Public Health History Corner

Vincenzo Tiberio: a misunderstood researcher

Roberto Bucci, Paola Gallì

Institute of Hygiene, School of Medicine, Catholic University of Sacred Heart, Rome (Italy)

Correspondence to: Roberto Bucci, Institute of Hygiene, School of Medicine, Catholic University of Sacred Heart, Largo F. Vito 1, 00168 Rome, Italy. E-mail:rbucci@rm.unicatt.it

The discovery of penicillin is associated with the name of Alexander Fleming, who in 1928 demonstrated the inhibition of growth of a bacterium around a mold, Penicillium notatum, on a culture plate. In 1940, based on the studies of Fleming, Florey and Chain were able to isolate and produce penicillin. Penicillin was to become a precious resource for the many wounded soldiers during the Second World War, paving the way for a new era in medicine. Fleming, Florey and Chain were awarded the Nobel Prize for Medicine in 1945 for the discovery of penicillin and its curative effects. However, in the official history of the discovery of penicillin there is a page that is missing: the page of Vincenzo Tiberio.

Vincenzo Tiberio's story is fascinating. He was born in 1869 in Sepino, a town built by the Romans after their victory over the Samnites. His father, Domenico Antonio, was a notary and his family was relatively wealthy. Domenico's house was a small cultural center, visited by scholars and professionals alike. Vincenzo showed a strong propensity for scientific studies early in life and after high school his father enrolled him in the Faculty of Medicine in Naples. During the course of his studies he lived in Arzano, a little village near Napoli, in an old house. This house and its well, which supplied water for the house's domestic needs, were crucial for Tiberio's discovery.

It was during this time that Tiberio made an unusual observation: he noted that whenever the mold on the walls of the well was cleaned off, the people who drank the well's water complained of intestinal disorders, up until the time that the new mold appeared. Tiberio believed that there might be a causal link between the two phenomena, but as a young graduate student, he was not allowed access to the laboratory of Hygiene until after graduation.

Immediately after graduating he became assistant to Vincenzo De Giaxa, Director of the Hygiene Institute in Naples University. It was during this time that he was able to focus his research, connecting the two phenomenons from his earlier observations.

In his paper it states that "starting from the theory that in the process of evolution of organic matter and organized, much is represented by widespread and interesting group of schizomycetes, no less important are fungi of a higher order that at times seem to hinder, in competition for life, the development of schizomycetes". Tiberio wanted to show that such relationships existed in the vital competition between these different groups of organisms. "I wanted to observe what action have on schizomycetes cell products, soluble in water, some mycetes: *Mucor mucedo, Penicillum glaucum, Aspergillus flavescens.*"

His research involved:

1) choosing and preparing the culture of the mold using the glue starch with

the addition of gelatin as an organic nitrogenous substance (the same culture medium which was later used by Fleming);
2) preparation of aqueous extract of the mold, which was sterilized and placed in test tubes;
3) the in-vitro study of the bactericidal power of this extract against various bacteria including typhoid bacillus, anthrax bacillus, cholera vibrio, etc.

Tiberio found that some bacteria in vitro experiments were killed after a day, as typhus and anthrax bacilli, while others were killed more slowly. After only 10 hours there was no growth of Streptococcus colonies. Furthermore, he observed the chemotactic power of the mold extracts in experimental infections of typhoid and cholera bacilli, both in the subcutaneous and intraperitoneal tissue of mice. In his conclusions he wrote that "it is clear from these observations that the cellular substance of the mold content of the principles examined is soluble in water provided bactericidal action" [1].

Amalia, Vincenzo's wife, was an eyewitness to his research. She was, along with Medicine, one of the two great passions in his life. She also recounted the story of Vincenzo busily scraping the mold off the well with a spatula to take back to the laboratory.

The academic and scientific world did not give importance to the findings and the conclusions of his research on the bactericidal power of the mold were recorded as a coincidence. The report published in 1895 was sent to collect dust in the archives. The discoverer accepted without protest the silent storage of his findings.

Many years later Fleming observed the same phenomenon, his research findings gained scientific and public acceptance and in 1945 he was awarded the Nobel Peace Prize. Later in 1955 a "bookworm" rediscovered Tiberio's paper, the year in which the Institute of Hygiene of Naples' University reprinted the scientific works of the first half-century. The city honored its native memory with a plaque, and various medical conferences were also held. After further recognition of Tiberio's discovery in the scientific literature by Martines and La Torre [2,3] in the 90s, Naples awarded Tiberio a posthumous homage.

It is said that Fleming was not aware of Tiberio findings. However, it should be noted that at that time Naples was internationally recognized as a centre for research and despite the fact that the publications were in Italian, it is possible that Fleming's research was inspired by the findings. Although this was never openly acknowledged by Fleming himself, there was a partial admission by Ernst Chain, who in an interview said that Alexander Fleming knew of Tiberio's studies.

Why is it that after more than a century since the publication of this simple, clear, rigorous paper titled "On certain mold extracts" and published in "Annali di Igiene Sperimentale" (Annals of Experimental Hygiene) [1] a prestigious magazine of that time, Vincenzo Tiberio has still not received due international recognition? Why is it that the research paper describing the discovery of the bactericidal power of this mold, some 34 years before Alexander Fleming published his observations in the British Journal of Experimental Pathology, has been relegated to a dusty shelf in the Institute of Hygiene in Naples for so many years?

"First in science, least in fame" is written with bitterness in the plaque put in front of his birthplace. Now the Italian National Research Council (CNR) [4] has decided to pay tribute to the merits of this scientist, promoting Tiberio's memory in the documentary "Vincenzo Tiberio, the man who discovered antibiotics", available for free on DVD (simply send an e-mail to: imago.film@libero.it).

The documentary clearly reveals that the discovery of the power of antibacterial mold was made in 1895, thirty years before Alexander Fleming, by the young MD Vincenzo Tiberio.

The documentary included in the programming of the celebrations for 150 years from the Unification of Italy, follows the crucial stages of the life and trials of Tiberio through letters and diaries, with contributions by Salvatore De Rosa , a researcher at the Institute of Biomolecular Chemistry of CNR, and in particular by two of Vincenzo's grandchildren, Giulio Capone, MD, and Anna Covelli Zuppa, a microbiologist.

The movie also shows Arzano's house and the notorious water well, an essential part of the story. From the story a portrait of Vincenzo Tiberio emerges as a man passionate for science and life, engaged as a military doctor to treat victims of infectious diseases all over the world, a man very much in love with his wife Amalia, and with a keen interest in archeology. The movie brings to light a short history of the intense personal and professional life of a scientist who has remained in the shadows for far too long.

Capone says that the passion for knowledge never left Vincenzo. He recounts the story of how Vincenzo wrote a symbolic phrase behind a picture of his grandmother, Amalia: "Long and difficult is the way of research, but underlying all is love."

So what happened to Vincenzo Tiberio? After the disappointing reception given to his research by the academic world, Tiberio became member of the Medical Maritime Corps. His career as a medical officer led him to other duties and honors: he took part in the military deployment to Zanzibar, where he cured sailors of smallpox; he was among the rescuers of the Messina and Reggio Calabria earthquake of 1905 saving more than 2,000 lives; in 1912 he was the Director of the Bacteriological Laboratory at the Maddalena Military Hospital, then moved to Tobruk in Libya as head of the military infirmary analysis laboratory, organizing the first Italian hospital and conducting studies on the "Libyan Illness" and typhoid vaccination.

Promoted to Major, Tiberio was transferred to Naples where on January 7, 1915 he died from a heart attack.

Even now the name of Tiberio is unknown to most. He could have been a protagonist of Italian and International Public Health but unlike others such as Angelo Celli and Alessandro Seppilli he had no academic honors or scientific awards. Vincenzo Tiberio rather belongs to the ranks of the unrecognized Italians genius but surely he should be defined as "the Meucci of penicillin".

References

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