

## Penicillin: The Magic Bullet (Transcript: Before human trials - Part 1.c)

The war brought a mounting sense of urgency to the penicillin work. The human trials Florey wanted still seemed out of reach. Until then he had allowed each member of the team to work at their own pace in their own area of expertise. Now, he wanted to force the pace.

When Heatley suggested a way to solve a major chemical problem, Chain considered it an invasion of his territory. What followed has been the subject of differing recollections from the three men.

*Chain:*

*"I must state categorically, I never said Heatley's experiment would not work. I've never been able to understand it, on what basis or at what time this story was invented. All I said was that it may be a good idea but it was chemical work and we had agreed that the chemical work would be done by myself."*

Florey backed Heatley.

*Heatley:*

*When Chain realized the argument's lost and with a shrug told me, "Well, if you think it will work, why don't you do it yourself? That would surely be the best and quickest way to show you were wrong."*

*Florey:*

*It seemed to me it didn't matter whose idea it was. If it worked out, our output would double and in any case everything would be published under all our names."*

The pressure was now on Heatley to make his idea work. Wartime shortages meant that the equipment he needed was not available. They had neither the money nor priority. He would have to prove his idea with what he could scrounge. His idea had two parts: the first was to back extract the penicillin concentrate into water; the second was to create a machine which would automate the process. If the machine worked it would increase the production 20-fold.

Florey had recruited Heatley because of his great technical skills, but no one had ever thought that he would have to design and build a revolutionary chemical extraction plant with the equipment store closed for war.

Later, pharmaceutical companies would spend millions of pounds replicating what Heatley did using an old light globe as a float and parts of an old telephone as an alarm system.

On the 24th of August, 1940 the influential medical journal the *Lancet* published the Oxford team's paper on the first mouse experiment. It announced their belief in the power of penicillin and it staked their claim to the credit for its discovery. Today it is regarded as one of the most important articles ever to appear in the *Lancet*.

In 1940, Britain had other things on its mind, but there was interest on their paper from an unexpected quarter. A week after the publication, Alexander Fleming re-entered the penicillin story. Fleming asked, "What's happening with my old penicillin?" His sudden appearance caught the Dunn School workers by surprise. Chain later confessed to Florey that he thought Fleming was dead.

*Chain:*

*...You understand of course that the heat will kill the penicillin, so....*

They gave him a small sample of penicillin as a powder, something he had never seen. Fleming went back to London, leaving no comment or word of praise for the Oxford work that would soon

lift him to fame around the world. In retrospect, the Oxford men should have been more cautious.

As Christmas 1940 approached, Heatley began touring the countryside in a van borrowed from the blood transfusion service. A hospital bed pan had given him an idea for a better vessel in which to grow the mould, and he was in search of cheap pottery.

*Heatley:*

*“My forte was innovation, a quality normally of little value to a research worker, they would prove useful under the wartime conditions of restriction and shortage.”*

Heatley delivered the first of the new vessels on Christmas Eve, 500 more were on order at a cost of seven and six pence each.

By injecting sterile air into his new vessels, Heatley found a neat way to keep contaminants out of the mould broth. He also employed three young women to help with the increased workload.

By early 1941, Heatley's continuous reverse extraction apparatus was complete. The machine could process 12 liters of crude broth per hour. It not only increased production, but the penicillin it produced was 10 times more powerful than from any previous extraction.

Chain acknowledged the success but it was another nail in the coffin of his relationship with Florey whom he never forgave for giving Heatley the expanded role in the team.

*Chain:*

*This was once again a clear breach of an agreement between Florey and myself, and I express a gesture my disappointment and annoyance that one could never trust any undertakings given by Florey. I gave in in the end as I could not afford a serious row at this stage because of my special position in the country which was very weak. I had become a naturalized British citizen just a few months before this conversation took place. I had to avoid any action which could provoke anti-Semitism, it was very wide spread.*

Chain and Florey had another issue simmering between them, this was about patenting their work. Chain held the German view that someone would patent their discoveries and they would end up paying royalties on their own work.

*Chain:*

*I saw a whole tremendous virgin field, and we were the leaders and we would remain so, so long as we got enough money. And this I argued our case with Florey again and again, and we fought many bitter fights.”*

Chain traveled to London, he wanted a ruling from Mellanby. The meeting was a disaster for Chain. Mellanby told him that patenting was considered unethical and his money grubbing attitude was not the British way.