**SCIENCE IN TEN MINUTES**

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**A tale of a scientist and soldiers**

The next time you see our brave soldiers disembarking at the airport from overseas, I would like for you to reflect on this ensuing tale. In the late 1940s, a scientist from India at the Lederle laboratories in New York City (now part of the pharmaceutical giant Pfizer) organized the largest known unique experiment in the world involving the unlikeliest participants and an unimaginable setting. The scientist persuaded the then government and medical establishment to instruct the American soldiers fighting in different parts of the world during World War II to return home with soil samples from their battle fields. Every soldier that came home brought with him a soil sample that was deposited at the Lederle labs where the scientist supervised a meticulous microbiological screening of the soil samples to fish out natural antibiotics that would help cure dreaded bacterial and viral infections. What came off were tetracycline antibiotics, and in 1945, the world was witness to the discovery of the aureomycin, the world’s first broad spectrum antibiotic that more powerful than penicillin, as it was effective against multiple bacteria and was an effective weapon against dreaded diseases such as the plague and conjunctivitis. The scientist in question is Yellapragada Subba Rao (more fondly known as Yella or Suby to his friends and colleagues). This lesser known anecdote is testimony as to how a scientist managed to put back a smile on every soldier’s face coming back from a dreaded war, in that a parallel peace effort in the form of a fruitful scientific research project made the violent battlefields an unintended research lab to benefit a much larger war against disease and benefit the mankind. Yella’s protégé Benjamin Duggar finally produced the purified form of aureomycin from a soil sample closer to home at Sanborn field at the University of Missouri. But the effort would have never seen the light of the day if Yella did not come up with the ingenious strategy of involving the thousands of soldiers to collect soil samples from around the world. So, what else did this genial, unknown and unassuming personality do? At Lederle, he also came up with an inexpensive method to synthesise vitamin B9 or folic acid from pig liver and later, a microbial source. Folic acid is the main ingredient of pre-natal vitamins, and since 1980s was made a mandatory ingredient of flour, pasta and grain products to stave off spinal cord defects in newborns. From this folic acid, Yella synthesized a derivative called aminopterin and he sent samples of these to Sidney Farber, a legendary cancer researcher who used it to completely cure blood cancer in children. This led to the synthesis of the first successful chemotherapy drug methotrexate that successfully cures leukemia and shows extensive remission of breast cancer tumors. Methotrexate also cures arthritis and the itchy reddish skin disease, psoriasis. Yella’s World War II experiment also resulted in synthesis of the drug hetrazan that cures the round worm disease filariasis or elephantiasis. Going back in time, in 1920s, when Yella came to Harvard as a graduate student to study, tropical medicine, he along with Cyrus Fiske experimentally proved that ATP is the source of energy in our body and developed a simple method to measure phosphorous content in living samples. The paper detailing the method as Fiske-Subbarao method is the one of the highest cited scientific publications in the medical field. When Yella died at the untimely age of 53, an obituary in the New York Herald Tribune described him as “An eminent medical mind of the century” and in 1950, a pulp magazine Argosy carried an article that summarizes his life in a single sentence "You've probably never heard of Dr. Yellapragada Subbarao. Yet because he lived you may be alive and are well today. Because he lived you may live longer." Considering the tetracycline antibiotics, cancer drugs and the vitamin supplements that prevent spinal cord defects in newborns, this sentence is an apt description of his contribution, but the most cherished achievement of his is the involvement of soldiers in the midst of a forgettable violence of a war in a monumental scientific experiment of the century to fish out the miracle drugs that benefit mankind for time immemorial. Let’s say a silent prayer of thanks to this great scientist and to the countless World War II heroes who returned home as his foot soldiers unknowingly with scientific gifts that sustain life.

 Talking of fishing things of value from unknown places, scientists from University of Missouri, Columbia recently published a paper stating that if soybeans are boiled in water, the water exudate contains two chemicals called Bowman Birk inhibitor and Lunasin that ward off breast and pancreatic cancer tumors. Now, these two anti-cancerous compounds have till date been prepared synthetically using expensive processes, but this method of just boiling soybeans is very inexpensive and also tells us that a simple soup of soybean (or the green edamame or mukimame seeds) may actually be a rich source of anti-cancerous compounds that we can take in at the drop of a hat.

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