

*Nautical Expedition
Ships Log Selections*

High Tech High

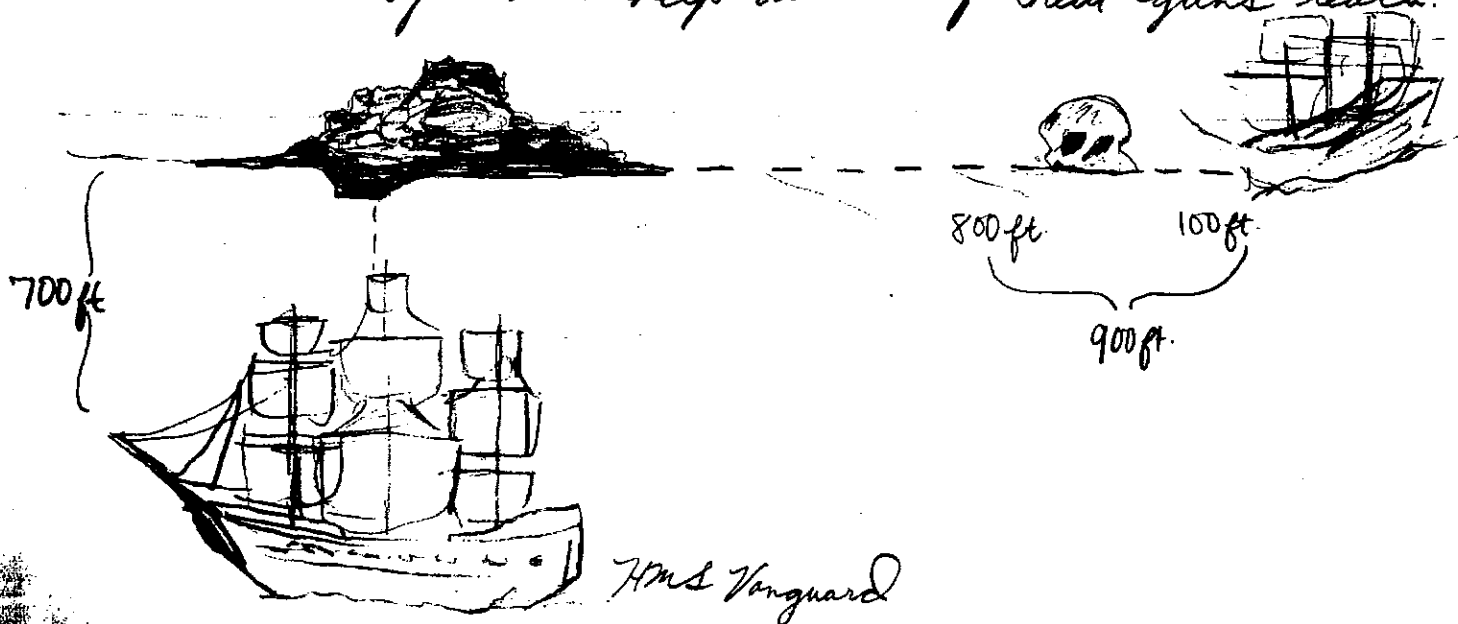
Our 11th grade team's Fall project "Maritime: Navigating Through the Ages" will culminate in a three-month exhibition of student work on the historic tall ship Star of India at the San Diego Maritime Museum. The exhibit will include artistic and academic writing in a Captain's Log Book, student-designed working sextants, AutoCAD drawings of historic ships and photographs and a documentary highlighting students working on each component of the project.

As part of the hands-on approach to this maritime project, students will be participating in an educational sailing trip where they will become working crew of a three-masted tall ship sailing from Long Beach, California to Catalina Island. On this three day trip, students will learn to sail the ship, navigate using charts and celestial navigation, gain a greater understanding and appreciation for local marine habitats and participate in snorkeling and other fun activities.

Enclosed are work samples of the students' logbooks. Each student chose an historic voyage at the beginning of the year and assumed the role of an individual on that voyage. Some are captains and pirates while others are submarine crewmembers or ocean liner passengers. They have been given specific logbook entry assignments in Biology, Humanities and Mathematics, including "Microscopy at Sea" where they assumed the role of a naturalist and analyzed and illustrated various cells, "Sea Shanty" where they wrote their own sailing work song and "Use Your Sextant at Sea" where they created their own math problem to put their sextant knowledge to the test. The idea is to create a work of historical fiction, blending the facts of their voyage with creative writing with creative writing. Each of these samples is still a work in progress, and therefore contains some grammatical and mathematical errors. This collection of entries also illustrates a variety of student levels and abilities.

Today the weather was fair and we ran into no hinderances from the seas or the heavens although we did make good use of our ship's Navigator. According to the Captain it was the Crow's Nest who first spotted a speck on the horizon, and it was he who relayed this to the men below. At once every sailor was on his guard for what the Crow's Nest saw was an unmarked ship on the horizon. The HMS Vanguard and the rest of our fleet, as a part of the Royal Navy, had no choice but to suspect that this mystery ship was a part of Bonaparte's navy.

Our fleet had just come from an uninhabited island and were anchored 700 ft. of its shore. The unmarked ship was growing on the horizon and was parallel to the island based on their proximity to skull rock, 800 ft. off the island's coast. Fearing that we would have to engage in battle, I asked the Navigator to keep us out of their guns reach.



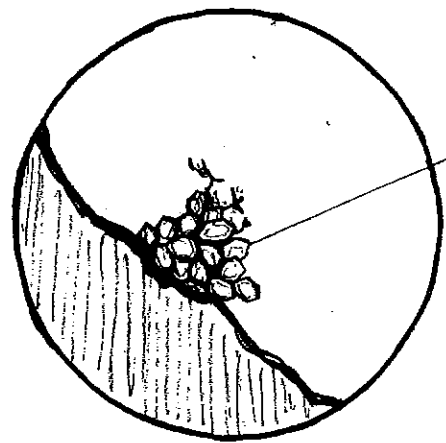
On this grand and beautiful day
I, Admiral Horatio Nelson, start a new
page in this ship's log in order to
record our progress, our troubles and our
advances against Bonaparte. It is
July now as we sail through the
warm waters of the Mediterranean
and the crew of our fleet of fourteen
ships has grown tired and anxious
for battle since we started this
journey in May, two months prior.

We sail as a part of the Royal Navy,
and as the days pass we hope to
sail closer to the French forces
controlling the south of the Mediterranean,
where Napoleon Bonaparte has a stronghold
near Egypt. Our fleets, let it be known,
are the first of the Royal Navy's to
sail in Mediterranean water since eighteen
months past. We are here to reestablish our
dictation over these waters, and to not allow the
French to assume authority over us.

This voyage is little less than daring since the
fleet has been left without a reserve,
but spirits are high, talents, as well
as a thirst for battle, unlimited and
our ships in good condition. I have no doubt
that we will be able to conquer the French
and establish ourselves, once again, as the strongest
force in the seas. I proclaim to all, in this year
of 1798, the great British Empire's war against the French
and Napoleon Bonaparte's rule will be powerful and
the Britons shall triumph.

Scientific Observations through a microscope

Cork cells



cell wall

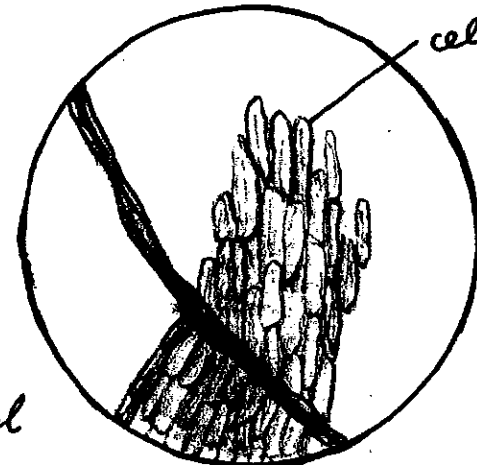
100x

- The cork cells appear to be empty in the middle. I would expect this because a piece of cork floats. Dense objects will sink when placed in water, a material that is not very dense would presume be lighter.

Eukaryotic Plant cells

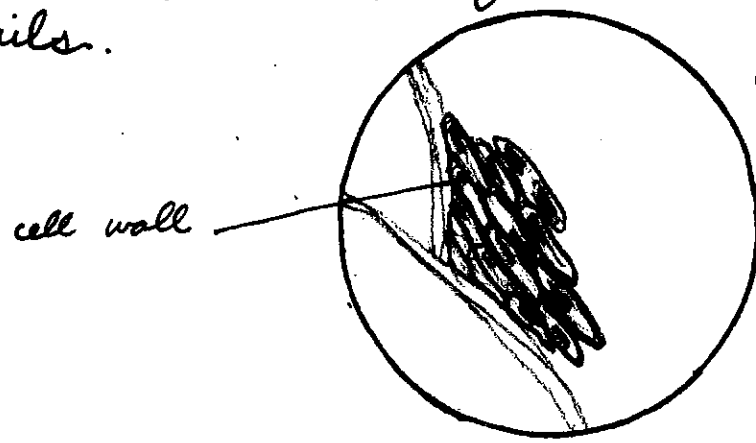
- Under the microscope the stained onion cells appear different than the unstained onion cells. While looking at onion cells that had not been stained, I could only see the cell walls and a collection of layers of cells. The image lacked detail until I added iodine to stain the cells. After I had done this I could see more of the cells' details.

Onion cells



cell wall

100x

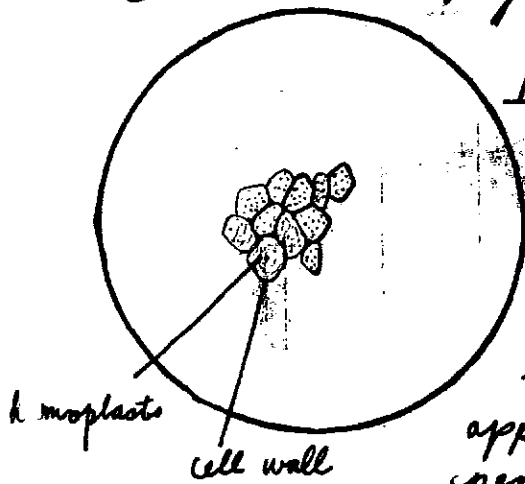


cell wall

Onion cells with iodine

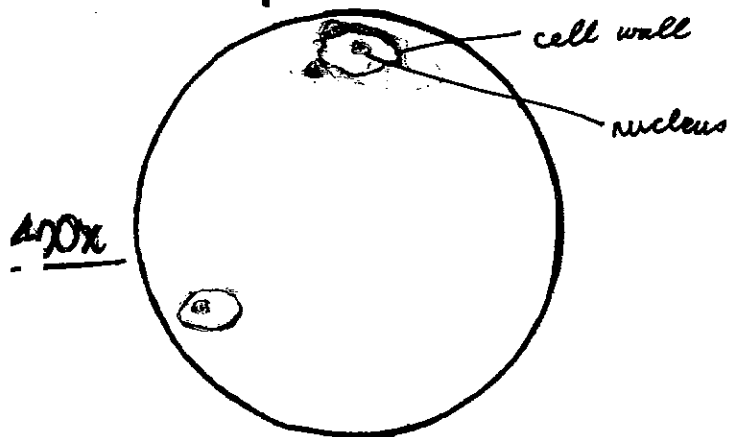
100x

Red bell pepper cells - Eukaryotic Plant cells



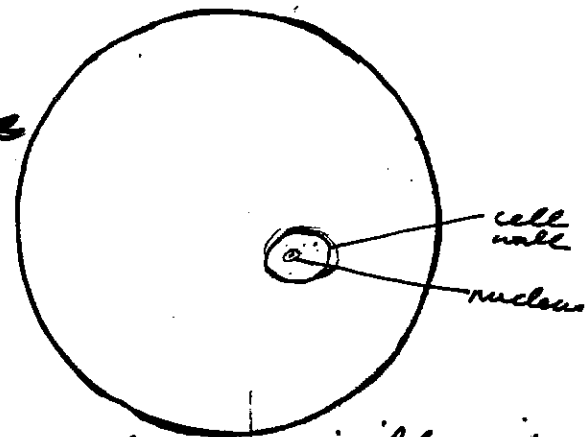
100x - The red bell pepper cells are similar to other eukaryotic plant cells I have observed. They clearly have a cell wall and inside. The red bell pepper cells are a robust red without stain and differ greatly from the other cells I have documented because there appears to be no uniform cell shape. Some cells appear round whereas others almost look pentagonal.

Cheek cells - Eukaryotic Animal cells



with Iodine

400x



The Nucleus of the cheek cells were clearly visible in the stained cheek cells; this was not as visible in the unstained cells. The unstained cells had very little definition under the microscope.

The animal cells differed from the plant cells because the animal cells seemed to contain less contents. This may be because plant cells need a plentiful amount of organelles in order to complete the process of photosynthesis, although the inner-workings of the animal cells may be even smaller than what I, with my ab aboard ship, can detect.

Also the cells did not stay attached to each other like the plant cells did. This observation could be pure coincidence.

Explanation and Description of Cell Components and Functions

- A - Central Vacuole: membrane bounded compartment that can serve a variety of secretory, excretory and storage functions
- B, E - Rough and Smooth Endoplasmic Reticulum: an organelle responsible for the creation and transportation of cell proteins
- C, D - Ribosomes: sight where the cell makes proteins
- F, H, H - Nucleus: central membrane bound organelle that controls the functions of the cell. Also contains genetic material
- G - Nucleolus: organelle that makes ribosomes
- I - Plasma Membrane: the boundary between the cell and the environment
- J - Cell Wall: A rigid structure around the plasma membrane that protects the cell and provides structure to the cell
- K, N - Cytoskeleton (Microtubules, Microfilaments): structure that maintains cell shape
- L - Chloroplast: an organelle that can create energy through photosynthesis
- M - Mitochondria: converts organic material into energy
- O - Lysosomes: an organelle that assists in the disposal of waste
- P - Golgi Apparatus: serves as a delivery system within the cell
- Q - Cytoplasm: a gel-like material inside of the cell

A Battle for Her Majesty's Ship

As we left the safe British harbour
With our Queen's heart and sharp eyes dear
Set the sails and followed the commander
To war, to victory until justice

Cannon mouths cleaned, guns at position
Powder children already smelling of fire
Weaponry at hand, sailors at attention
Britons sail onward to battle

Our homely port swiftly vanished
Her Beauty engulfed by horizon
Afraid of nothing, fierce storms nor rough seas
She pushed forward, onward to battle

Cannon mouths cleaned, guns at position
Powder children already smelling of fire
Weaponry at hand, sailors at attention
Britons sail onward to battle

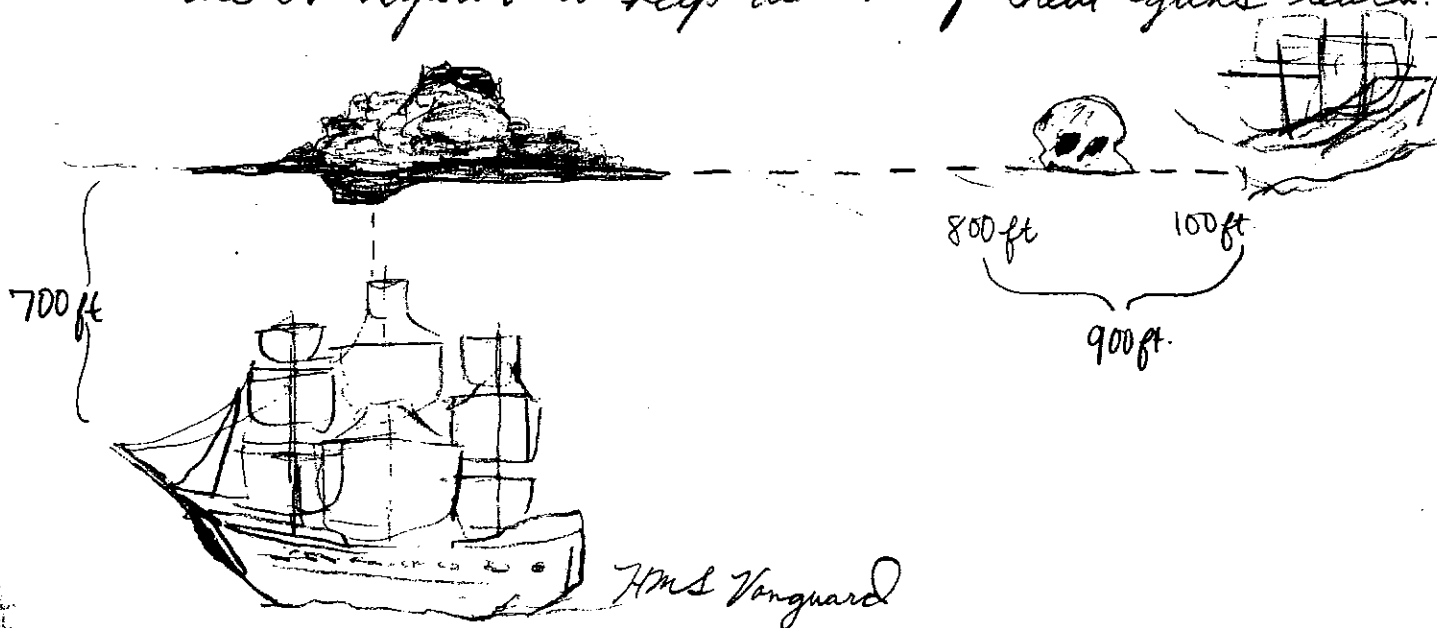
Healthy days at sea, craves every sailor
Preparing Her Beauty for turmoil
Powder and gunstock and ophans in place
Cannons ready to fire

Sails at full mast, commander and chief at post
"French ships ahead" the crow's nest calls out
Each sailor and his spirit alike brace

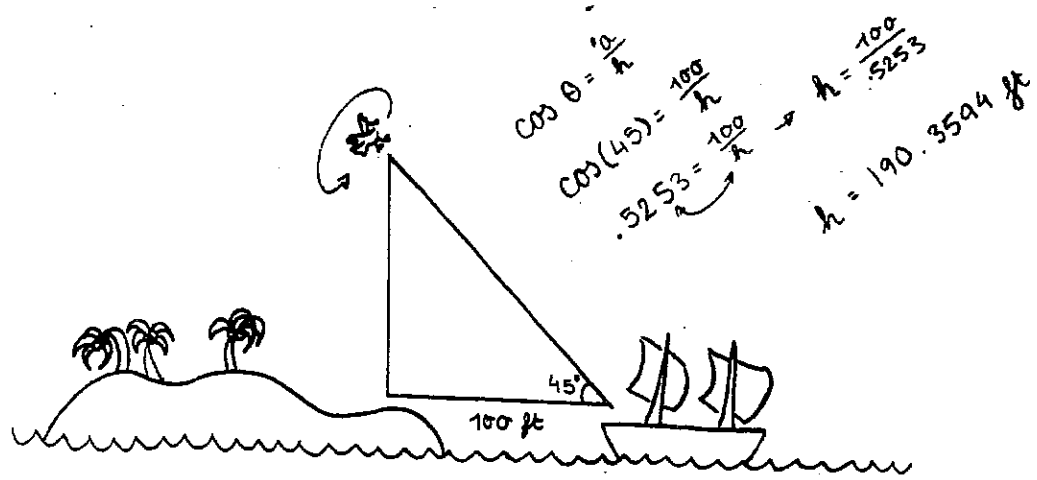
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One of my crewmembers was extremely careless this very morning and tripped over me while I was calculating our supplies. As punishment, I made the fellow solve a problem using our sextant. Using the shore of Fiji as a reference point, the man had to find the distance from a bird I spotted up ahead to our launch. The bird was circling over Fiji, our boat was stopped 100 ft away from the shore. After learning how to use the sextant, he measured a 45 degree angle between the shore of Fiji and the circling bird.



My crewmember calculated the distance between our launch and the bird to be about 190 ft. I can only hope that this taught him a lesson.

for the swimming movements
of cilia and flagella.

Microfilaments: They are
twisted double chain of actin
subunits. The function of micro-
filaments in the cytoskeleton
is to bear tension. They also
help support the cell's shape.

After arriving to an island
in South America, we settled a
camp close to the shore (point
A). After settling our things,
some crew members and
myself began to explore the
area. The crew members and

I walked 120 paces in a

North-Easterly direction

(point B). I decided to stay
there and explore some
plants in this area, while

the crew members, (from

where I was), began to walk

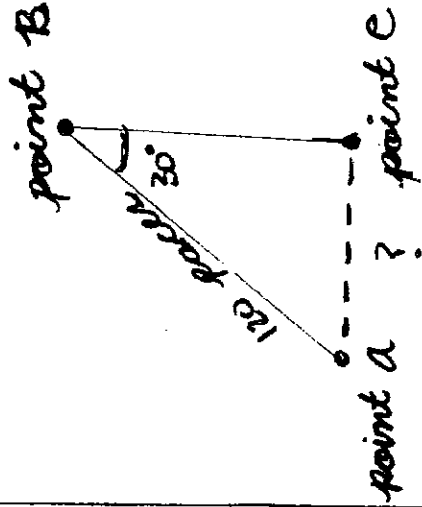
South (point C). After I finished

exploring the area I decided to

join everyone at this new location

(point C). However, before I

Below are the calculations I made in order to find the distance between our location and the camp:



$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\sin 30^\circ = \frac{x}{120}$$

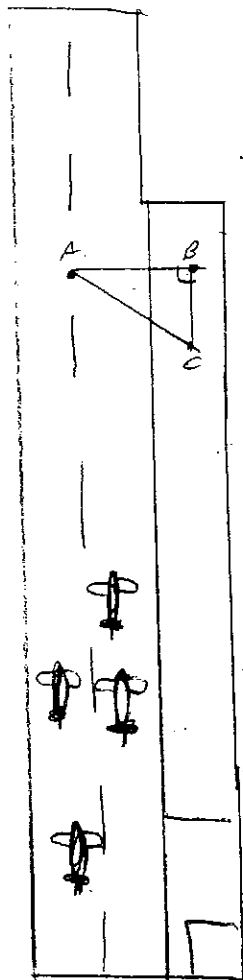
$$120 \times 0.5 = \frac{x}{120} \cdot \frac{120}{1}$$

$$x = 60 \text{ paces}$$

Now that I know the distance, first thing tomorrow morning I will go and finish my investigations.

Captain J's Sextant Problem

I'm hungry, I wonder how far I am from the Galley
I would say its 30 ft to the bunk, which is a 90°
angle from the Galley. I think the Galley is a 45°
angle from where I am standing. So if I take
the \sin of 45° it equals about .70711 multiplied
by 30 it equals 21.21 ft. So we must be
21.21 ft from the Galley. I then started to
walk there and it indeed was 21.21 feet,
and then I had my lunch. The end.



A - flight deck / starting pt
B - Bunk
C - Galley

The reason why I decided to be part of this voyage is very simple. I personally see this voyage as an opportunity for me to explore as well as study nature in other parts of the world, which in this case it is the rich continent of South America. Before taking this journey, I had made observations of both plants and animals in my environment. Because of my interest in nature, I was advised by Henslow to take a voyage to the Canary Islands to explore new things. His advice really inspired me and therefore I took the initiative to plan a voyage. Unfortunately, a very dear friend of mine, Marmaduke

Legend

I was laying on my hammock yesterday, feeling a little ill, when all of a sudden I heard two of the crew members talking about legends and sailor's superstitions. As the conversation continued, the two crew members began to tell each other their favorite legends. Out of the many legends that they recited, one of them in particular caught my attention, for I had heard it before. The legend was.....

There was once a Mariner, who set out to sea.

Along with 3 other ships, for they had a mission to complete.

The Mariner felt they would be secure, off a silver coin, under a masthead was put.

The Mariner was made fun of, and laugh at all the time. "You are crazy and very dumb," that was everyone's response.

On the way to their mission, their trip was perfectly fine.

On the way back though, that is when problems arose.

One night the sea turned violent and a strong storm formed.

Crashing waves hit the side of the boats, shaking them violently, like nothing seen before.

Sea Shanty

Once again we are out in the sea,
In search of new adventures,
And exciting things to see.

(Chorus) Arr, Arr here we go,
Arr, Arr sailing off we go.

Because we are pirates,
We take no measures,
And try to enjoy as many pleasures.

Women, rum, and especially gold,
Are all important things
That our adventure holds.

(Chorus) Arr, Arr here we go,
Arr, Arr sailing off we go.

We set sail yesterday,

From the bay
And we are already many miles away.

(Chorus) Arr, Arr here we go,
Arr, Arr sailing off we go.

Our goal for this trip is very simple,
To try to find as many treasure chest,
To show the others that we are the best.

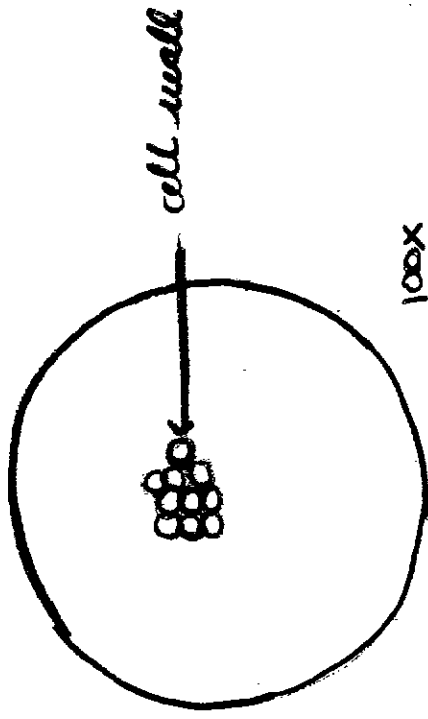
We like the danger, as well as this song,
Therefore nothing scares us,
Which makes us the bomb.

(Chorus) Arr, Arr here we go.

In search of all the treasure in the world.

(Chorus) Arr, Arr here we go,
Arr, Arr sailing off we go.

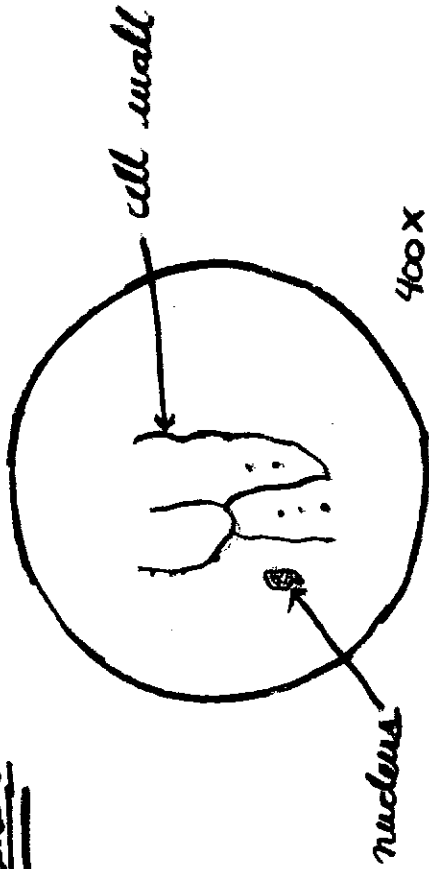
Cork Cells



I observed that all of the cells are all packed together and are very small. Some of the cells appeared to be 3-dimensional.

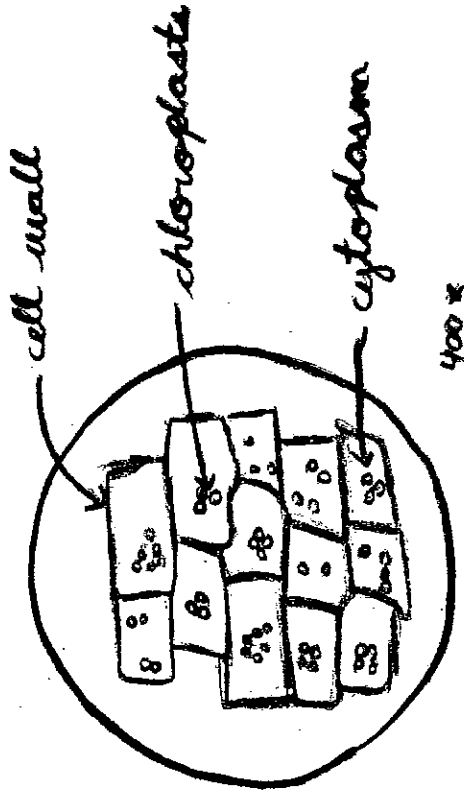
The cork cells appeared to be empty from the inside. I would expect this because the cells of the cork are not alive (they are dead).

Stained:



Under the microscope the stained onion cells appeared different from the unstained onion cells because the stained onion cells appeared darker than the unstained cells, which made it easier for me to see the nucleus inside the cell.

Eloidea Cells

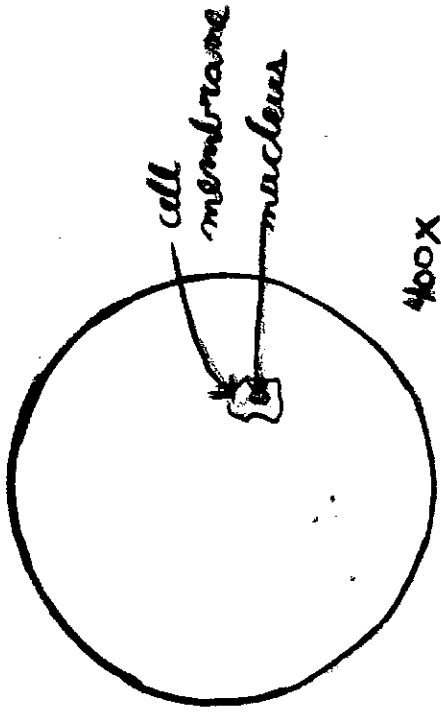


I observed that the chloroplasts inside the cytoplasm are moving really slow. (The movement of the chloroplasts inside the cytoplasm is called cytoplasmic streaming). Something that I noticed as I increased the power of the microscope was that the elodea cell has 2 layers.

Eukaryotic Animal Cells

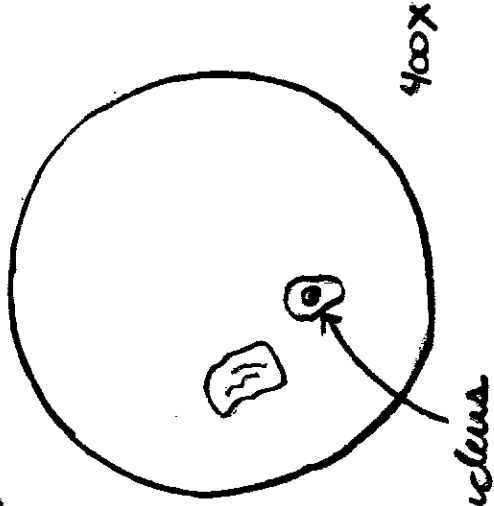
Cheek Cells

Unstained:



While doing my observations I noticed that the unstained cheek cells appeared clear, which made it hard for me to see the nucleus inside the cells.

Stained:

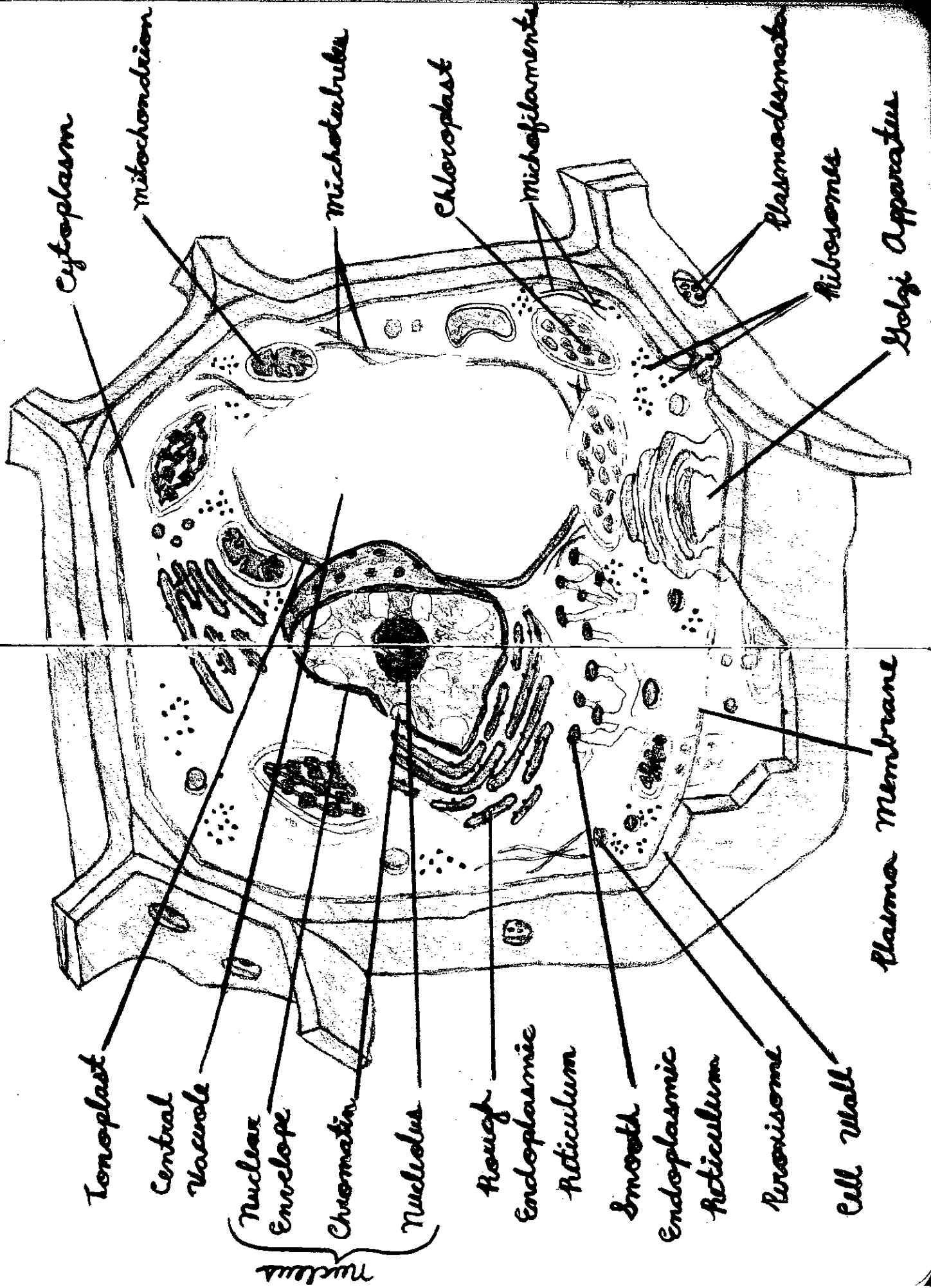


I observed that the stained cells looked like a bunch of cells put together.

The nucleus was visible in the stained cheek cells, this was not visible in the unstained cheek cells.

The animal cells differed from the plant cells because animal cells do not have cell walls and plant cells do.

Plant Cell



Cytoplasm

Mitochondrion

Microtubules

Chloroplast

Microfilaments

Plasmodesmata

Ribosome

Golgi Apparatus

Tonoplast

Central
Vacuole

Nuclear
Envelope

Chromatin

Nucleolus

Rough
Endoplasmic
Reticulum

Smooth
Endoplasmic
Reticulum

Lysosome

Cell Wall

Plasma Membrane

nucleus

Golgi Apparatus: It is a membrane structure found close to the nucleus. The function of the Golgi Apparatus is to sort out and pack proteins for their final destination.

- Vacuoles: It is a membrane enclosed space that are used for storage, digestion and waste removal. Plant cell vacuoles for example are used to store organic compounds, such as proteins. Vacuoles can also help protect the plant from predators because they contain compounds that are poisonous or have an unpleasant taste for animals.

- Lysosomes: They are organelles that contain digestive enzymes. The function of lysosomes is to digest materials taken into the

cell and receive material from intracellular refuse.

- Mitochondria (singular, mitochondrion) It is the sites of cellular respiration, the catabolic process that generates ATP by removing energy from sugars, fats, and other fuels using the help of oxygen.

- Cytoskeleton: A network of fibers extending throughout the cytoplasm. The function of the cytoskeleton is to give the cell mechanical support and maintain the cell's shape. The cytoskeleton also provides anchorage for many organelles. It can also direct the movement of some organelles. Just like the cytoskeleton can maintain the shape of the cell, it can also completely change its shape.

for the continuity of movement
of cilia and flagella.

Microfilaments: They are twisted double chain of actin subunits. The function of microfilaments in the cytoskeleton is to bear tension. They also help support the cell's shape.

After arriving to an island in South America, we settled a camp close to the shore (point A). After settling our things, some crew members and myself began to explore the area. The crew members and

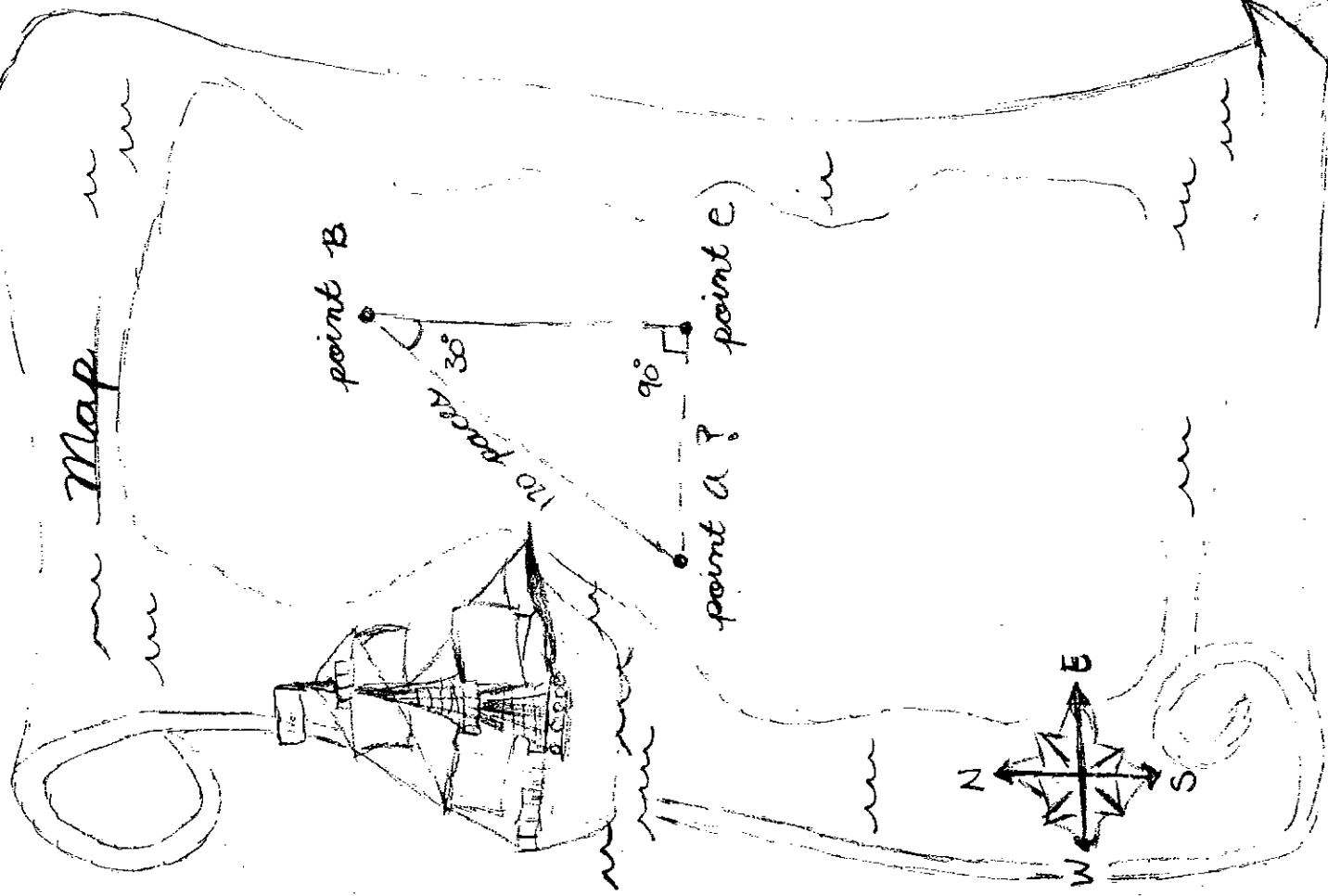
I walked 120 paces in a North-Easterly direction.

(point B). I decided to stay there and explore some plants in this area, while the crew members, (from where I was), began to walk

South (point C). After I finished exploring the area I decided to join everyone at this new location (point C). However, before I

journey from I took out my sextant and measured a 30° angle between the camp and the crew members.

Once I had reached this new location I began to explore the area along with some crew members. Since it was getting late we had to stop exploring the area and go back to the camp. Having found this area full of interesting things, I decided to measure the distance from this new location (point E) to the camp (point A), that way the next day I could go back and finish exploring the area.



I have been betrayed in ways I never dreamed to be possible. Those whom I have placed my deepest trust in have torn from me my role as captain of the HMAT Bounty. All I have are my loyal and unloyal crewmembers who were also cast from the Bounty and a small boat that separates us from the sea below. Although my betrayers have been generous, the supplies I am left with are not enough to keep my small crew alive for long. Nonetheless, we will make our way to England, I will make sure of that. My first concern is reaching safety. This tiny boat must reach the dock of civilized land. Unfortunately, I fear that we will have to retrieve supplies from nearby land in order to survive this voyage. I can only pray that the natives take kindly to our visits. We will take this voyage on a new route in order to avoid contact with the mutineers. They have let me live once and I doubt that they will do it again. I cannot understand the anger they hold for me. How have I wronged them? Where did I go wrong?

to make the sea be calmer

The sea is no place for the perfect man

(Chorus begins)

Perfection will never embrace the sea -

but the sea will embrace Perfection

Perfection will never harm the sea -

but the sea will harm Perfection

Perfection will remain the same -

no matter what the sea does

(End of Chorus)

Perfection never changes

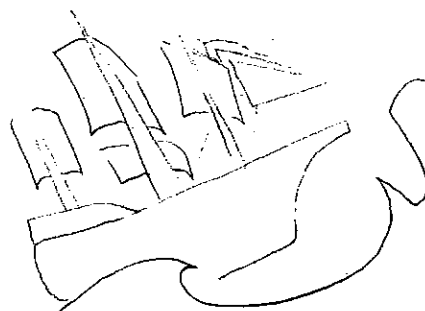
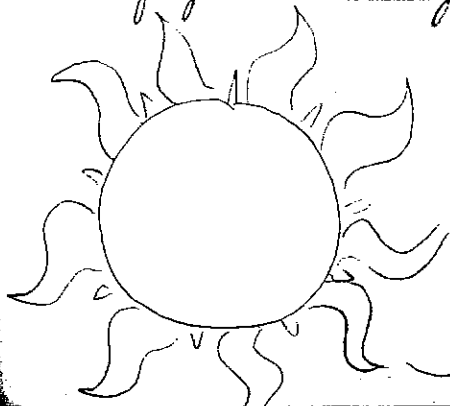
The sea will embrace

The sea will harm

While Perfection will remain unchanged

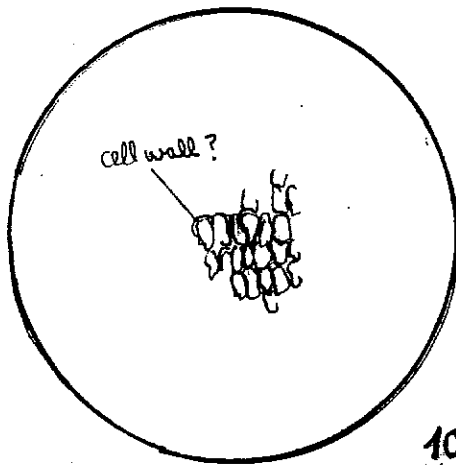
The sea is no place for Perfection -

but perfection belongs to the sea.



Scientific Observation

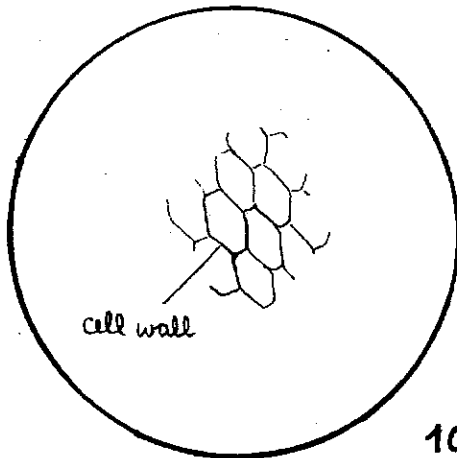
Example of tree cells in corks



100x

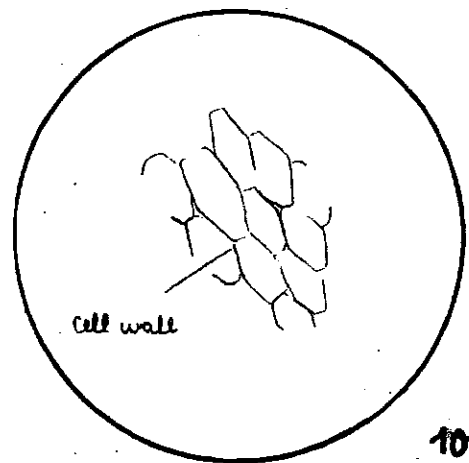
Upon viewing the cork under a microscope, I ~~noticed~~ ^{noticed} that the cells appeared to be shriveled and deformed. Each cell also was encircled by what seemed to be several layers of cell wall.

Onion cells



100x

I noticed that these cells are much larger and the structure is very clear.

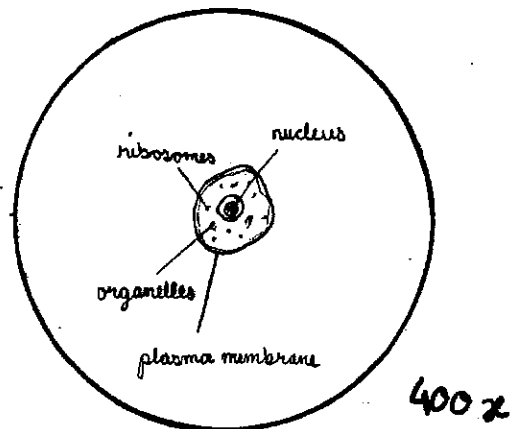
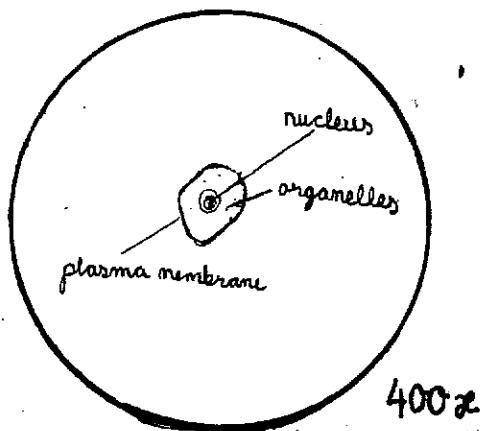


100x

Joline did not show me any details. The area of cells may show cases of cellulose.

Scientific Observations Continued

Human Cells from the inner cheek

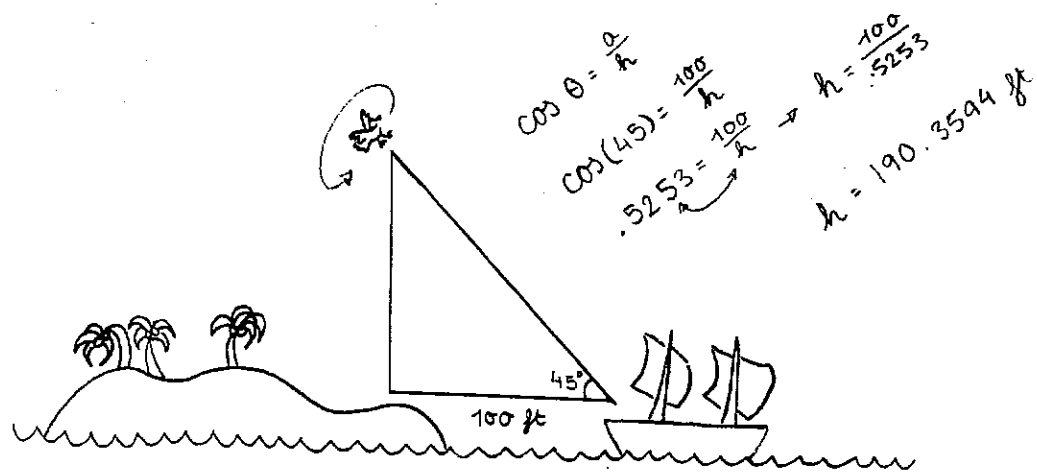


The human cells were much different in shape compared to the plant cells. Using iodine made the organelles slightly clearer. I supposed that the small dots were ribosomes. The nucleus could be seen ~~with~~ ^{with} or without iodine.

cell type	cell wall	cell membrane	chloroplast/ chromoplast/ cristoplast	nucleus	eukaryotic/ prokaryotic
cork	✓				eu
onion	✓				eu
potato	✓		amyloplast		eu
elodea	✓		chloroplast		eu
bell pepper	✓		chromoplast		eu
cheek		✓		✓	eu

- A. Nucleus: An organelle that controls the functions of the cell by copying RNA from DNA. The nucleus also serves to protect the chromosomes from which RNA is made.
- B. Nucleolus: A sub-organelle that resides within the nucleus. It contains RNA and proteins, and is responsible for the production of ribosomes.
- C. Vacuole: This organelle has several functions such as storing and distributing. In plants, the vacuole provides pressure that supports the structure and weight of the organism.
- D. Cytoplasm: A liquid-like substance that fills the inside of a cell and holds the organelles in suspension.
- E. Cell Wall: An outer barrier that is only found on plant cells. It serves as a supportive structure that keeps plant cells ^{rigid} ~~rigid~~.
- F. Plasma Membrane: A thin wall that surrounds a cell and separates it from the environment. The membrane controls what enters and leaves the cell.
- G. Endoplasmic Reticulum: A network within the cell that transports materials in the cytoplasm. There are two types of ER: smooth ER, in which enzymes and chemicals are stored, and rough ER, in which proteins are modified and moved.

One of my crewmembers was extremely careless this very morning and tripped over me while I was calculating our supplies. As punishment, I made the fellow solve a problem using our sextant. Using the shore of Fiji as a reference point, the man had to find the distance from a bird I spotted up ahead to our launch. The bird was circling over Fiji, our boat was stopped 100 ft away from the shore. After learning how to use the sextant, he measured a 45 degree angle between the shore of Fiji and the circling bird.



My crewmember calculated the distance between our launch and the bird to be about 190 ft. I can only hope that this taught him a lesson.