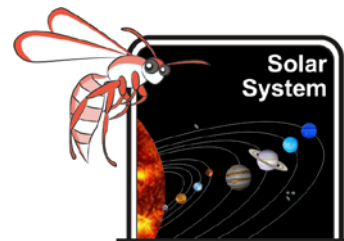


Historical Thinking – Teacher Notes



Metacognition means thinking about thinking. The patterns and possibilities for the attributes of the planets in our solar system have changed over time. Students may be interested in studying and discussing these examples.

“It is the mark of an educated mind to be able to entertain a thought without accepting it”
Aristotle

Science tries to give the best explanation at that time for what has caused something to exist and to change. Ideas are vigorously tested and retested and theories adjusted when new information is brought in from new technologies. It can take many years for people to change their minds. In the past supporters of differing ideas have slaughtered and starved out those supporting conflicting explanations. It is very difficult to get people to change the way they think.

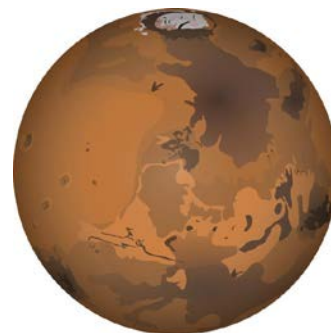
In medieval times the **Doctrine of Signatures** was a very popular way to explain things. People believed that everything was created to be useful to mankind. Each thing contained a clue or signature that would explain its use, if only you searched for it.

Example 1

The planet Mars appears red in the night sky. Red is the colour of blood therefore this planet is named after Mars the God of War. The metal copper is a red-gold colour. If you wear a copper bracelet to battle it will make you victorious like the god.

Do you think the doctrine of signatures is a good explanation for wearing a copper bracelet to war?

Any reasoned thoughts. Copper round your wrist will not protect you from a gunshot or arrow to the head. Copper will even bend if hit by a rock. A simple trial/test should disprove that this is so.



Example 2

The herb or weed dandelion has a whitish sticky juice in its stem and juice that looks a bit like urine.



If you suck juice from the stem it will make you urinate more frequently. It is a diuretic, hence its common English name “piss weed”.

Do you think the doctrine of signatures is a good explanation for the use of dandelion as a medicine for correcting water retention? Explain your answer.

Any reasoned answer. Although the juice looks like urine it doesn't smell like urine. Inconclusive. It can be useful in lowering fluid levels in a body. During WW11 coffee could not reach the UK easily. A substitute was made from dandelion.

Although both coffee and dandelion are diuretics the effect from dandelion is much stronger. Fighter pilots would refrain from drinking ersatz (pretend) coffee until after their flights. The name dandelion comes from the French “dent de lion”, lion's tooth.

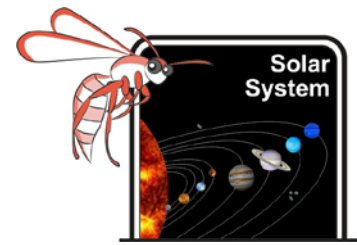
Example 3

The herb eyewort has flowers that look to some people like eyes. It was used to treat eye infections and other diseases of the eye.

Do you think the doctrine of signatures is a good explanation for the use of eyewort as an eye medicine? It was made into a tea and applied externally. Explain your answer.



Historical Thinking – Teacher Notes



Any reasoned thoughts. It doesn't look like an eye. It is mostly ineffective. Any boiled water that is at all astringent will help reduce inflammation and infection. Salt water or seawater is more effective against infection. Neither is effective against physical problems of the eye such as short sightedness or cataract development.

Example 4

The planet Venus can be clearly seen near the western horizon at dawn and at dusk. Its position was, and still is used as a navigation aid by sailors before compasses were commonly available. It became known as the sailor's planet in medieval times. A planet for sailors must also provide the hemp that was needed for sails and ropes for sailing ships at that time. It was believed that Venus must therefore have hemp growing on its surface.



Do you think hemp grows on the surface of Venus? Explain your answer.

Any reasonable answer. The carbon dioxide rich atmosphere of Venus acts like a great greenhouse that traps heat from the Sun. The surface of Venus is 465°C, hot enough to melt the metal lead. There is no water or oxygen on Venus. Plant life cannot exist.



With the advent of the Renaissance in the 16th and 17th centuries, scientists, philosophers and free thinkers were challenging traditional ideas. Those seeking explanations started depending on data (information) that is observable (subjective not objective) measurable in SI (International standard units) and repeatable. Possible explanations were tested and retested.

Science must change as more information becomes available. Scientists no longer declare "Laws" of Science. Instead they suggest hypotheses (Hypo = less than and thesis = law). Hypotheses are scientific guesses or estimates that explain why changes occur.

Example 5

The philosopher Aristotle was born in Macedonia in 384BC. He believed that "like attracts like". Stones fall towards the ground because they are both made of similar materials. Smoke rises up into the air because they are again both similar substances. Write an hypothesis to describe and explain what happens if you are holding a rock and let go of it.

If you let go of the rock then it will fall downwards. The mass of the rock is attracted to the much greater mass of the planet. The force of gravity attracts it.



Example 6

Astronomers have noted that "rings" surround the planet Saturn. In 1610 Galileo Galilei first saw them when he turned his telescope toward this bright planet. What do you think that someone who believed in the Doctrine of signatures would interpret these rings as? Perhaps this planet is for ring makers or jewellers. It must be rich in silver and gold.

What do you think modern astronomers interpret these rings as? They are reflections from the surface of many moons and smaller objects held in orbit round the planet.