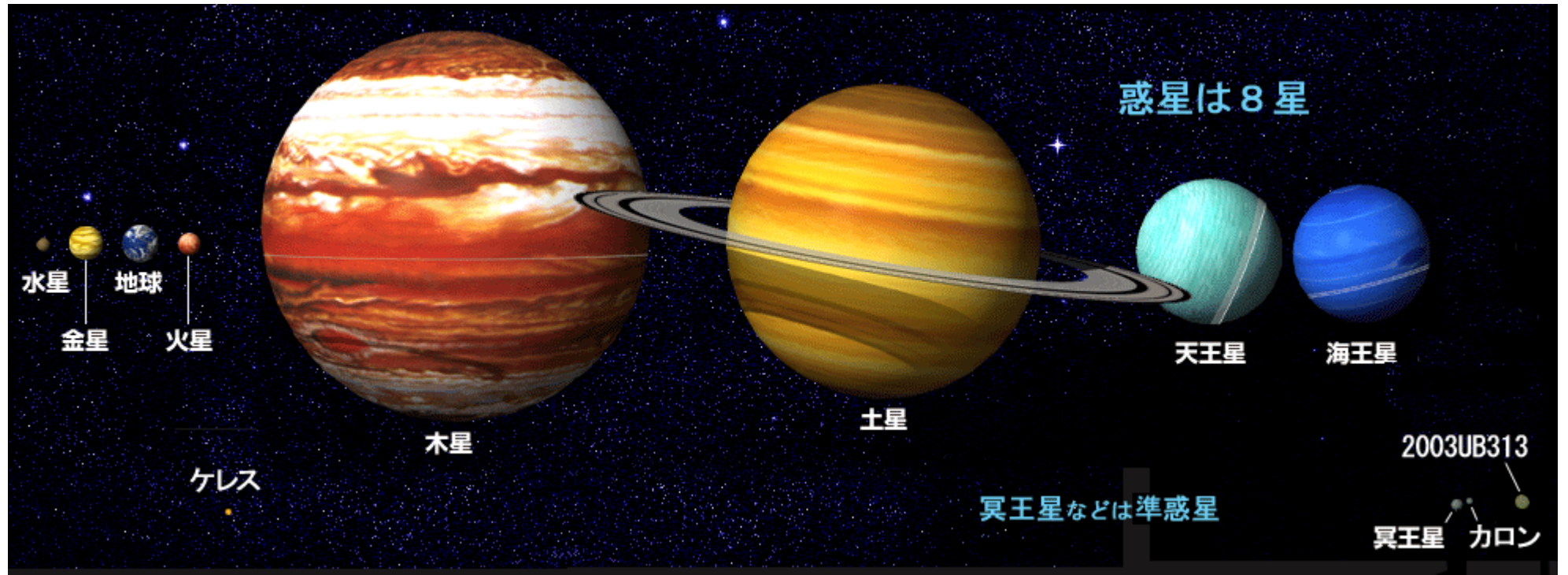


Symbiosis with the environment: the Earth environment and the quality of water

- It depends on distance with the sun, size, a greenhouse gas of the earth that there can be life on the earth.
- The water investigation is, first of all, pH values. The neutrality is 7, and the acidity is lower than this, and the alkalinity is high.
- In our investigation, there was a pH change during one day and it is considered photosynthesis of the rice growing.

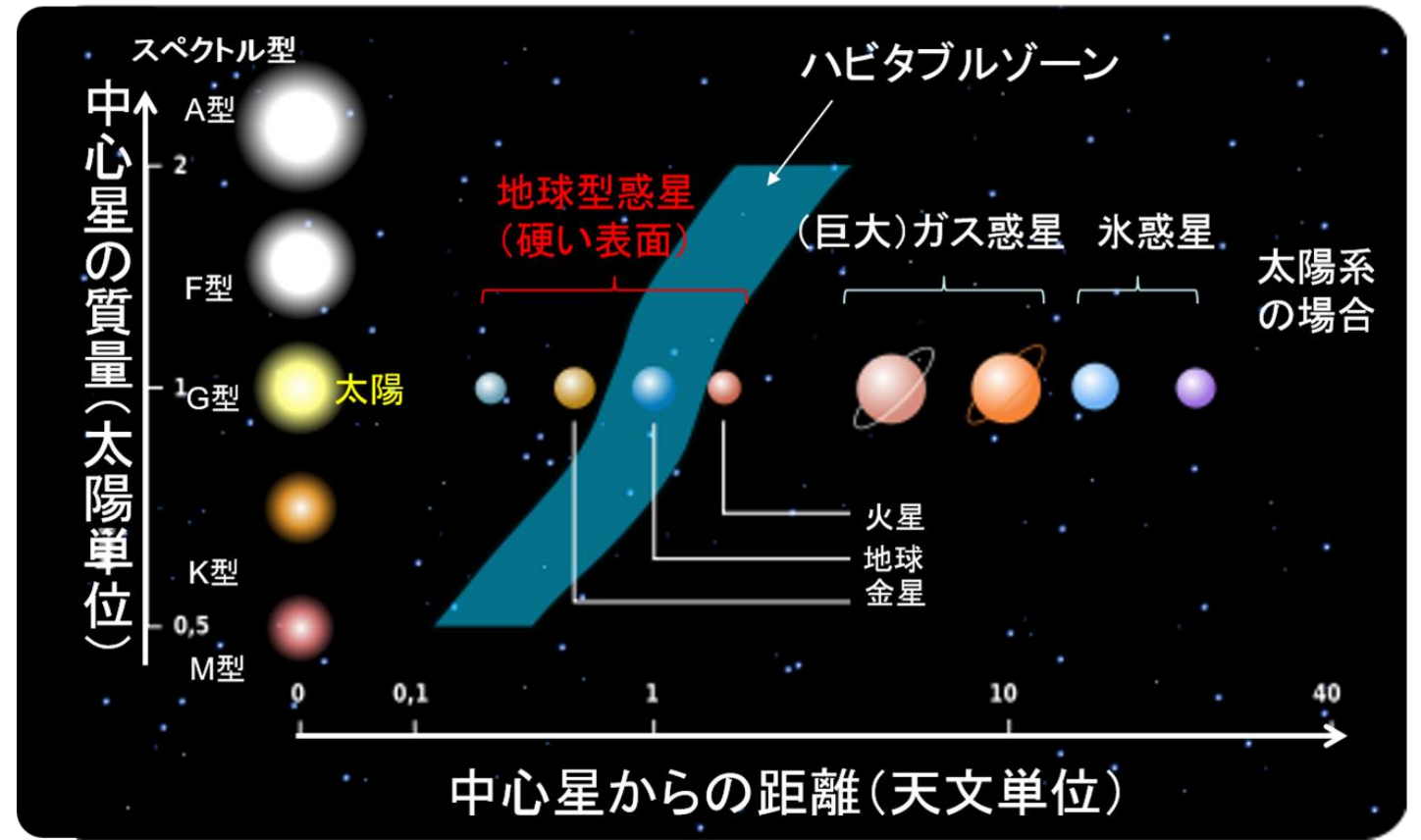
The Planets



- A Earth-type planet: It is composed primarily of a rock, and a radius and mass are small, and density is big. It is Mercury, Venus, Earth, and Mars.
- A Jupiter-type planet: It has much gas, and a radius and mass are big, and density is small. It is Jupiter, Saturn, Uranus, Neptune.

Why does the earth have the sea (water) and why is it filled with life?

- The distance from the sun is suitable to keep the temperature that liquid water (the ocean) can exist.
- Because the earth has enough size and mass, the atmosphere and liquid water are made come near on the surface of the earth.
- Temperature of the earth is kept convenient for a creature by the greenhouse effect with the atmosphere.



Why do you check the quality of the water?

- We live on the earth of the condition that is almost a miracle to bring up life.
- Therefore I try to check the water which is important to life close.
- We have consciousness of the management of the quality of the water with water carefully.

The water investigation

- The quality of the water investigation into spring, pond water, river water from a tea plantation (2000)。

The acid spring from a tea plantation flows into the pond. The spring is neutral or alkaline, and it changes from the acidity by photosynthesis of the plankton.

The water investigation is, first of all, pH values.

pH

- It is acid in the one that is lower than pH 7 and calls high one with alkalinity.
- Water: Tap water 6.5, Well water 7.0–8.0, Seawater 8.0–8.5
- Drink: Sports drinks 3.0–4.0, Japanese green tea 4.5–6.0, milk 6.7
- Food: Lemon 2.5, Yogurt 4.4, Konjac 12.2
- Life article: Soap liquid 7.0–10.0, Ash 12.5

Definition of pH

- The water H_2O ionizes in the water solution and becomes $[\text{H}^+]$, $[\text{OH}^-]$. $[\text{H}^+][\text{OH}^-]=10^{-14}$ is constant.
- With pure water and the neutral solution, the definition of $[\text{H}^+]=[\text{OH}^-]=$ route $10^{-14} = 10^{-7}$. pH is $\text{pH}=-\log_{10} [\text{H}^+]$. As it is $[\text{H}^+]=10^{-7}$ with the neutral solution, it becomes $\text{pH} = 7$.

Review: $10=10^1$ is $\log_{10}10^1=1$. $100=10^2$ is $\log_{10}10^2=2$. $0.1=10^{-1}$ is $\log_{10}10^{-1}=-1$

pH measurement by Japanese Industrial Standards

- When there are a lot of hydrogen ions, each may collide. The theory calculation is difficult.
- As for pH in the practical use, pH measurement is performed in comparison with a standard with a constant water solution.
- The difference of pH is $\text{pH}(X) - \text{pH}(S) = (E_x - E_s) / (2.3026RT/F)$
Ex: Electromotive force, Es in X: Electromotive force, R: Gas fixed number (constant), T: Absolute temperature, F: Faraday fixed number (constant).

How to measure pH of the water

Compact pH meter “LAQUAtwin pH”, HORIBA

- 1 Micro volume sample
- 2 Replaceable Sensor
- 3 USA or NIST Buffer Sets
- 4 Auto Calibration



The fixed points surveying

- 1 Mt. Owari-fuji – Lake of Iruka – Mt. Hongu
- 2 Around Nagoya University of Economics

