The Mystery of The Spiders' Web

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Motivation for Research

Speaking of spiders, some people may think of "Spider-Man". His threads are very strong. A real spider's are, too. What is the structure of those threads? We researched not the strength of them but the difference between warp and woof.

Purpose

To research the characteristics of spider's thread using an optical microscope and an electron microscope. And also to research the difference between the woof which have sticky droplets and the warp which have no sticky droplets.

Methods

As preliminary research, we investigated the kinds of spider which live in Kobe High School and the place of their webs.

And then, we collected the spider's web by using a black cloth.

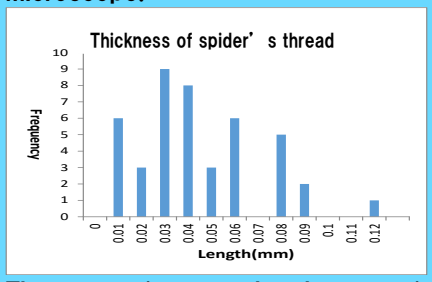
After that we sketched a picture of the web.

The next, we judged warp or woof from whether the dust or particles stuck to the thread or not.

Finally, we observed the structure of the thread by an optical microscope and an electron microscope.

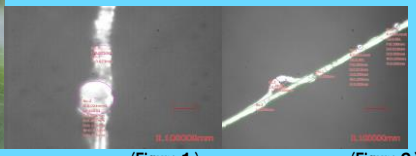
Results

We found the spiders in our school, and all of them proved to be silk spiders. We got the following result by making the graph from the enough number of spider's thread data. These data were observed by an optical microscope.



These are pictures taken by an optical microscope (↓).

(Figure 1)



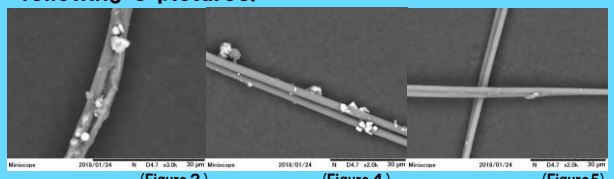
(Figure 2)

(Used Digitalmicroscope MS-200)

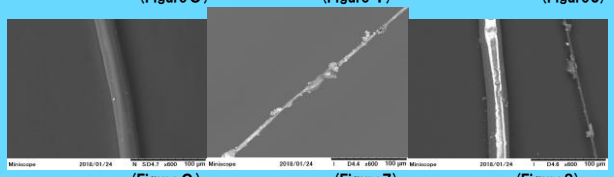
Acknowledgements

Thanks for teachers who cooperated with our research and the company which lent us an electron microscope and all people who helped us.

As a result of taking pictures by an electron microscope which magnification 600 to 3000 times, we got the following 6 pictures.



(Figure 3) (Figure 4) (Figure5)



(Figure 6) (Figure7) (Figure8)

(Used Miniscope TM3030)

Consideration

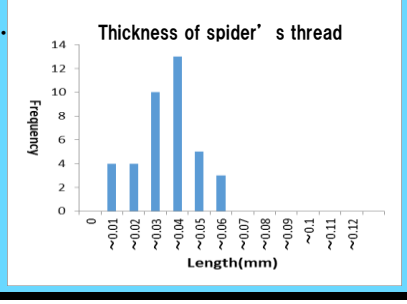
The following are considerations which can be judged from these results.

According to the histogram, there are three kinds of threads. First one's length is not more than 0.01mm. The next one's length is 0.02mm to 0.04mm. The last one's length is 0.05mm to 0.08mm. However, in fact, we measured the last one (the threads whose number are two and over) as one thread by mistake in figure 1. This means that there are, in fact, only two kinds of threads (figure 8).

Two threads make up all of the threads (warp, woof, dragline) which were observed (figure2,4,5,6).

We found a thread that has the annular unevenness (figure6).

Considering the results, it seems that this graph is right.



Bibliography

http://www.insects.jp/kon-kumojyorou.htm