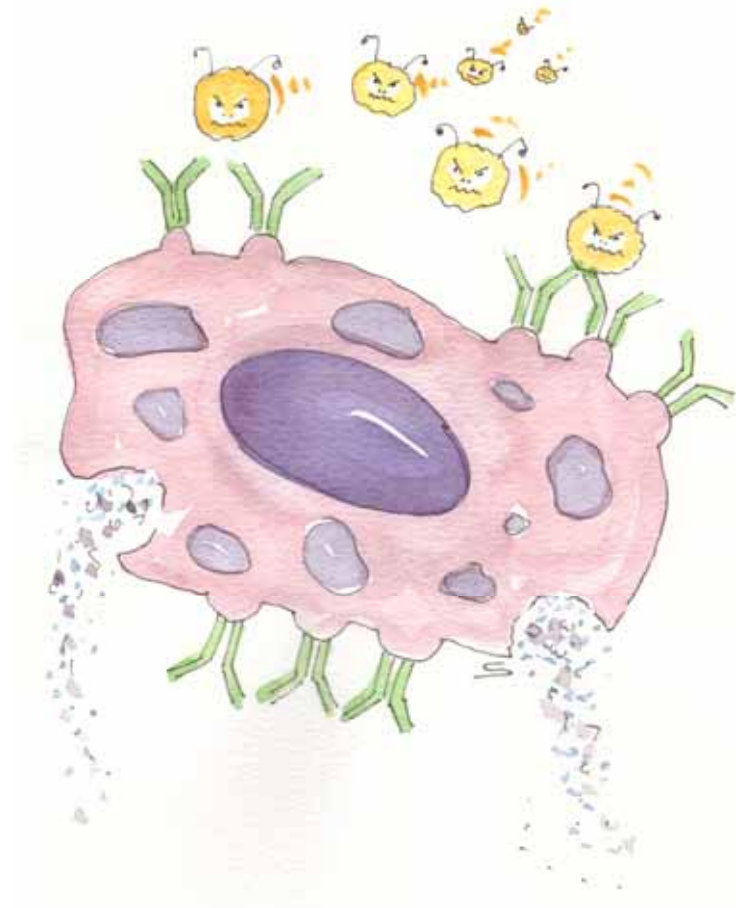


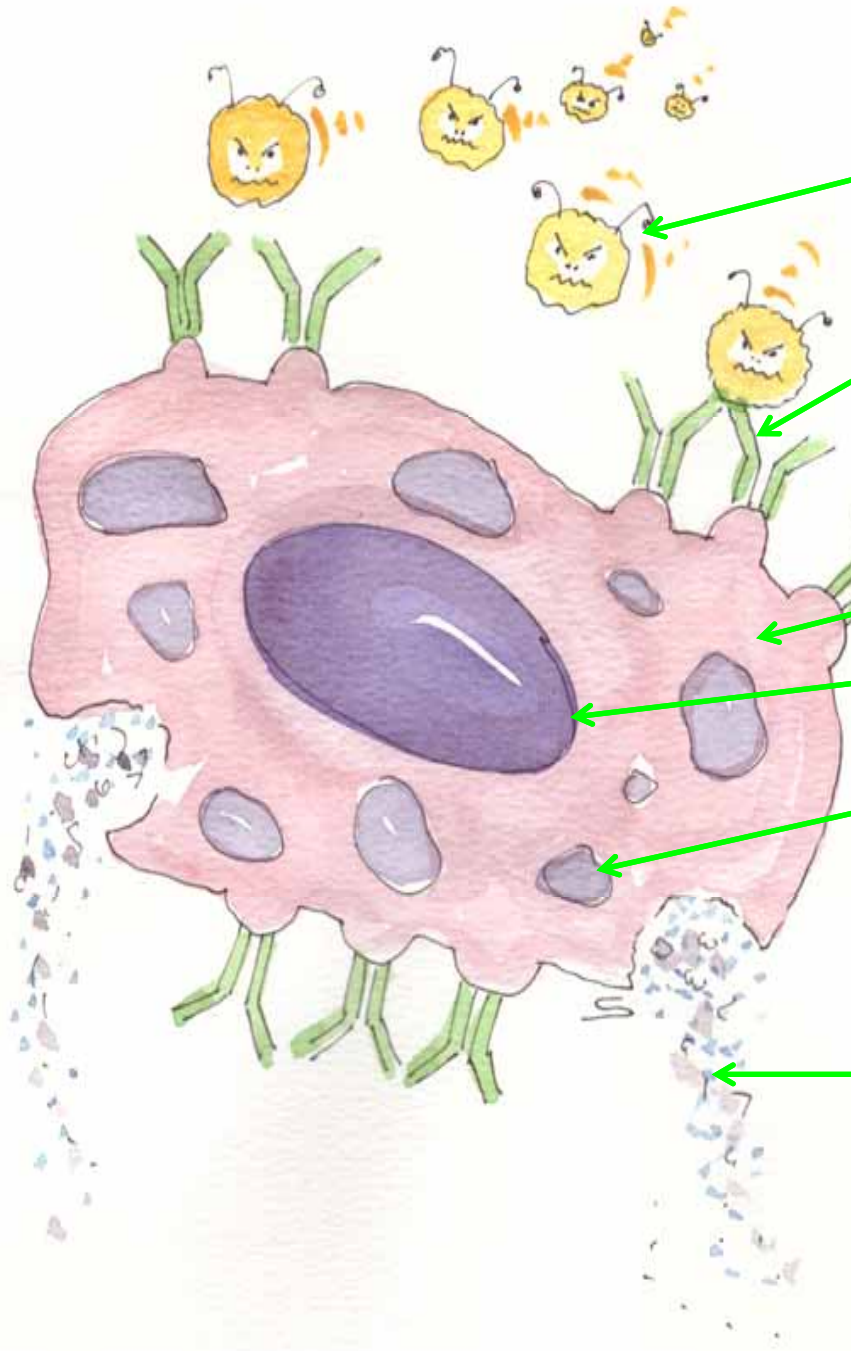
The mast cell

Poised for degranulation



What happens when individuals react to protein molecules like pollen?





Pollen granules (antigen)

Crosslinking of IgE
by a pollen molecule

Immunoglobulin E

Mast cell

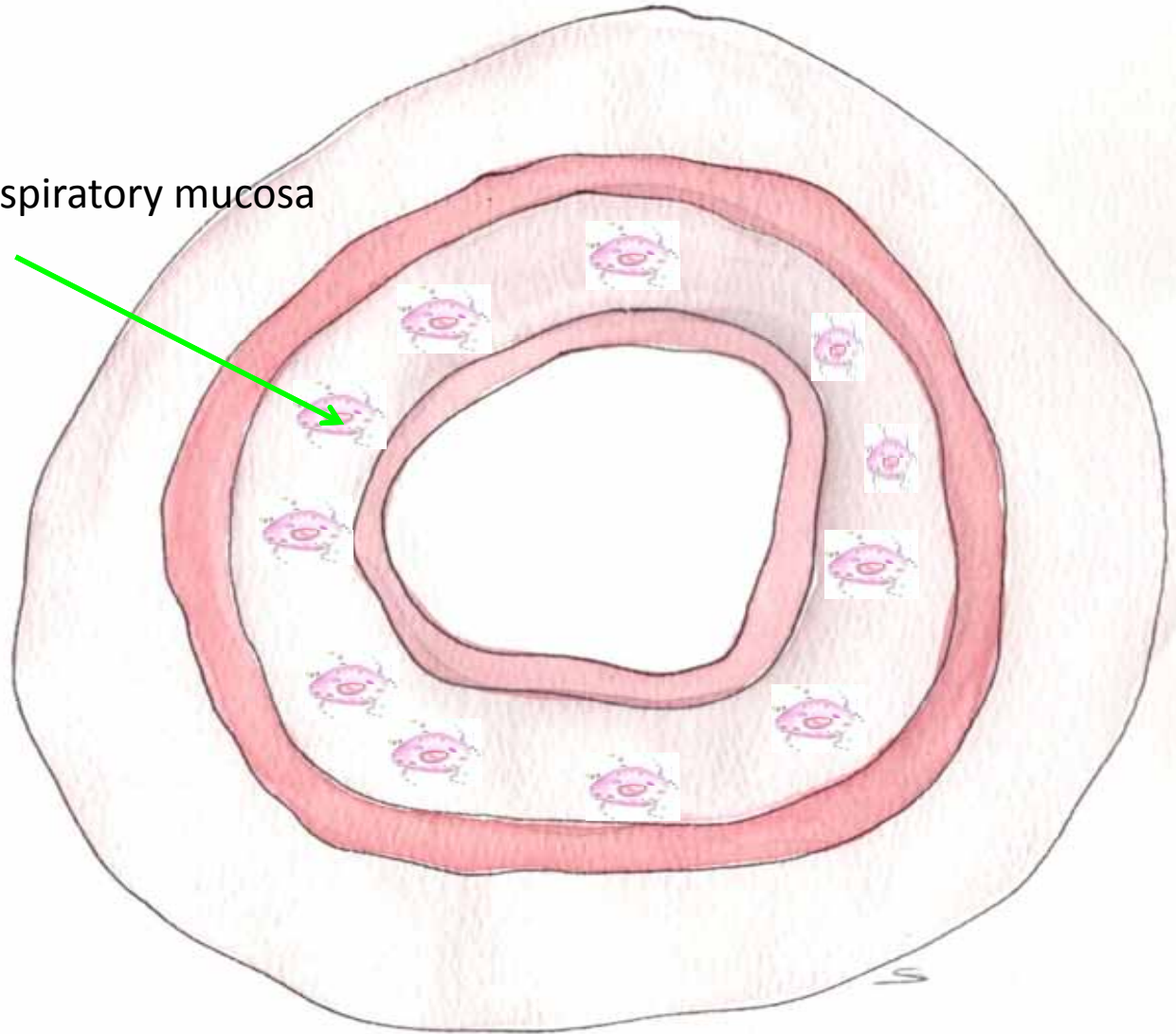
Nucleus of the mast cell

Globules filled with
histamine and other
preformed inflammatory
mediators

Degranulating mast cell
Releasing histamine
and inflammatory mediators

There are many mast cells lining the respiratory mucous membrane

Mast cells in the respiratory mucosa

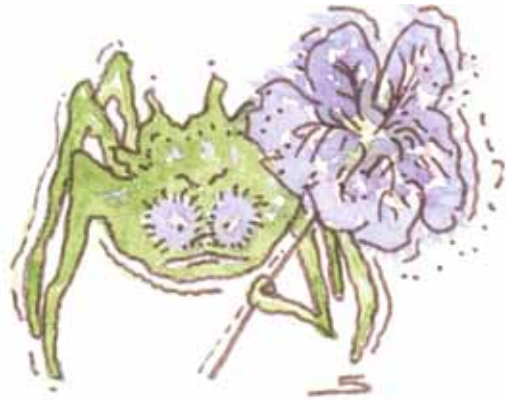


So...

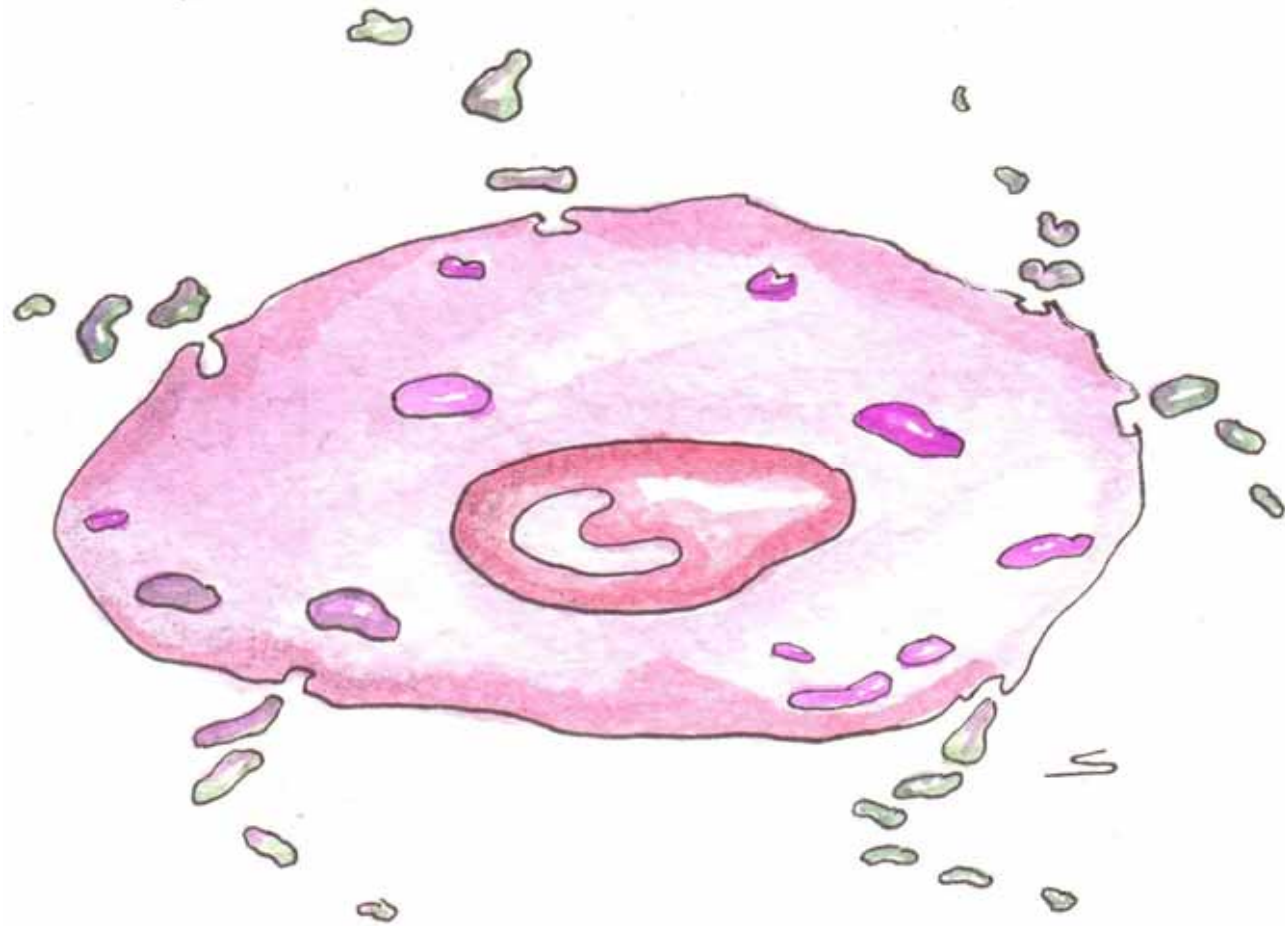


What happens when...

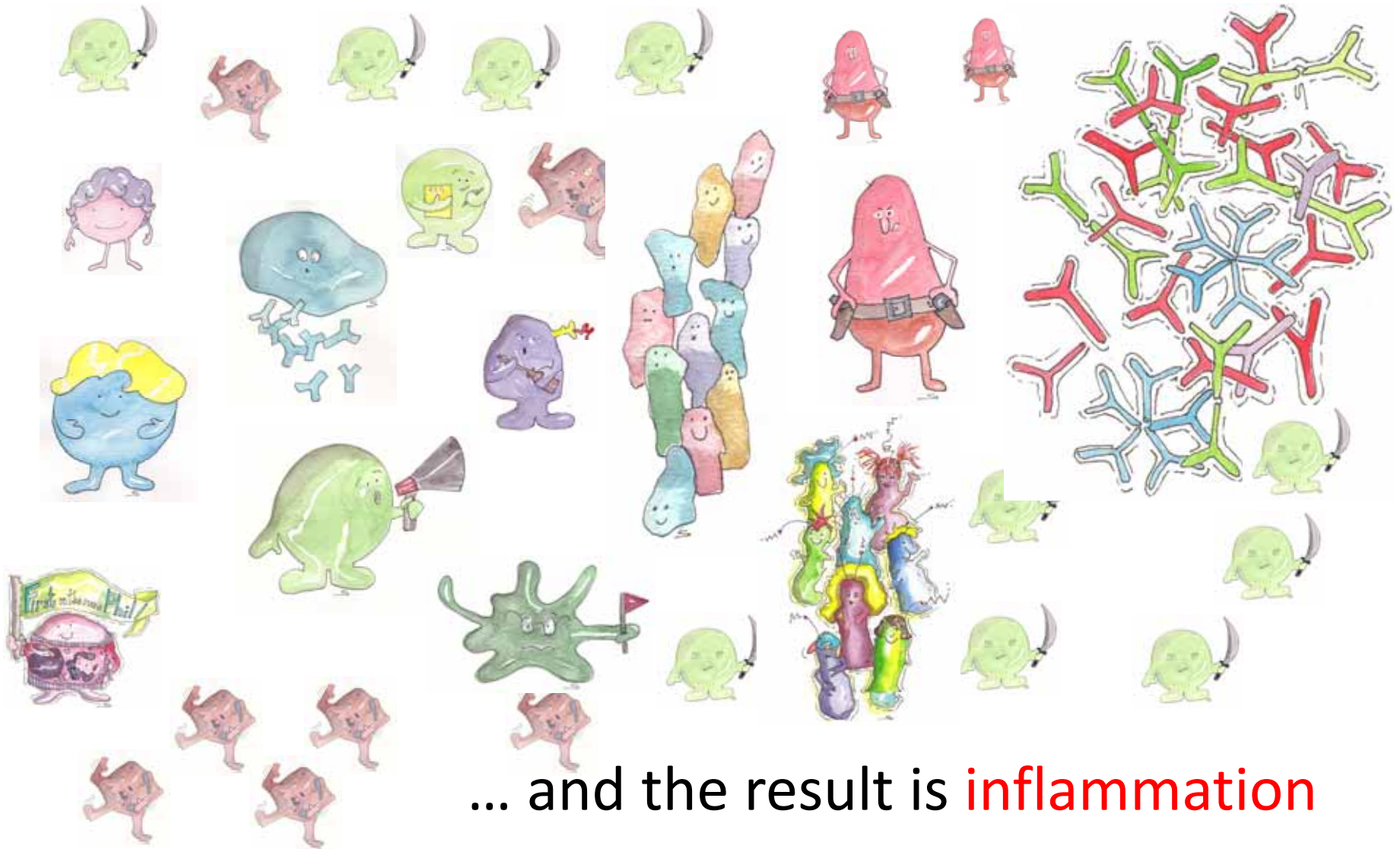
molecules that are not dangerous, like pollens, dust mites or animal dander land on the mucous membrane...



The mast cells degranulate

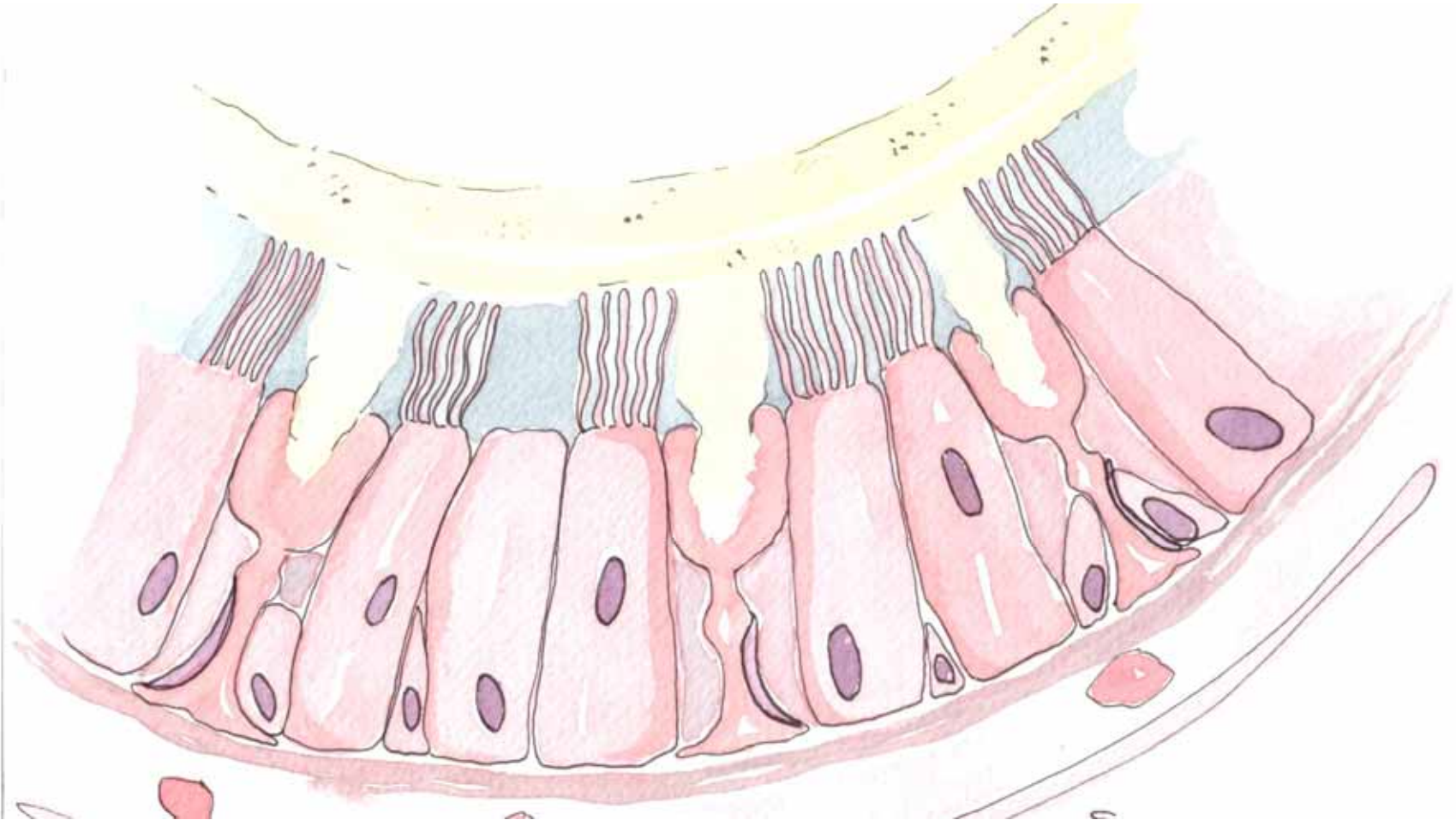


This causes the immune system to get involved...

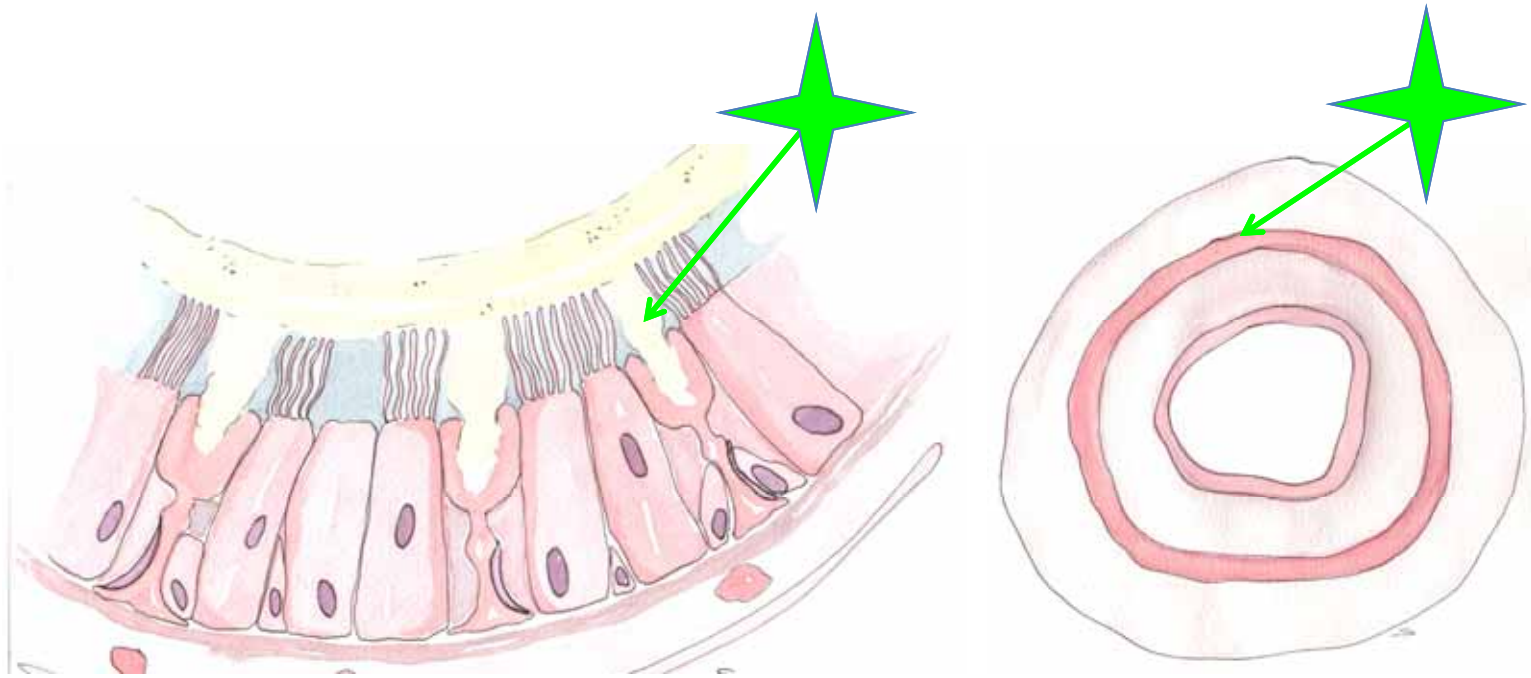


... and the result is inflammation

The magnificent mucous membrane
becomes over-zealous

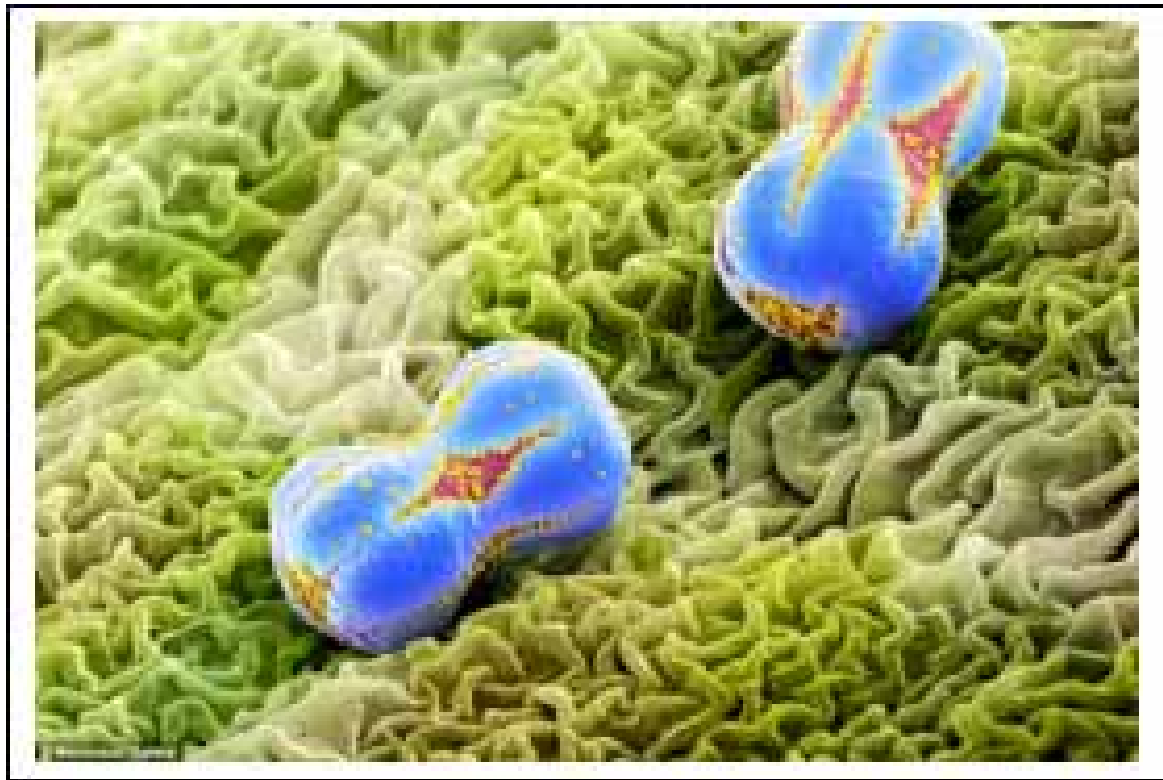


There is over-production of mucous
and the smooth muscles constrict



Just a few pollen granules...

Can make this beautiful system go uncomfortably wrong...



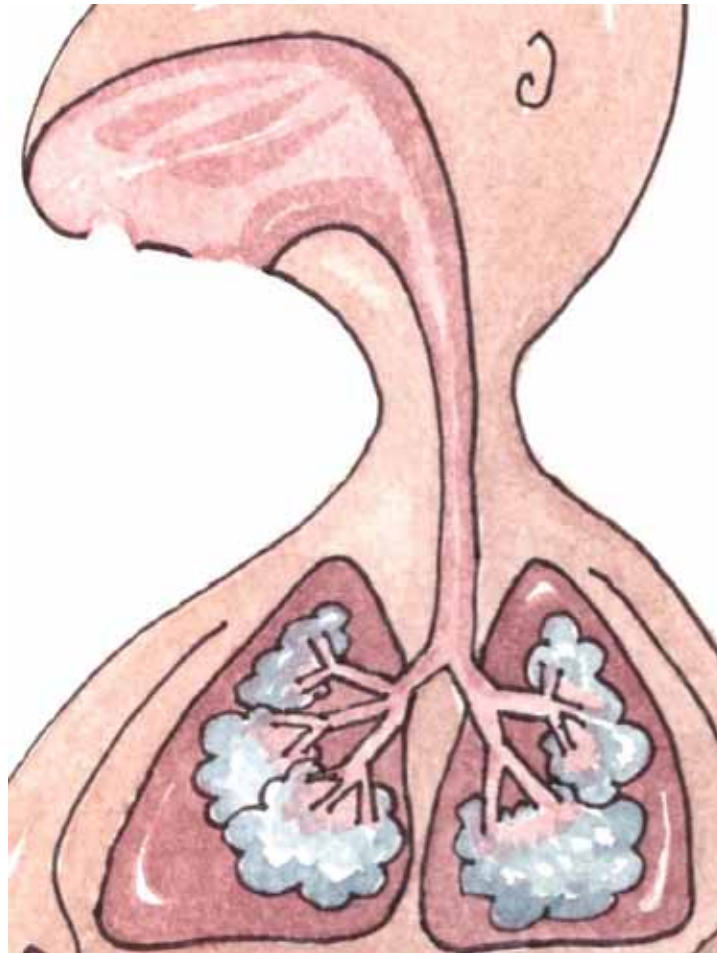
Which results in the sneezes, wheezes and coughs that we see in allergic rhinitis and asthma



Which does not feel good!



Now that we know how things can go wrong at the level of the membrane...



Let us look at Allergic Rhinitis and Asthma and how we attempt to manage these conditions



Notice... I used the word 'manage'

- There is no cure for these conditions.
- We do not know what causes them
- Genetics and environment are large role-players



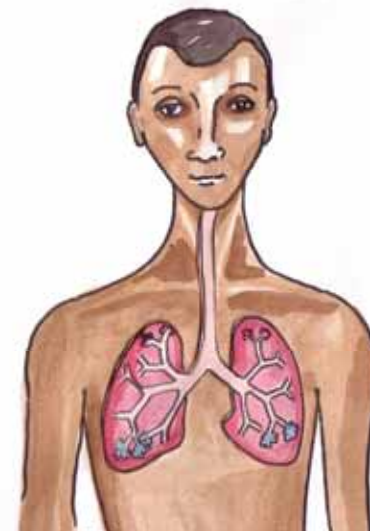
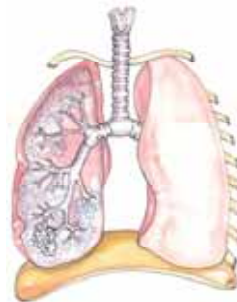
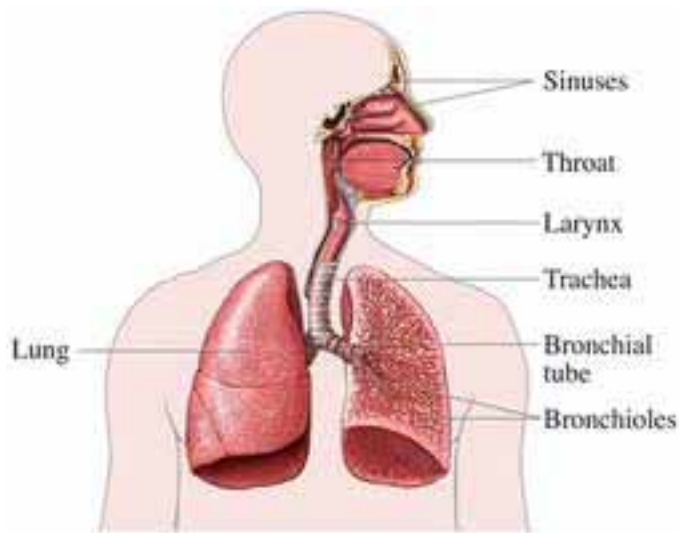
Combined
Allergic Rhinitis
and Asthma
Syndrome

‘The United Airway’



The united airway...

We tend to think about allergic rhinitis and asthma as two distinct conditions.



But in fact they often coexist...

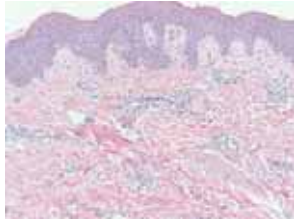
About 80% of patients with asthma also have allergic rhinitis



And conversely...

About 40 % of patients with allergic rhinitis also have asthma





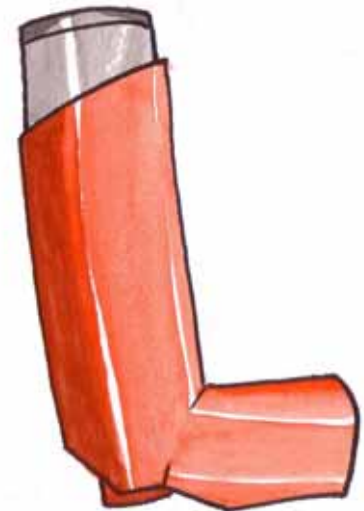
The mucous membrane

- Extends from the tip of the nose to the depths of the lung.
- Both asthma and allergic rhinitis are conditions that result from inflammation of the mucous membranes.
- In some patients the manifestation is more prominent in the lungs and in others it is more prominent in the nose and in many patients it is expressed in both organs



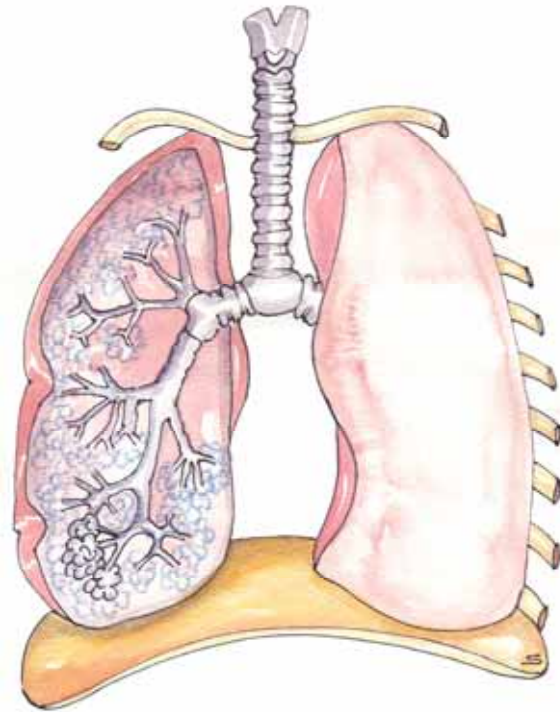
Management

- This has significant treatment implications
- It is no good trying to treat a patient's asthma if their allergic rhinitis is not controlled



When you think about the lungs...

Remember the NOSE



And when you treat the nose...

Ask your patient to exhale



Let us remind ourselves about allergic rhinitis and asthma management



The allergic march

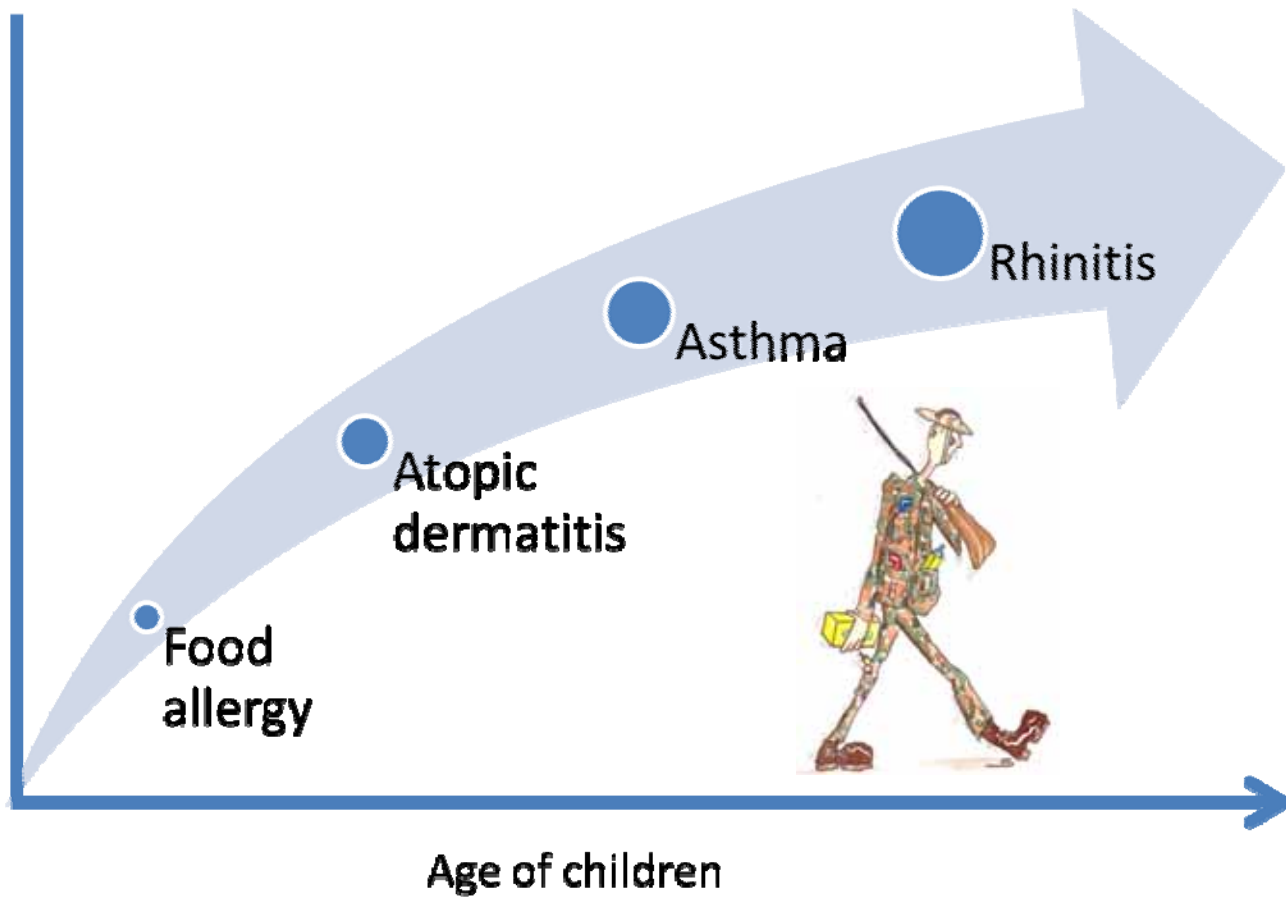


The allergic march

- There is a common progression of clinical symptoms that occur in atopic individuals known as **the allergic march**.
- It starts with GIT symptoms and eczema, and progresses through to allergic asthma and allergic rhinitis.
- 40% of infants with dermatitis in early infancy will develop asthma by the age of 3-4 years



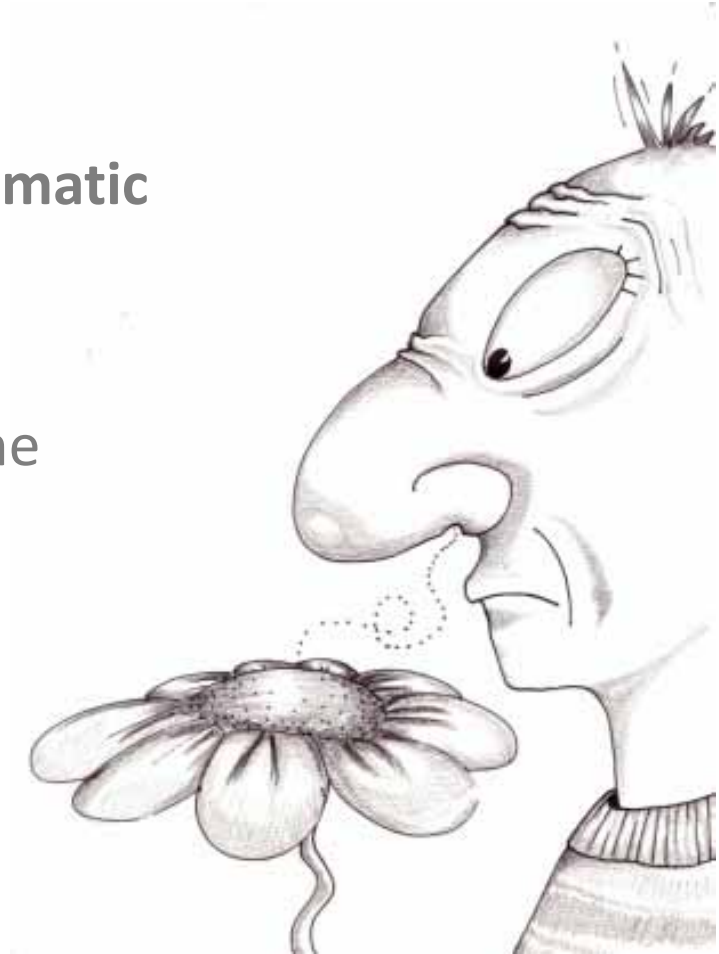
The allergic march...



What is allergic rhinitis?

Allergic rhinitis is defined as a symptomatic disorder of the nose induced:

- after allergen exposure
- by IgE-mediated inflammation of the membranes lining the nose.



Allergic Rhinitis is a global health problem



Allergic Rhinitis

- Up to 50% of the population is affected in some countries
- In South Africa about 30% of our population uses allergy medication which means that at least 14 million people are affected.
- The prevalence is increasing.



Quality of life

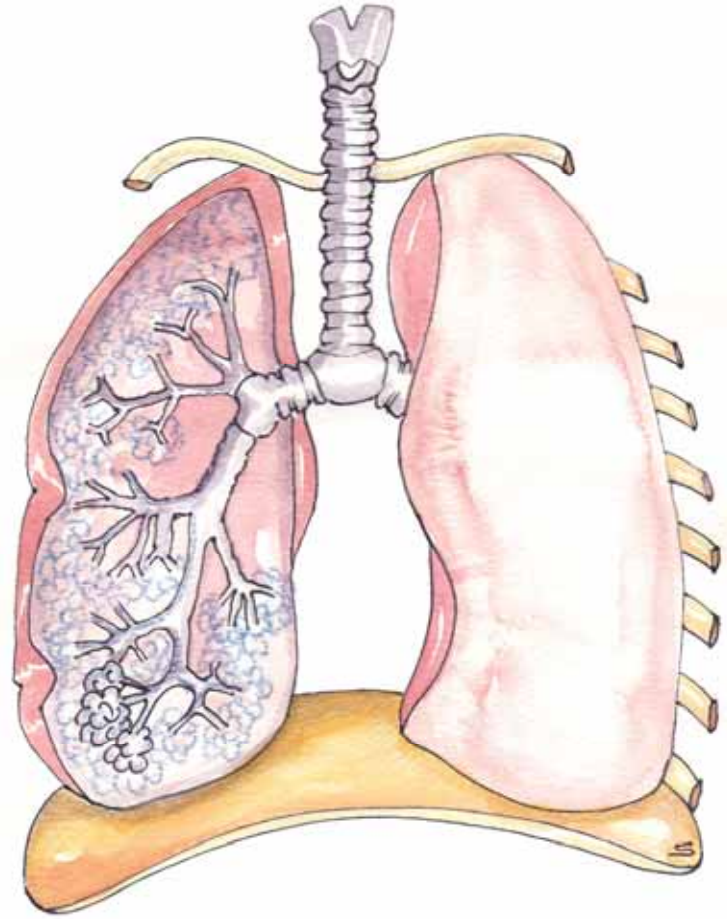
Although it is not usually a severe disease, allergic rhinitis :

- affects school performance
- work productivity
- significantly alters social life.



What are the chances that this patient

who clearly has severe allergic rhinoconjunctivitis,
also has asthma?



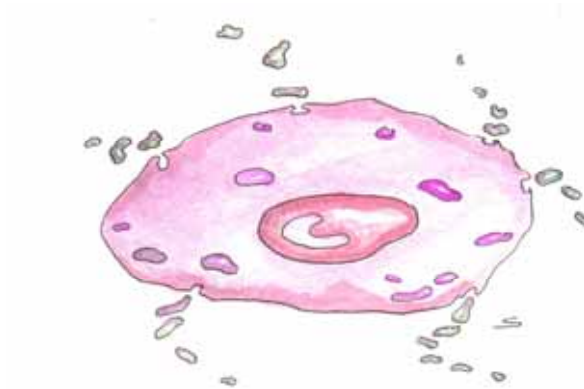
Correct!



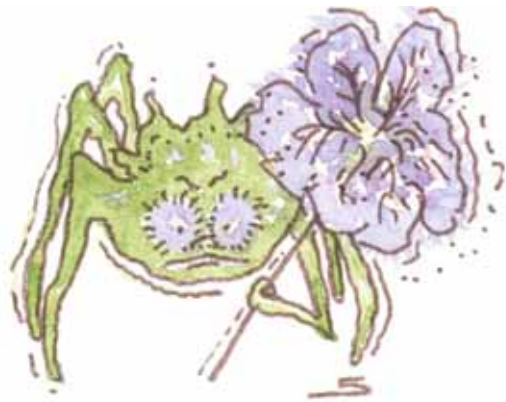
40%

Mast cells and IgE

The root of the problem



They make rather a meal out of proteins that shouldn't cause any trouble at all!



The nasal symptoms of Allergic Rhinitis

Nasal

Sneezing

Nasal obstruction/congestion

Rhinorrhoea/Post nasal drip

Pruritis



The **non-nasal** symptoms of allergic rhinitis

Non-nasal

Itchy palate

Itchy ears

Allergic Conjunctivitis



In other words...



Your ears, eyes,
nose and throat are
blocked
runny
itchy
sneezy!

Really not good!



Managing Allergic Rhinitis

- Allergy diagnosis
- Allergen avoidance
- Drug treatment
- Immunotherapy



Making a diagnosis

- History
- Examination
- Investigations



History...



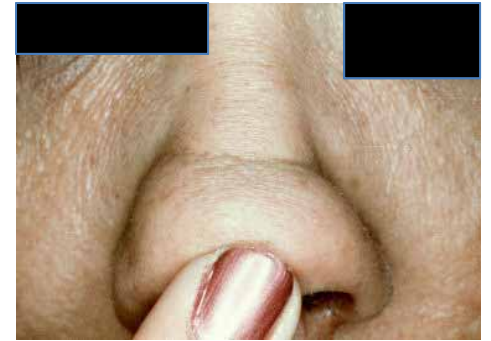
Your patient will have
ears, eyes, nose, throat
that are
blocked
runny,
itchy
sneezy!

Examination



Examination: Typical atopic facies

- Allergic salute
- Nasal crease
- Mouth breathing
- Allergic shiners
- Clicking sounds
- Deviated septum



Special investigations

- Skin prick test
- Specific IgE test



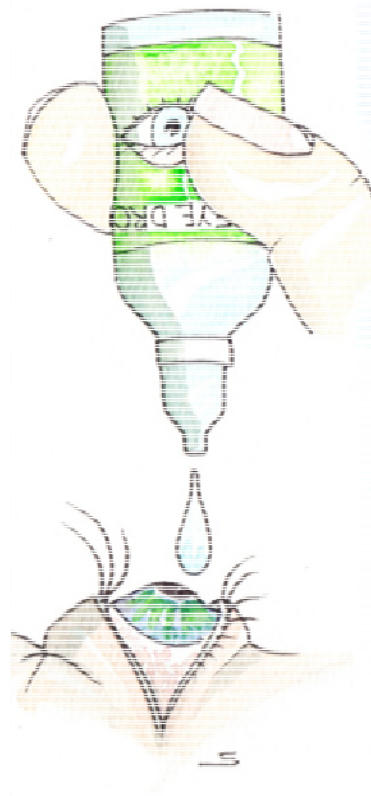
Treatment

- Allergen avoidance
- Drug treatment
- Immunotherapy



Drug treatment

- Intranasal corticosteroids
- Antihistamines
- Eye drops



Intranasal steroids



Antihistamines



Eye drops



Allergen immunotherapy

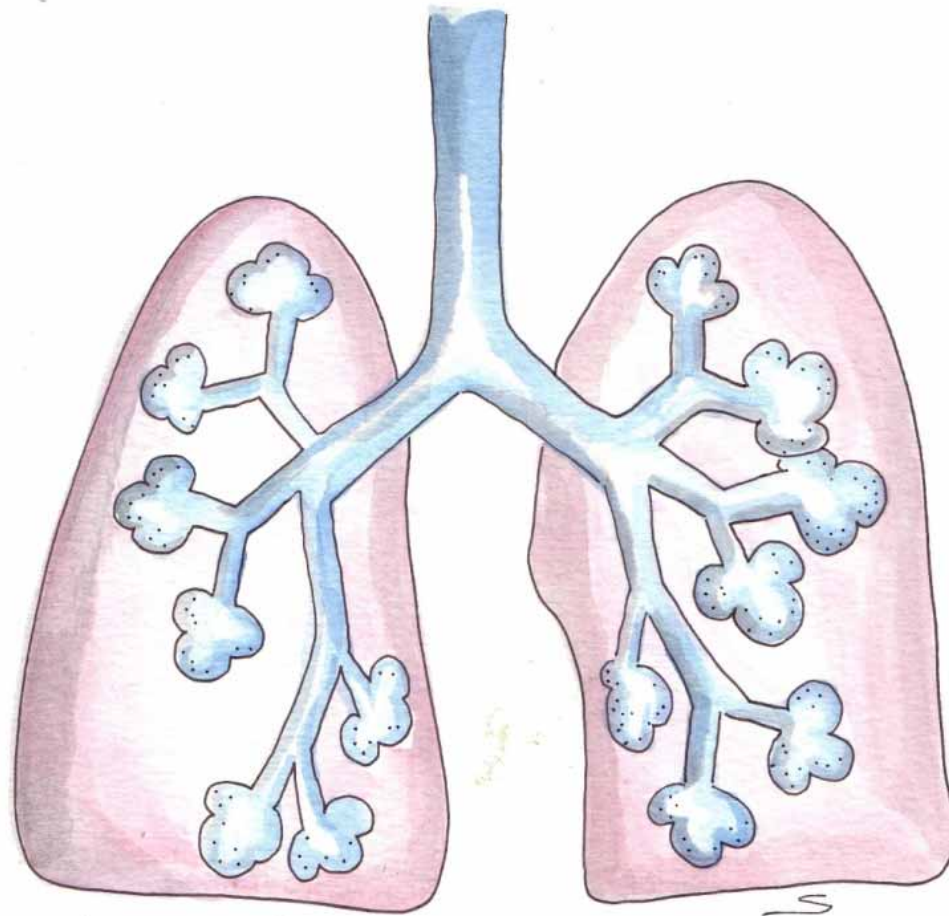
- can change the natural history of allergic rhinitis,
- prevent progression of the disease
- cure patients, in carefully selected cases.
- reduce disease severity
- reduce requirement for drugs
- improve quality of life



Nasal decongestants



Now let us remind ourselves about
asthma management





What is Asthma?

- Chronic inflammatory condition
- Usually allergic in origin
- Characterised by hyperresponsive airways
- That constrict easily in response to a wide range of stimuli.

Typical features...



Cough
Wheeze
Shortness of breathe
Tight chest

Examination



Special Investigations

Spirometry:

FEV1 decreased in Asthma

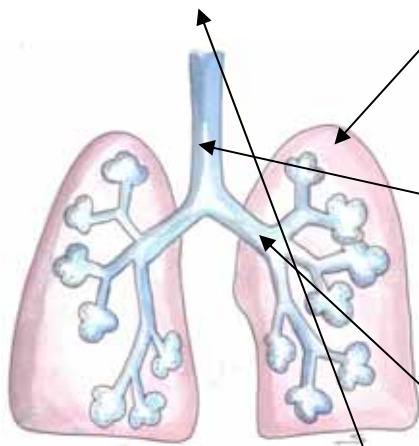


PEFR:

PEFR decreases in asthma

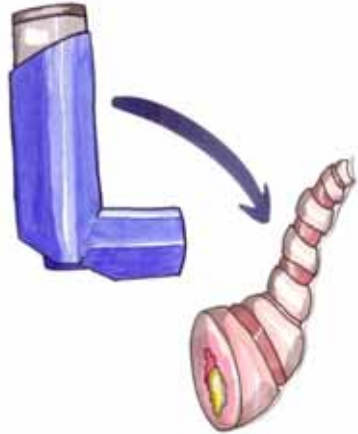


Exclude other causes of airway obstruction



WIDESPREAD AIRWAY OBSTRUCTION <i>May present with wheeze</i>	<ul style="list-style-type: none">- Asthma- COPD- Bronchiolitis- Pulmonary congestion/oedema (left ventricular failure, mitral valve stenosis)
TRACHEAL OBSTRUCTION <i>May present with stridor</i>	<ul style="list-style-type: none">- Extrinsic compression (thyroid, lymph nodes)- Lesions in the lumen or wall (stenosis, stricture, tumour)- Cartilage (tracheomalacia, relapsing polychondritis)
BRONCHIAL OBSTRUCTION <i>May present with localised wheeze</i>	<ul style="list-style-type: none">- Extrinsic compression (lymph nodes)- Lesions arising from the wall (tumour, stenosis, endobronchial TB, sarcoidosis), Luminal lesion (foreign body)
LARYNX <i>May present with wheeze and/or stridor</i>	<ul style="list-style-type: none">- Vocal cord dysfunction- Tumours

Pharmacotherapy

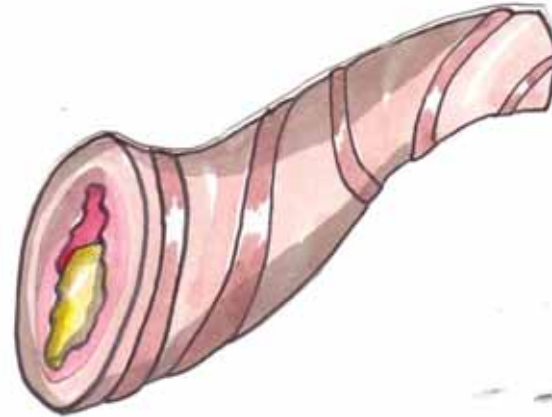


Bronchodilators,
or reliever medications
work on the
bronchial smooth muscle.

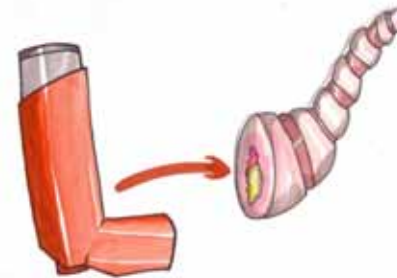
Most asthmatics require
anti-inflammatory medication
to control their
persistent symptoms,
even if they have
mild asthma



Pharmacotherapy



Beat the inflammation

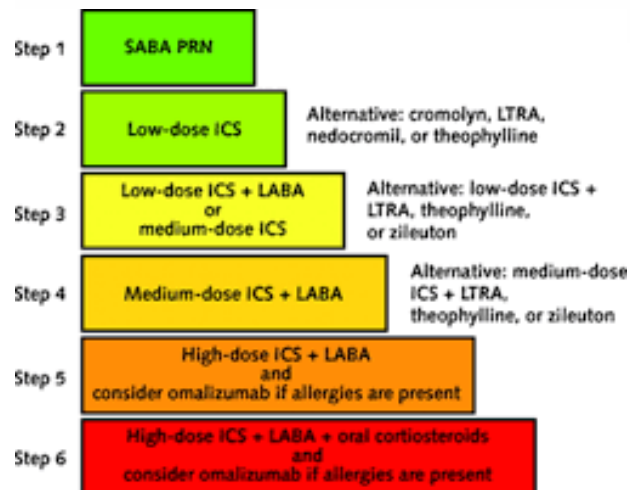
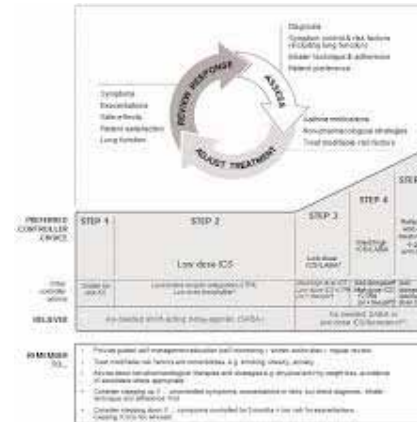
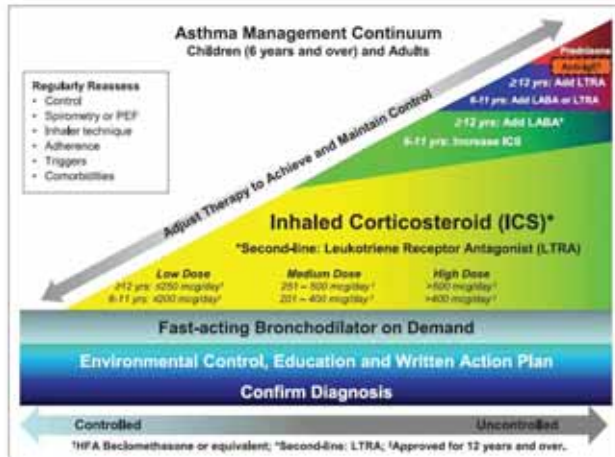


Pharmacotherapy

Table 4: Equivalent effective metered doses of inhaled corticosteroids

STEROID PREPARATION	EQUIVALENT METERED DOSE IN ASTHMA
Beclomethasone Dipropionate	250 µg
Budesonide	200 µg
Fluticasone propionate	100 µg
Ciclesonide	80 µg
Mometasone furoate	220 mcg

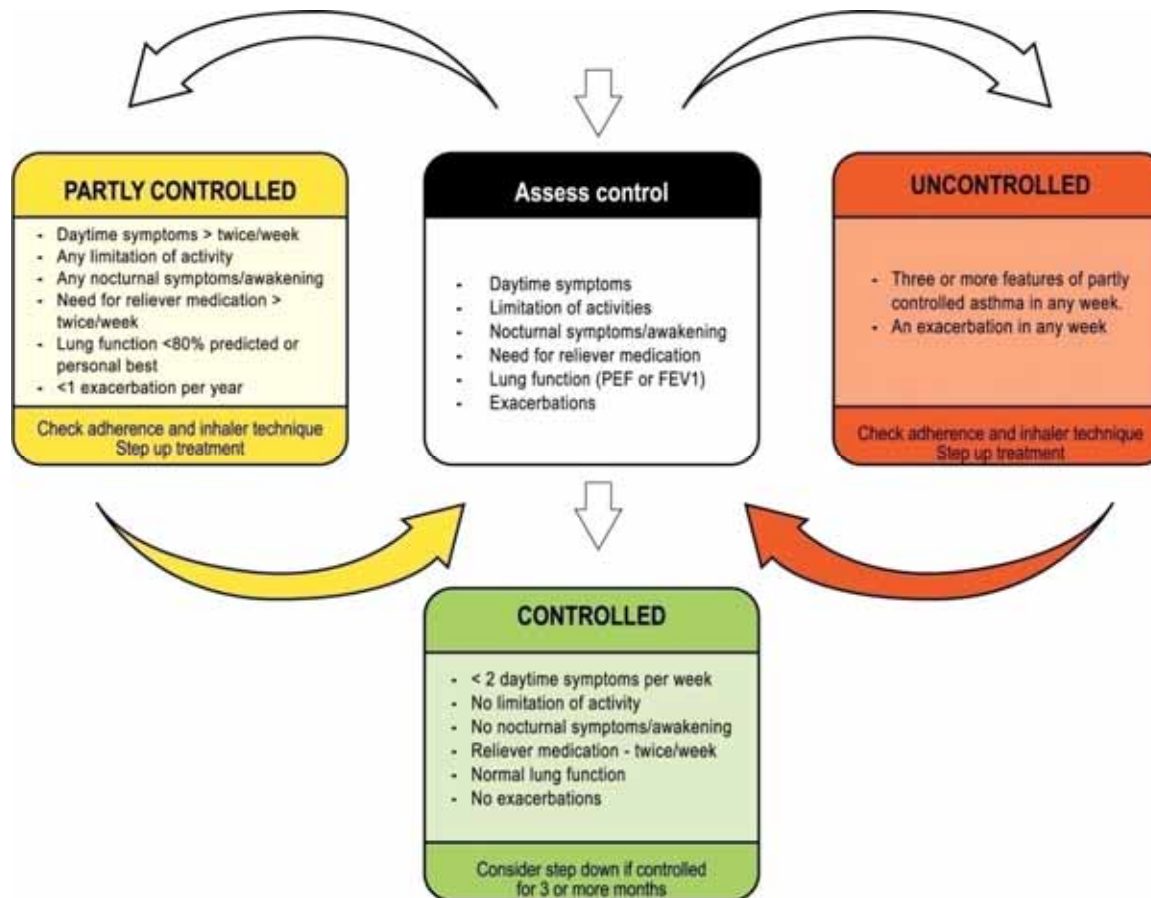
Asthma treatment guidelines...



Maintaining

Control

Assessing Control

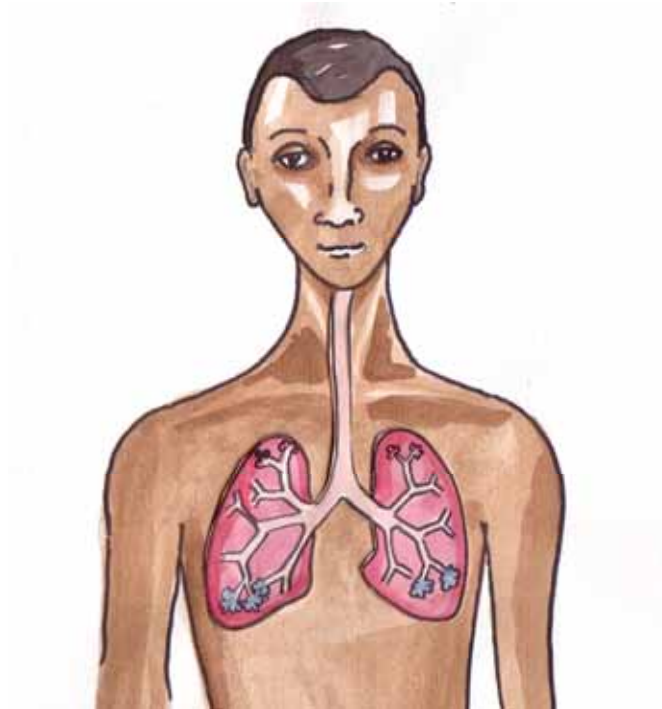


The cornerstone of good asthma management is
EDUCATION



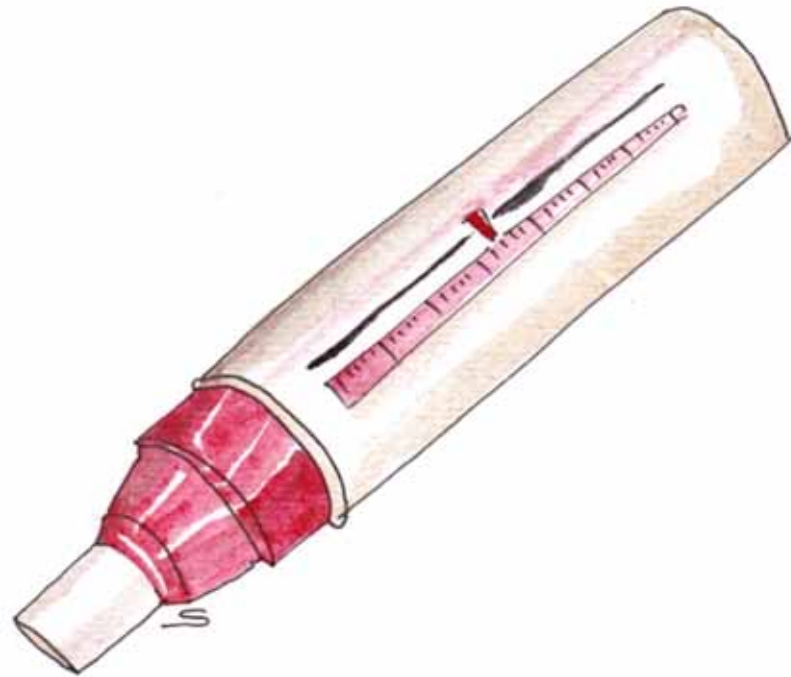
We have looked at each condition
separately...

But remember that they are linked



If you treat the nose...

Check how he blows!

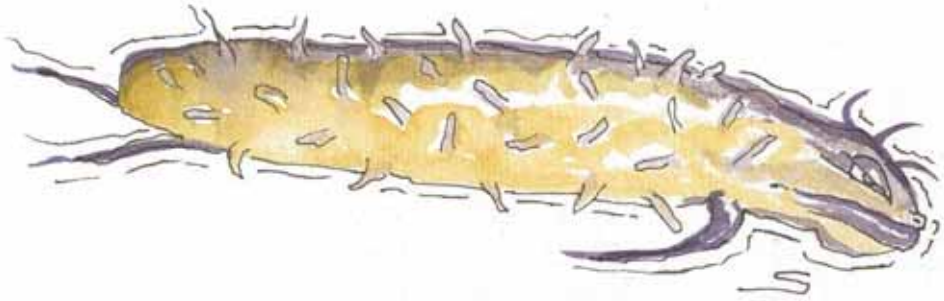


If you throat the wheeze...

Be sure to treat the sneeze!



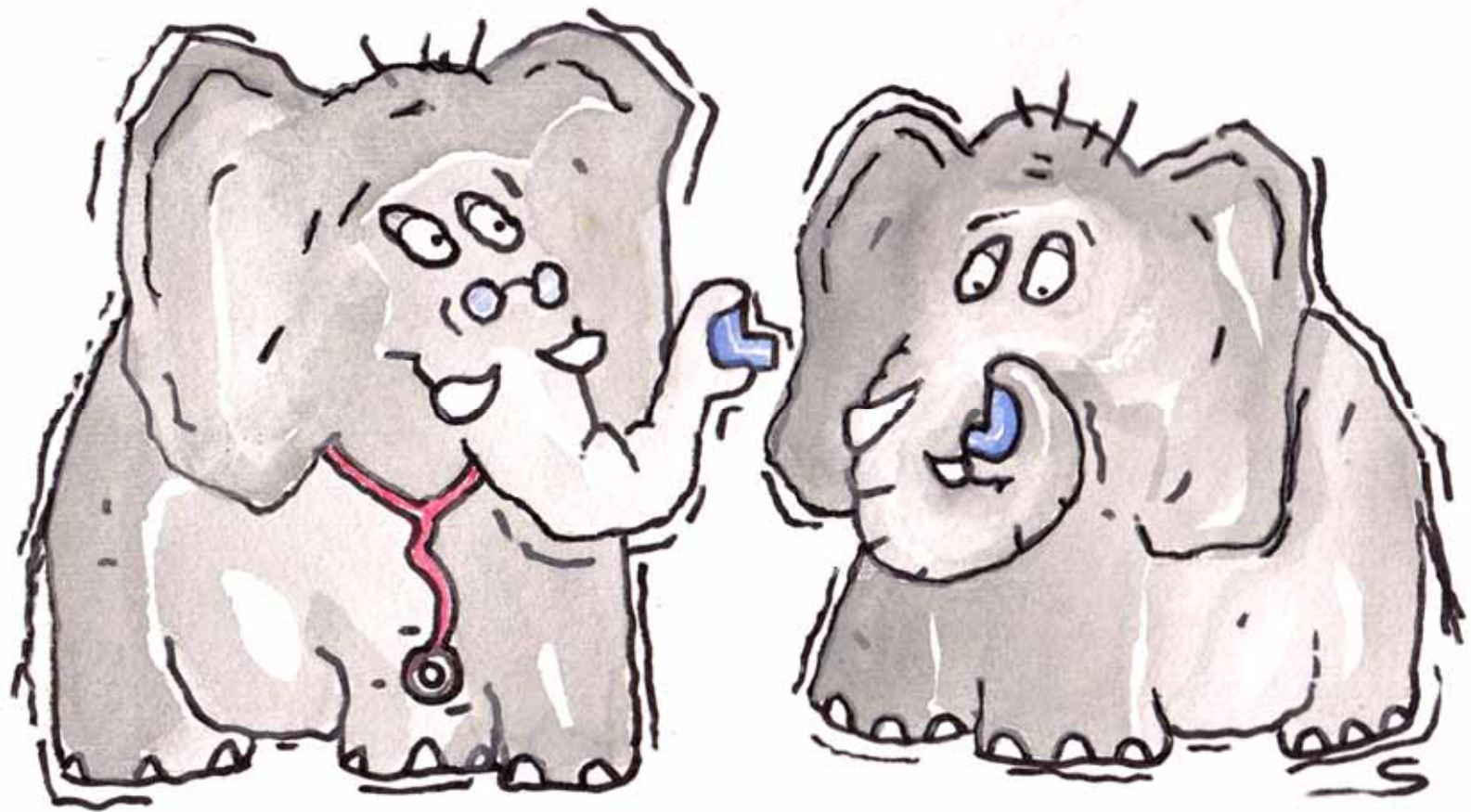
The microbiome



Thank you!

shaunagh.emanuel@gmail.com





www.allergysa.org