

Searching

for Nature Stories

2010 / 2011

CLIMBERS

IN THE CITY

Team Members:

F.5D Lui Bing Chun
F.5D Shiu Ling Fung
F.5E Chu Cheuk Yin
F.5E Hung Lap Tak
F.5E Kwok Ming Kong



Teacher-In-Charge:

Ms. Au-Yeung Wai Yee

TEAM - 37

Kwun Tong Maryknoll College

CHAPTER 1 -

ABSTRACT

Introduction to the Boston Ivy:

Boston Ivy is a kind of climbing plant with leaves, a cultivated climbing plant with leaves consisting of three green lobes that turn red in the fall.



Figure 1

English Name:	Boston Ivy (Japanese Creeper)
Latin Name:	<i>Parthenocissus Tricuspidata</i>
Kingdom:	Plantae
Division:	Magnoliophyta
Class:	Magnoliopsida
Order:	Vitales
Family:	Vitaceae
Genus:	<i>Parthenocissus</i>
Species:	<i>P. Tricuspidata</i>
Features:	<ol style="list-style-type: none">1. Epiphytic2. Fairly Large3. Three Lobed Leaves in Dark Green colour4. Leaves are about 15cm across (light yellowish green colour)5. Grow into a Large Woody Stem when it matures
Living Conditions:	<ol style="list-style-type: none">1. Can spend winters as cold as -30°C2. Can spend summers in excess of $+ 30^{\circ}\text{C}$3. Can confront the change of weather (Tolerant)

Investigation Objectives:

To take a deep look into *Boston Ivy*, which is a kind of special plant in our school, through different kinds of experiments. For example, how it grows along the wall and its adaptive features.

Key Methods Used

1. Investigating the attachment (suckers) by observation.
2. Use microscope to see the microstructure of suckers.

Main Results

None of the suckers has attached to different materials we prepared within the 9 days.

CHAPTER 2 - INTRODUCTION

Background of Investigation

Our group has chosen *Boston Ivy* as our investigating target is due to our curiosity towards it. Since it grows around our college throughout at least 30 years, and we would like to know more about this kind of plant that how it can overcome different difficulties and having such a tolerance towards them. Therefore, we would like to know more about how the adaptive features, internal structures and its attachment of suckers help it grow well in a city but also in the nature.



Figure 2



Figure 3

Our group is investigating in the *Boston Ivy*, which is a typical type of plants in our college living for at least 30years. Being attracted by the special 'abilities' of the *Boston Ivy*, our group decided it as our investigating target.

CHAPTER 3 -

MATERIALS AND METHODS

Our group has done three experiments in determining whether the different kind of materials of the living environment is an element of affecting the attachment of the suckers and the growth of the *Boston Ivy*.

Experiment

First Experiment:

Methods and Tactics adopted:

This experiment is investigating into the materials of different living conditions whether it will affect the attachment of the *Boston Ivy* of the suckers or not.

Set	Materials
A	Wood
B	Cement (Control Set-Up)
C	Metal
D	Plastic (Polystyrene)
E	Tile
F	Glass

Table 1

Materials and Equipment used:

The apparatus used are as follow:

1. Plastic Plate
2. Tile
3. Cement
4. Glass
5. Wood
6. Metal Plate
7. Thermometer

Detailed Information:

From 21st March to 29th March, 2011

Process:

1. Place the materials onto the stand and clamp.
2. Place the *Boston Ivy* on top of them.
3. Record the attachment of the suckers.

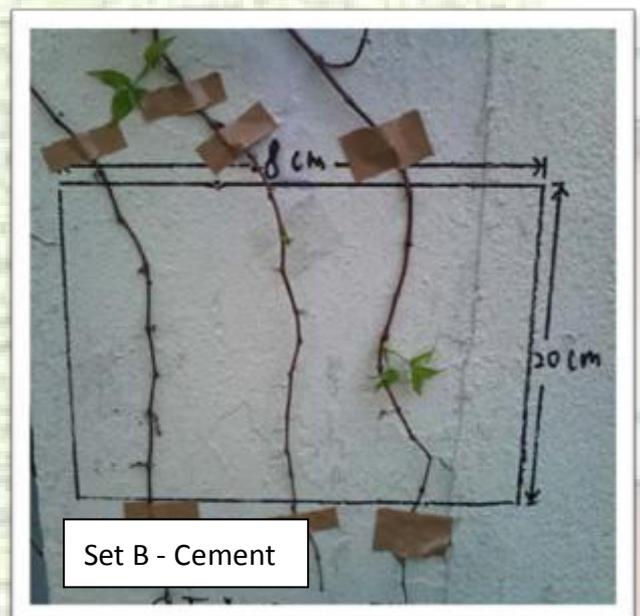


Figure 4



Figure 5

Second Experiment:

This experiment is used to investigate into the internal structures of the *Boston Ivy* in order to find out whether there are any adaptive features for it to satisfy its attachment of the suckers onto the materials.

Materials and Equipment used:

1. Microscope
2. Slides
3. *Boston Ivy* pieces

Process:

1. We first cut the stem and the sucker out into pieces.
2. After that, we put the pieces onto the slide with water covered completely on top of the samples.
3. Then, we place slides on top of them.
4. Next, we observe them under the light microscope.
5. Finally, we can observe some of the structures of the *Boston Ivy* as seen in Figure 6 (stem) and Figure 7 (suckers)

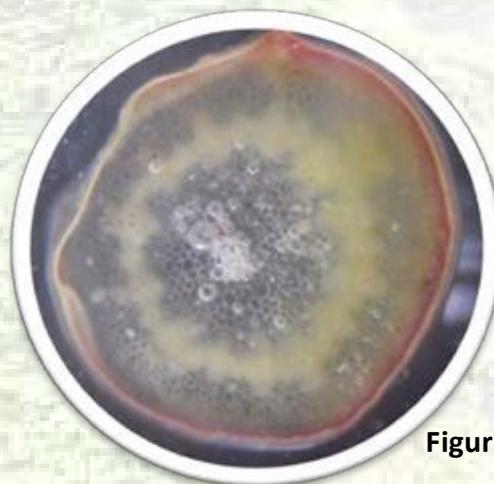


Figure 6



Figure 7

We can conclude that the sucker has the force to 'stick' onto the wall in order for its growth.

And from the microscopic photos, we can see that the cell is packed together which gives a strong force for the *Boston Ivy* to attach on somewhere.

Before the observation, our group thinks that there may be some substances which help the suckers attach onto the wall and boards, however, we can hardly discover that there is no obvious substances which help the attachment of it.

Observation

Apart from the experiment mentioned above, our group has also observed the growing conditions of the *Boston Ivy* in our college, comparing the leaves and areas that the sunlight reached, and the growth and development of the stems and branches of the *Boston Ivy*.

Methods and Tactics adopted:

1. We observe the *Boston Ivy* in our college to investigate the adaptive features for *Boston Ivy* to grow in the school. (e.g. Figure 8)
2. We try to find *Boston Ivy* outside the school.



Figure 8

Detailed Information:

Duration: Within two weeks



Figure 9

Conclusion:

1. *Boston Ivy* grows faster at sunny place. We can observe that there are more and larger leaves at the sunny place while there are less and smaller leaves in non-illuminated areas. We also find that adventitious roots are formed on the wall.
2. The sucker has a thick wall, which can provide a strong surface for the attachment of suckers.
3. We find some *Boston Ivy* at Sau Mau Ping, which have similar to the *Boston Ivy* at school.



Figure 10

CHAPTER 4 -

RESULTS

Set	Material	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9
A	Wood	0	0	0	0	0	0	0	0	0
B	Cement	0	0	0	0	0	0	0	0	0
C	Metal	0	0	0	0	0	0	0	0	0
D	Plastic	0	0	0	0	0	0	0	0	0
E	Tile	0	0	0	0	0	0	0	0	0
F	Glass	0	0	0	0	0	0	0	0	0

Table 2 – Attachment of the suckers onto the material board

Day	Temperature (°C)	Relative Humidity (%)
1	22.9	90
2	19.7	80
3	16.0	71
4	16.8	69
5	17.4	62
6	16.9	58
7	18.0	50
8	18.1	51
9	18.9	50

Table 3 – Temperature and Humidity of each day



Figure 11

CHAPTER 5 -

DISCUSSION AND CONCLUSION

Significance and Importance

1. *Boston Ivy* is one kind of the common climbers in Hong Kong. *Boston Ivy* needs to gain enough sunlight for undergoing photosynthesis. In this concrete jungle, *Boston Ivy* needs to climb higher in order to gain enough sunlight, which is an important material for photosynthesis. Therefore, *Boston Ivy* has its suckers to climb up the wall.



Figure 12



Figure 13

2. In our school, we found that there is more *Boston Ivy* on the side of the wall with more light intensity. It proves that *Boston Ivy* acquired sunlight for its growth.
3. *Boston Ivy* has many branches, it is necessary for its growth as it needs to extend and gain more sunlight for photosynthesis.

Limitations

a. Experiment of testing the attachment of *Boston Ivy*:



Figure 14

1. The time for the growth of *Boston Ivy* is not long enough, also only few weeks are available for us to do the experiment. Therefore, there is no growth of suckers in the period of our experiment. *Boston Ivy* may not attach to the wall. In our school, *Boston Ivy* attached on many walls, but the fact is that *Boston Ivy* have been attached onto the wall over ten years.

2. The choice of *Boston Ivy* stems is difficult, different stems have different growing rate. It may not be a fair test since some stems may grow faster. Moreover, we find it difficult to choose stems from large bush of *Boston Ivy*. It is hard to determine whether the stem is weak or not. Weak stems or even withered stems may affect the experimental result.
3. The weather is bad, with consequently 9 days of cold weather. The growth rate of stems of the *Boston Ivy* is bad.
4. *Boston Ivy* climbs on many materials, such as rocks, perspex, glasses, etc. Only 6 types of materials cannot cover all conditions.
5. *Boston Ivy* must to be grown in outdoor rather than in indoor. Thus, we cannot do the experiment 1 mentioned in the laboratory.



Figure 15

b. Observation of the suckers and stems of Boston Ivy under the microscope:

1. We cannot observe all of the structures of the suckers and stems because the magnification of the microscope is not high enough and also the transmittance of the samples of stems and suckers.
2. We do not have professional apparatus thus we cannot observe the suckers and stems in detail.
3. It is hard for us to find detail structures of the *Boston Ivy*.



Figure 16



Figure 17

Errors

Experiment of testing the attachment of Boston Ivy:

Our conclusion may not be accurate because the experimental result is difficult to determine the attachment of the *Boston Ivy* on different materials.



Figure 18

Improvements

a. Experiment of testing the attachment of Boston Ivy:

1. The time needs to be longer. Since the time is too short for the *Boston Ivy* to grow well and completely, we can hardly see the attachment of the suckers onto the materials provided. We can start the experiment much earlier to ensure the time of the experiment is enough to let the *Boston Ivy* grow well. We can perform the experiment in a longer time in order to provide enough time for the growth of the suckers of *Boston Ivy*.
2. The *Boston Ivy* chosen may be matured and developed, which may be hard to grow the suckers again, and so the experiment may not be that accurate. To improve the experiment, we may choose some younger shoots of the *Boston Ivy* to process out the experiment, to obtain a better and more accurate results. We can use the shoots of the *Boston Ivy* to undergo this experiment instead of the original suckers and branches of *Boston Ivy* due to the rapid growth rate of the shoots. The experiment is similar to that the experiment of testing the phototropism.



Figure 19

b. Observation of the suckers and stems of Boston Ivy under microscope:

1. We can cut the samples of stems and suckers a bit thinner to increase the transmittance of light of the samples in order to observe the samples more clearly.
2. We can undergo this observation under a microscope with a higher power and thus increasing the definition of the photos of samples and allowing us to identify more structures of the samples.

Conclusion

There is no direct relationship on the attachment of the *Boston Ivy* on different materials in this time interval.

Also, we have hypothesis that there may be some substances which help the suckers attach onto the wall or other materials. However, after the observation of the internal structures of the *Boston Ivy*'s suckers, we cannot discover any adaptive features for the attachment of the suckers of the *Boston Ivy*.



APPENDIX -

REFERENCES

Internet Resources:

1. http://landscaping.about.com/od/vineplants1/p/boston_ivy.htm
2. <http://www.gardenguides.com/taxonomy/boston-ivy-parthenocissus-tricuspidata/>
3. <http://cccmkc.edu.hk/~kei-kph/Wetland%20park/Boston%20ivy.htm>
4. http://en.wikipedia.org/wiki/Parthenocissus_tricuspidata