Establishment of the STEM experimental materials in Japan – using *Vargula hilgendorfii* –

Naoko KOSAKA[1,2] and Yoshisuke KUMANO[1]
[1]Graduate school of Science and Technology, shizuoka University
[2]Katoh Gakuen Gyoshu junior and senior high school
[1]nsomete@gmail.com

ABSTRACT

STEM education, though it is widely used in other countries, is not very familiar to junior and senior high school educators in Japan. Currently, educators in Japan are reviewing their classroom pedagogy and practices to provide students with opportunities to develop the 21st century skills. In this study, activities are conducted with 11 junior and senior high students which were framed under the eight practices of NGSS or the STEM education. *Vargula hilgendorfii,* a native *Crustacea* in Japan, is mainly used as the experimental material for students to work with. *Vargula hilgendorfii* is a nocturnal animal and emits blue light when it surfaces to shallow waters in the evenings. This was chosen as a material for this study since this is not known for many Japanese students. The blue light from this animal is produced by the chemical reaction of luciferase and luciferin. One of the surprising results as the students studied the behavior of this animal is that it releases its brightest blue light at 4°C(39.2°F). This data shows that there are could be possibly more characteristics is not known about this animal. Also based on students' responses, they enjoyed working with *Vargula hilgendorfii* and have realized that they can work with another framework different from what they have been used to in the Japanese education system. It is concluded that *Vargula hilgendorfii* could be a great choice for students to work with as a STEM experimental material. It is also possible to use the relatives of *Vargula hilgendorfii*.

Keywords: Experimental materials, junior high school science, STEM education, *Vargula hilgendorfii,*