Tu Youyou’s story is one of the most extraordinary examples of science directly saving millions of lives.

屠呦呦的故事是科学直接拯救数百万人生命的最杰出范例之一。

The Global Context

In the mid-20th century, malaria was one of the deadliest diseases in the world. Caused by parasites transmitted by mosquitoes, it killed millions annually, particularly in Asia and Africa.

By the 1960s, resistance to existing drugs like chloroquine was spreading rapidly, and new treatments were desperately needed.

The Project 523 Mission

In 1967, during the Vietnam War, China secretly launched **Project 523**, a nationwide effort to find a cure for malaria. Tu Youyou, a researcher trained in both modern pharmacology and traditional Chinese medicine, was appointed to lead one of the key teams. Unlike many colleagues, she had no medical degree or overseas training, yet she combined rigorous scientific method with deep knowledge of herbal remedies.

Discovery of Artemisinin

Tu systematically screened **over 2,000 traditional Chinese herbal preparations**. She focused on *Artemisia annua* (青蒿, qinghao), a plant described in a 4th-century text, *Handbook of Prescriptions for Emergency Treatments* by Ge Hong. The text suggested soaking the plant in cold water and drinking the juice for fevers.

Her insight was crucial: earlier experiments boiling the plant destroyed its active compound. By switching to **low-temperature ether extraction**, she isolated a substance later named **artemisinin** (青蒿素), which powerfully killed malaria parasites in both animals and humans.

Because of this achievement, Tu Youyou received the **2015 Nobel Prize in Physiology or Medicine** — the first Chinese woman to receive a Nobel in science. Importantly, she credited the wisdom of traditional medicine combined with modern science for the breakthrough.

Legacy

- **Millions saved**: Deaths from malaria have been cut dramatically since ACTs became standard.
- **Integration of traditions**: Tu's work demonstrated how ancient knowledge can spark modern medical revolutions when studied rigorously.
- **Model of persistence**: She worked quietly, without seeking fame, often under challenging conditions, yet produced a discovery that changed global health forever.

Tu Youyou is often called the “Three No’s scientist”: **no doctorate, no study abroad, no membership in the Chinese Academy of Sciences** — but her discovery became one of the most important medical breakthroughs of the 20th century.

Global Impact

Artemisinin and its derivatives became the foundation of **artemisinin-based combination therapies (ACTs)**, now the **world standard for malaria treatment** recommended by the World Health Organization. These therapies are fast-acting, highly effective, and have saved **millions of lives worldwide**, especially children in sub-Saharan Africa.

全球背景

20 世纪中期，疟疾是世界上最致命的疾病之一。疟疾由蚊子传播的寄生虫引起，每年造成数百万人死亡，尤其是在亚洲和非洲。到 20 世纪 60 年代，对氯喹等现有药物的抗药性迅速蔓延，迫切需要新的治疗方法。

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523 项目任务

1967 年，在越南战争期间，中国秘密启动了 "**523 工程**"，在全国范围内努力寻找治疗疟疾的方法。屠呦呦，一位接受过现代药理学和传统中医学训练的研究人员，被任命领导其

中一个关键小组。与许多同事不同，她没有医学学位，也没有接受过海外培训，但她将严谨的科学方法与深厚的中草药知识相结合。

发现青蒿素

屠呦呦系统地筛选了 **2000 多种传统中草药制剂**。她重点研究了青蒿（qinghao），这是一种在公元 4 世纪葛洪所著《伤寒*杂病论*》中描述过的植物。该书建议将青蒿浸泡在冷水中，饮用汁液治疗发烧。

她的洞察力至关重要：早先的实验将植物煮沸，破坏了其活性化合物。通过改用**低温乙醚萃取**，她分离出一种后来被命名为青蒿素的物质，这种物质能有效杀死动物和人体内的疟疾寄生虫。

全球影响

青蒿素及其衍生物成为**青蒿素类复方疗法（ACTs）**的基础，目前是世界卫生组织推荐的**世界疟疾治疗标准**。这些疗法起效快、疗效高，**在全球范围内**挽救了**数百万人的生命**，尤其是撒哈拉以南非洲地区的儿童。

因为这一成就，屠呦呦获得了 **2015 年诺贝尔生理学或医学奖**--第一位获得诺贝尔科学奖的中国女性。重要的是，她将这一突破归功于传统医学智慧与现代科学的结合。

传承

- **拯救了数百万人**：自从青蒿素综合疗法成为标准疗法以来，死于疟疾的人数大幅减少。
- **融合传统**：屠呦呦的工作表明，如果对古代知识进行严格研究，它们也能引发现代医学革命。
- **坚持不懈的典范**：她默默耕耘，不求名利，常常在充满挑战的条件下工作，但她的发现却永远改变了全球健康。

屠呦呦常被称为 "三无科学家"：**无博士学位、无留学经历、无中国科学院院士**--但她的发现却成为 20 世纪最重要的医学突破之一。