书里那个失败的对照组

《一次有趣的实验》里最让我难忘的，不是哪一次成功，而是一个失败的对照组。书里作者想知道铁为什么在海边锈得更快。他摆出三个杯子：一个保持干燥，一个倒进自来水，一个倒进盐水，每天记录杯中铁片的样子。做到第五天，他发现两个杯子的标签贴反了，一周的记录全部作废。换谁都想扔掉重来都不一定干，他却把标签重新贴好，从头再做，还在文章里老老实实写了这次失误。他说，失败查清楚了，也是答案。

我以前总觉得实验就该出正确结果，失败了只能说明我不是学科学的料。去年秋天我做过一个自己的实验：往铁钉上涂指甲油，看能不能防锈。我把一根没涂的铁钉和一根涂了指甲油的铁钉分别放进两个盘子，倒上水，等奇迹发生。三天后，涂指甲油的那根反而锈得更凶，橙色的锈顺着指甲油的裂缝往外爬。我失望透了，下结论说指甲油防不了锈，科学也防不了我。

是书里那个失败的对照组让我回头去看我的失败。我想起来，我指甲油涂得太厚，表面干裂了；盘子里的水浑了也没换。裂缝就是通道，水带着空气顺着通道爬到铁面上。我的失败不是在说指甲油没用，它在说：涂得太厚、裂了缝的指甲油，比不涂还糟。这两个结论完全是两回事，一个把门关死，一个留了门缝。

上周我把实验重做了。指甲油只涂薄薄一层，等干透再补第二层，每天换清水。七天过去，涂了指甲油的钉子还是白的，没涂的那根已经锈成褐色。这次的高兴和上次不一样：上次要是碰巧成了，那是运气；这次是失败替我攒下的。

这本书给了我一个打算：准备一本错题一样的本子，专门记实验里出的岔子。做砸一次，先别扔，先问它教了我什么，写下来，再决定怎么重做。书里的人舍得丢掉一周的数据，我总舍得丢一根铁钉。真知是动手做出来的，而动手这件事里，本来就包括做砸。

The Failed Control Group in the Book

What impressed me most in One Fun Experiment was not a great success but a failed control group. The author wanted to know why iron rusts faster near the sea. He set out three jars: one kept dry, one filled with tap water, one filled with salt water, and he recorded the iron pieces inside every day. On the fifth day he found that two labels had been stuck on the wrong jars, and a whole week of records became useless. He could have thrown everything away. Instead he relabeled the jars, started over, and honestly wrote the mistake into his article. He said that a failure, once examined closely, is also an answer.

I used to believe experiments exist to produce correct results, and that failing only proves you are no good at science. Last autumn I ran my own experiment: coating an iron nail with nail polish to see whether it could stop rust. I put one bare nail and one polished nail into two separate dishes, covered them with water, and waited for a miracle. Three days later the polished nail rusted worse than the bare one, orange rust creeping out along the cracks in the polish. I decided then that nail

polish is useless against rust, and that I am useless at science.

The failed control group in the book made me go back and look at my failure. I remembered that I had put the polish on too thick, so its surface cracked while drying, and I never changed the cloudy water in the dishes. The cracks were passages, and the water carried air through them to the surface of the nail. My failure was not saying polish is worthless. It was saying that thick, cracked polish is worse than none at all. Those two conclusions are very different things. One shuts the door; one leaves a crack of light.

Last week I redid the experiment. One thin coat of polish, left to dry fully, then a second thin coat, and fresh water every day. Seven days in, the polished nail is still white while the bare one has turned the color of rust. This success feels different from the last one. If the first attempt had worked by accident, it would have been luck. This one was saved up for me by a failure.

My plan from this book is to keep a notebook, like a mistake notebook, just for the things that go wrong in experiments. When something breaks down, do not throw it away. First ask what the failure taught me, write it down, then decide how to start again. The man in the book could afford to lose a week of data. I can afford to lose one nail. True knowledge comes from doing with your own hands, and doing has always included failing.