Nobel Prize for the discovery of natural product-derived drugs

The Nobel Prize for Medicine 2015 was awarded for the discovery of two natural products that brought breakthroughs in the therapy of tropical parasitic diseases. Youyou Tu received the prize for her discovery of the anti-malarial compound artemisinin, and William C. Campbell and Satoshi Ōmura for their discovery of the avermectins as potent anthelminthics.

The discovery of artemisinin as an exquisitely potent antimalarial compound from the traditional Chinese herb *Artemisia annua* demonstrates the potential ethnomedicine-based drug discovery, and the importance of plant-derived drugs. Artemisinin has unique structural features, such as rare trioxan and peroxide substructures that are essential for the activity. Artemisinin derivatives were brought into the clinic in the 1990s. Artemisinin-based combination therapies (ACTs) are today a main pillar for the treatment of malaria. Artemisinin is also remarkable in another sense, as it was one of the plant derived compounds to be produced in an industrial semi-biotechnological process. It is more than justified to say that artemisinin opened the door to metabolic engineering of plant-derived natural products.

The avermectins were isolated by Satoshi Omura from a soil streptomycete. The semi-synthetic ivermectine was subsequently developed as a veterinary anthelminthic, before being introduced as a drug for human use. Ivermectine is a broad-spectrum antiparasitic agent which is highly effective for the treatment of onchocerciasis (river blindness) and strongyloidiasis.

The Society for Medicinal Plant and Natural Product Research (GA) congratulates the Nobel Prize Winners for their breakthrough discoveries! We are proud that two of them selected Planta Medica, the official journal of GA, as a medium for reporting some of their important findings. Youyou Tu published some of her seminal work on *Artemisia annua* and peroxidic lactones in Planta Medica [1], and Satoshi Omura some of his later work [2-6].

1. Tu YY, Ni MY, Zhong YR, Li LN, Cui SL, Zhang MQ, Qang WZ, Hi Z, Li XT: Studies on the Constituents of *Artemisia annua* Part II. **Planta Medica 1982**;44:143-145 www.thieme-connect.com/products/ejournals/pdf/10.1055/s-2007-971424.pdf
2. SugawaraA, Kimishima A, Takada H, Hirose T, Matsumaru T, Ōmura S, Sunazuka T: Toward the Total Synthesis of Luminamicin, a Specific Anti-Anaerobic Bacteriacide. **Planta Med 2013**;79:CL19 www.thieme-connect.de/products/ejournals/abstract/10.1055/s-0033-1348544
3. Ichino C, Kiyohara H, Soonthornchareonnon N, Chuakul W, Ishiyama A, Sekiguchi H, Namatame M, Otoguro K, Omura S, Yamada H: Antimalarial Activity of Biflavonoids from *Ochna integerrima.* **Planta Med 2006**;72:611-614 www.thieme-connect.de/products/ejournals/html/10.1055/s-2006-931569

4. Nunome S, Ishiyama A, Kobayashi M, Otoguro K, Kiyohara H, Yamada H, Omura S: *In Vitro* Antimalarial Activity of Biflavonoids from *Wikstroemia indica.* **Planta Med 2004**;70:76-78 www.thieme-connect.de/products/ejournals/html/10.1055/s-2004-815462

5. Yamada H, Otsuka Y, Ōmura S: Structural Characterization of Anti-Complementary Polysaccharides from the Leaves of *Artemisia princeps.* **Planta Med 1986**;52:311-314 www.thieme-connect.de/products/ejournals/abstract/10.1055/s-2007-969162

6. Yamada H, Ohtani K, Kiyohara H, Cyong JC, Otsuka Y, Uneo Y, Omura S: Purification and Chemical Properties of Anti-complementary Polysaccharide from the Leaves of Artemisia princeps. **Planta Med 1985** www.thieme-connect.de/products/ejournals/pdf/10.1055/s-2007-969424.pdf