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EDITORIAL

Nobel Prize in Physiology or Medicine for 2015

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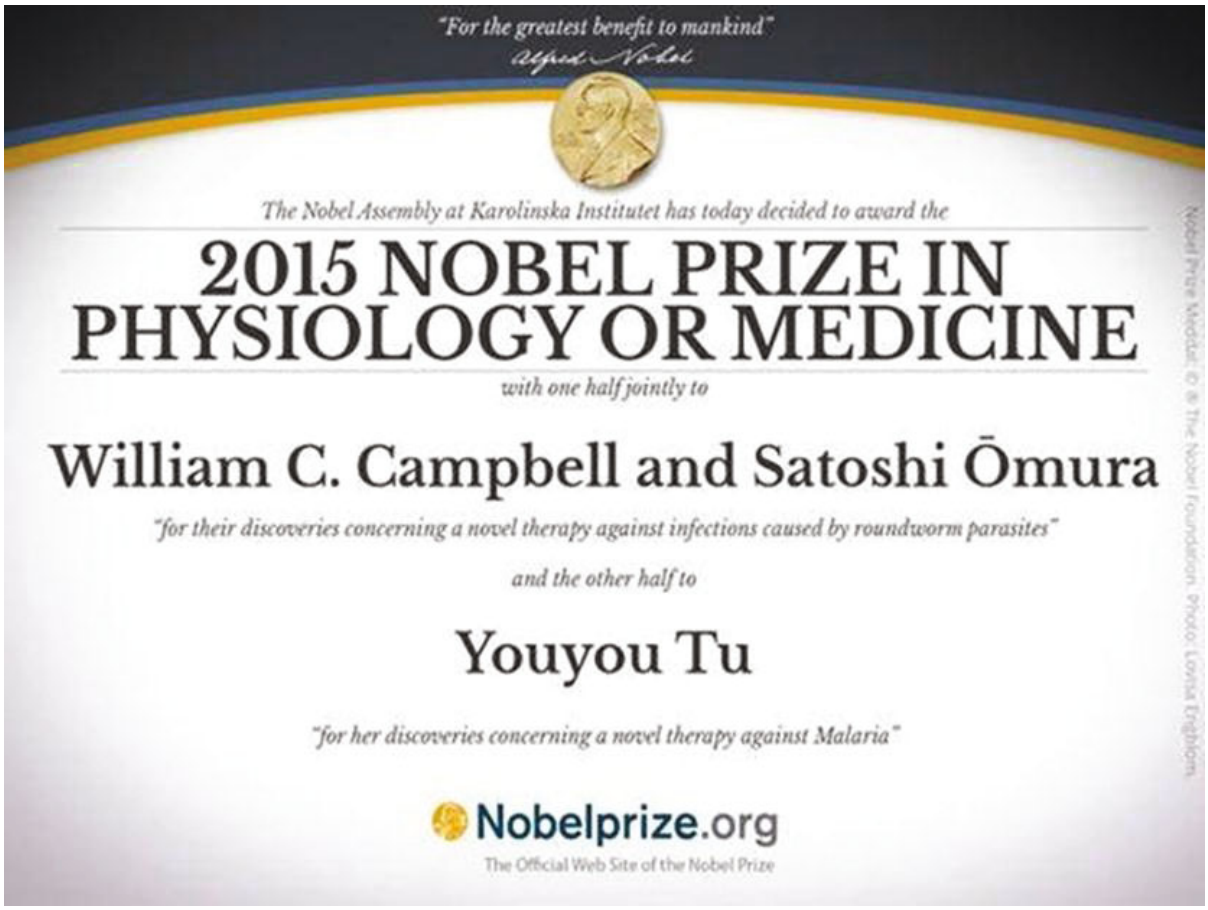
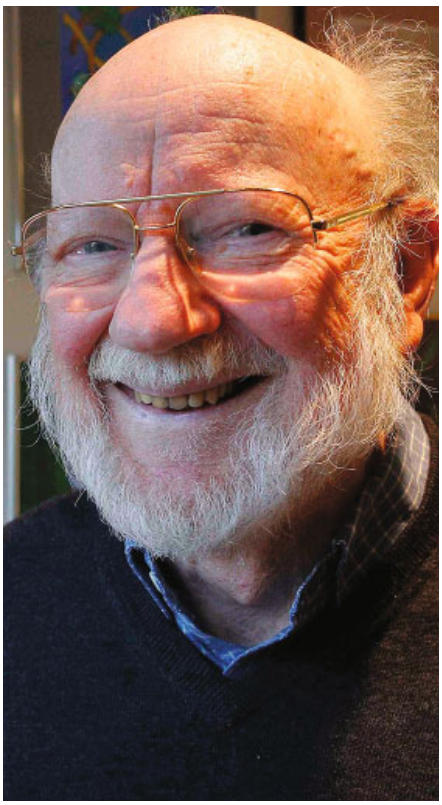
In 2015 the Nobel Prize in Physiology or Medicine has been awarded to three outstanding scientists, namely to Satoshi Ōmura and William C. Campbell "for their discoveries concerning a novel therapy against infections caused by roundworm parasites" who shared the Nobel Prize with Chinese scientist Youyou Tu "for her discoveries concerning a novel therapy against malaria".



Prof. Satoshi Ōmura is a biochemist working as the head of the Antibiotics Research Group at Kitasato University in Japan. He led the team of scientists who during the intensive screening programme of compounds, from natural sources, isolated the **avermectins** (Egerton *et al.*, 1979). Eight active components of avermectins were isolated from the broth of lower terrestrial organism originated in soil samples. The original strain was classified as a new species of actinomycetes (bacteria) and named *Streptomyces avermectinius* (formerly *Streptomyces avermitilis*) (Takahashi *et al.*, 2002). Avermectins activate parasite-specific glutamate-gated chloride channel (Ōmura, 2002), what leads to the neurological disruption of the parasite. Although avermectins also bind to the γ-aminobutyric acid-gated (GABA) and glycine-gated chloride channels in mammals their affinity for invertebrate receptors is more than 100-times higher. Later in collaboration with Prof. W.C. Campbell, working in US-based Merck Pharmaceutical Company, they developed a derivate of avermectin known as **ivermectin**. It was introduced to the market as a broad spectrum veterinary anthelmintic for the control of endogenous and exogenous parasites in livestock and pets. Subsequently it was found that ivermectin is safe and very effective also for human use. Due to its specific nematocidal activity it is widely used to eliminate infections in patients suffering from devastating parasitic diseases.

Dr. William Campbell is an Irish-born parasitologist at Drew University in New Jersey. In 1987 Dr. Campbell spearheaded the Merck decision to distribute drug ivermectin free to the millions of poor people, especially in tropical areas. This very effective nematocidal anthelmintic and drug is usually given once or two times per year. It was one of the first leading examples of a public - private partnership in international health. Currently, the ivermectin is used in eradication programmes coordinated by the World Health Organization for two devastating tropical diseases - Onchocerciasis and Lymphatic filariasis (Bockarie *et al.*, 2013; Keenan *et al.*, 2013). The other major contribution of Dr. Campbell to the parasitology field is *Trichinella and Trichinosis* book (Campbell, 1983). This publication assembled the contributions of the best specialists on the topic at the time and is still considered as an important reference.



Prof. Youyou Tu who was educated and carried out research exclusively in China discovered one of the most effective treatments for malaria while working on a secret military project during China's Cultural Revolution (Miller & Su, 2011). During the war between the North and South Vietnam malaria caused by chloroquine-resistant *Plasmodium falciparum* was a major problem that spurred research efforts on both sides of the battlefield. In China the main goal of the research project, headed by Prof. Youyou Tu, was to discover new antimalarial drugs by searching recipes and practices of traditional Chinese medicine. On rodent malaria model more than 200 recipes with Chinese traditional herbs and 380 extracts from the herbs (Tu, 1981) were tested. The most promising results were achieved with the extracts from *Artemisia annua* L. (Qinghao), a type of wormwood native to Asia. Antiparasitic activity was attributed to the unique bioactive sesquipene lactone with an endoperoxide bridge called artemesinin which was found in the high concentrations in *Artemisia annua*, *A. vulgaris* and *A. absinthium.* It is believed that activity of artemisinin is released when the endoperoxide bridge is open. Thus giving rise to peroxide molecules which are the source of reactive oxygen species (Olliaro *et al.*, 2001). Within the next decade the other semi-synthetic derivatives such as artemether, arteether and artesunate were prepared from the parent compound. Discovery of artemisinin proved to be an improvement over chloroquine which had become far less effective due to developed parasite resistance. At the present, artemisinin-based combination therapy is considered as the best available treatment for malaria and some other protozoan parasites.

As stated by the Nobel committee: "The two discoveries (avermectin and artemisinin) have provided humankind with powerful new means to combat these debilitating diseases that affect hundreds of millions of people annually. The consequences in terms of improved human health and reduced suffering are immeasurable."

Congratulations to all Nobel laureates for their great achievements.
You are remarkable inspiration for the present and future generations of parasitologists.

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The photographs were retrieved from The Guardian: http://www.theguardian.com/science/2015/oct/05/william-c-campbell-satoshi-omura-and-youyou-tu-win-nobel-prize-in-medicine