

云山深处幽，书海任遨游——图书馆保卫计划

An Action Plan to Save the Moldy Books in Yunhai School Library

项目日记

Project Journal

## 1. 缘起 Why we do this

某一天，我们来到图书馆看书，随意翻开一本放在角落里的书，一股霉味扑鼻而来，仔细瞧瞧还有霉斑。我们通过与图书管理员的聊天了解到图书馆里有很多书发霉了。

One day when we went to the library, we came across a book in the corner, with a strong musty smell and some mildews at a closer look. Later, we learned from the librarian that many books in the library grew mildews.

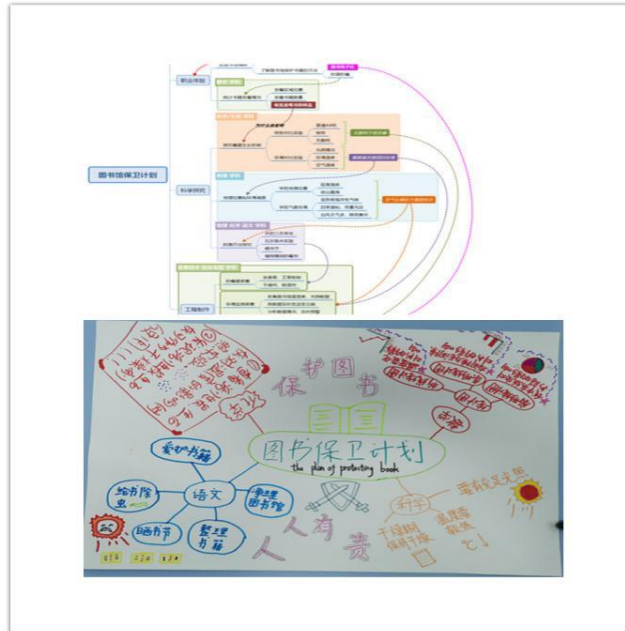


## 2. 项目研究 The researches we've done

- (1) 为了帮助图书馆解决图书发霉的问题，我们成立小组，制定研究计划，以思维导图的形式罗列出我们需要研究的小任务以及完成任务所需要

的背景知识。

In order to solve the problem of mouldy books, we set up a group. The group created a plan, listed tasks we need to finish and background knowledge we need to know in the form of mind maps.



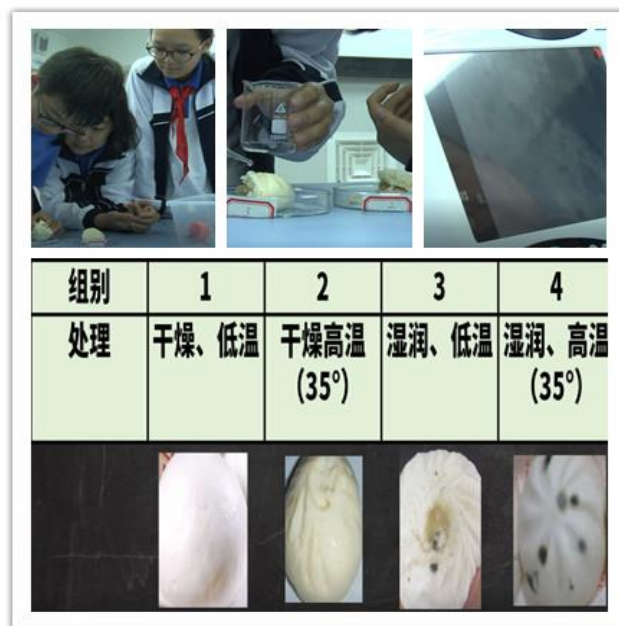
- (2) 第一个小任务是对图书馆进行实地调查。我们选择了云海学校图书馆和盐田区图书馆进行实地调查，在图书管理员的帮助下，我们统计了发霉书本的摆放位置、数量以及纸张类型等,并将收集到的数据利用Excel 汇总成统计表，方便后续数据分析。

The first task is to conduct field surveys in libraries. We surveyed Yunhai School Library and Yantian District Library. With the help of the librarians, we listed the mouldy books' positions, quantities and types of paper. The collected information were summed up into Excel tables for further analysis.



- (3) 第二个小任务是探究霉菌生长的条件，为此我们共同设计了对照实验来探究霉菌生长的条件。我们从发霉的书籍上获取了霉菌菌种，用馒头片来做实验对象。我们发现霉菌喜欢潮湿高温的环境。

The second task is to work out the conditions for mildew growth. For that purpose, our group members designed some contrast tests. We removed some mildew from the mouldy books onto some steamed breads. Then we put the breads in different environments, waiting to see how the mildew would grow. It turned out that mildew grew much thicker in a humid and warm environment.



- (4) 第三个小任务是探究不同材质的纸张对霉菌生长速度的影响。我们把菌种接种到不同材质的纸上，放置到相同的环境中，观察霉菌喜欢哪一种纸。我们发现无酸纸最不容易滋生霉菌。

Task Three is to explore how the mildew growth varies on different materials of papers. We removed some mildew from the books onto different materials of papers, put them in the environments with the same humidity and temperature. After the test, we found that acid-free paper among other materials is the least susceptible to mildew.



- (5) 第四个小任务是找出图书馆潮湿的原因。在地理老师的协助下，我们测绘了地图，收集了2018年盐田区的风向和湿度数据，经过分析，我们发现云海图书馆所处的位置，地形与气候来说，湿度常年较大，又其窗户只朝一面，空气流通不好，因此，图书馆资料和书籍容易受潮。

Task Four is to find out why our library is humid. With the help of our Geography teacher, we did surveying and mapping and collected data of wind direction and humidity in Yantian District in 2018. After analyzing the geographical position and climate of Yunhai School Library, we found it was located in a place with relatively high humidity all year round, and the windows are only facing one side, causing poor air circulation. As a result, books were easy to get damp.



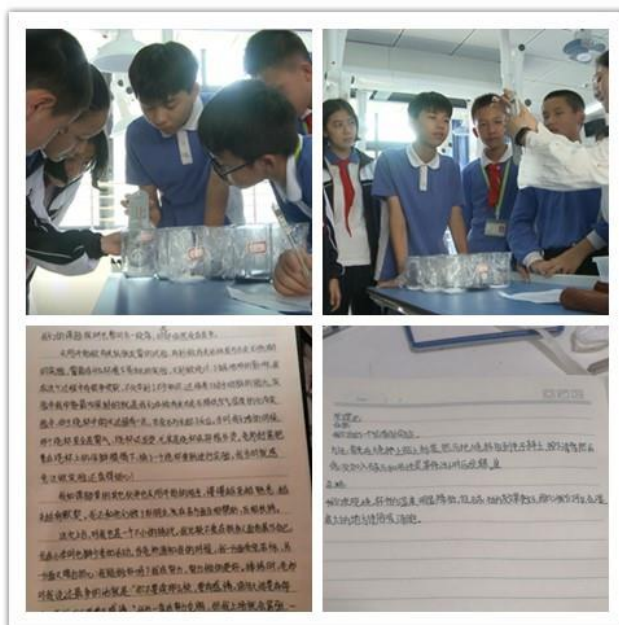
- (6) 第五个小任务是了解潮湿的背景知识——“水是怎么由水汽变来的？”
- 在学习了水的三态变化后，我们明白了水汽变成水的机制，并尝试采用吸潮包和光照等方法做吸潮实验。

Task Five is to learn about the background knowledge of the moisture - how does liquid water change from water vapour? After studying the three forms of water, we understood the mechanism of vapour turning into water. Then we tried to do experiments to absorb the moisture through moisture absorption bags, illumination, etc.



- (7) 第六个小任务是用化学方法降低湿度。我们做了一个小实验，在加入活性炭和石灰石后，烧杯中的湿度明显降低，其中石灰石的效果更好。因此我们可以先在湿度较大的地方使用吸潮包，减少书籍发霉的数量或减缓发霉的速度。

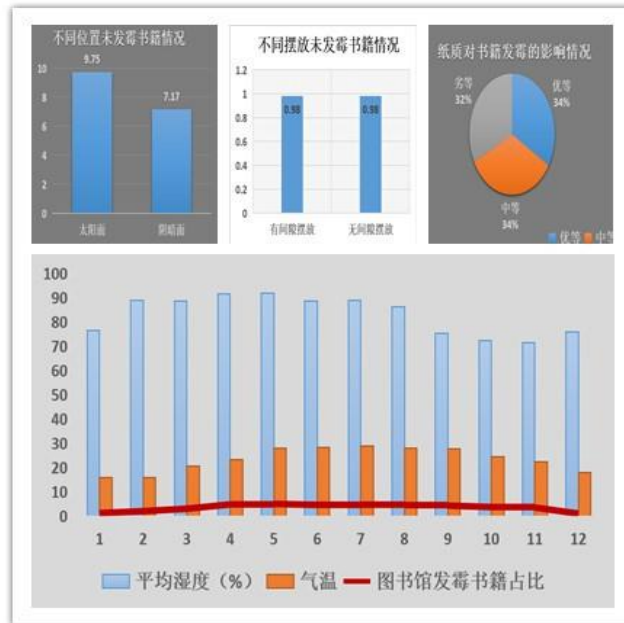
Task Six is to reduce humidity with chemical methods. To this end, we did an experiment. We put some activated carbon and limestone into different beakers, both of which can decrease the humidity in the beaker significantly and the latter worked even better. Inspired by this, we came to the conclusion that we could put lime powder bags in places with high humidity to reduce the mildew or slow down the process.



- (8) 第七个小任务是将收集到的数据进行处理分析，为了更加直观形象地体现，我们制作了一系列的图表。我们利用数学统计发现：造成书本发霉的罪魁祸首，就是霉菌，而导致霉菌的主要原因就是部分区域的环境十分适宜霉菌的生长。

Task Seven is to process and analyze the collected data. To reflect it more intuitively and vividly, we made a series of charts. By the means of mathematical statistics, we found that the main cause for book getting

mouldy was the mildew, and the main reason for mildew growth was the humid and warm environment.



### 3. 工程制作/解决方案：The solutions we've worked out

经过讨论，我们提出了四种解决方案，所以我们分为四个小组实施四种解决方案。

We put forward four solutions after discussion, and therefore all members were divided into four groups to implement them respectively.

- (1) 1号小组设计了一个环境数据检测和报警装置。这个装置主要由环境数据监测传感器和警报组成。由传感器监测环境，每秒的数据将会上传到云端形成动态图表，当达到易霉变的条件的时候，就会给图书管理员发送一封邮件或者短信并且发出警报，提醒管理员需要抽湿或者放置更多的吸潮包。

Group One designed a device for environmental data detection and alarming. It is mainly made up of a sensor and an alarm. The data of the environment humidity monitored by the sensor is uploaded to the internet second by second, forming into a dynamic chart which keeps updating. When it reaches the conditions for mildew growth, the device will issue an alert and send an e-mail or a message to the librarian, reminding her to add in more moisture absorption bags.



- (2) 2号小组做的是个图书保险箱来保护我们还没有受潮的图书。在前面的调查中我们发现霉菌难以在无酸纸上繁殖，因此选用无酸纸制作图书盒子，为了保险起见还可以放置一个吸潮袋。通过实验，我们发现就算在潮湿环境中，也可以保护书籍保持干燥的环境，不会发霉。

Group Two made a strongbox for books to protect those undamped books. Since earlier experiments suggested that acid-free paper is less susceptible to mildew, we used acid-free paper to make the strongbox and put a moisture absorption bag in it to protect those books. After all those experiments, we were confident that even in humid environments books can be kept dry and free from mildew.



- (3) 3号小组用扫描仪把书籍变成电子书，放进电子书包里。在制作电子书的过程中，我们发现电子书不仅不会发霉，还方便我们在这上面做一些笔记和摘抄！除了以上这两点外，使用电子书还避免了图书不够借的情况出现。

Group Three scan the books into e-books and put them into e-schoolbags. E-books will never go mouldy, and it is easier to take notes and download excerpts on e-books. Furthermore, e-books will never run out of stock!



(4) 4号小组则从古籍中获得灵感，我们从古籍中发现农历七夕是“晒书节”，古时候的人们在这一天会把书籍拿出来暴晒防霉。所以我们制定了晒书时间表，每天晒一部分书。古籍中还写到：“请君架上添芸草，莫遣中间有蠹鱼”。所以我们借鉴了古人的做法，用芸香草制成植物精油防霉剂，喷洒在书籍上，通过实验，不仅防霉，而且带来阵阵书香。

Group Four got inspiration from ancient people. According to ancient books, the Qixi Festival, known as the Chinese Valentine's Day and celebrated on the 7th day of the 7th lunar month, is also a day for Chinese people to dry their books in the sun and keep them away from mildew. Therefore, we made a schedule to dry books in the sun. The ancient books also say "put rue herbs on the bookshelf to keep silverfish away from your books". Borrowing the idea we made some mildew preventive oil with rue herbs and sprayed them on books. The results showed that it could not only prevent mildew growth but also help books send forth a delicate fragrance.



#### 4. 活动评价与总结

俗话说：“做事要有始有终”，这次学习活动结束后，我们对自己和其他同学的学习表现做出了评价，教师们也给予我们评价和建议。我们还书写了活动的总结，为我们继续解决学校图书馆的其他问题，完善图书馆的软硬件提供

了思路。

## Assessment and summary

As the saying goes, never do things by halves. After the project, we made an self-evaluation of our performance, and teachers gave us assessments and suggestions as well. We also wrote a project summary, aiming to provide reference for people to solve other problems of the school library.

