Biologists name a newly discovered threadworm after physicist Max Planck

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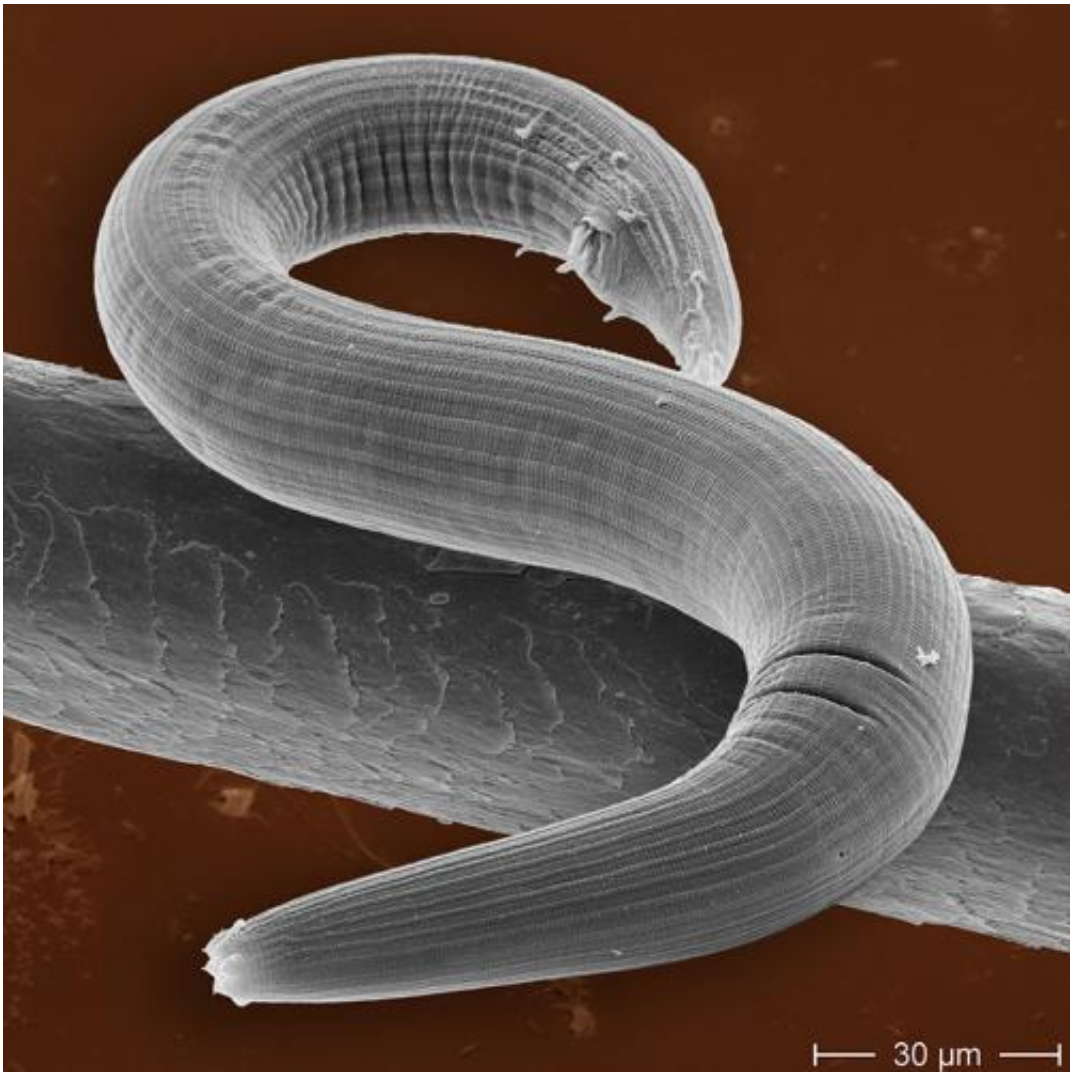

The nematode Pristionchus maxplancki can change the shape of its mouth depending on the form of its nourishment. Credit: MPI for Developmental Biology

An unusual posthumous honour for physicist Max Planck: Biologists in Tübingen working with Ralf J. Sommer have named a newly discovered nematode after the German Nobel laureate. Pristionchus maxplancki is thus the first species to carry the name of the scientist, who died in 1947. The discovery from the Far East is assisting the researchers of the Max Planck Institute for Developmental Biology to attain new insights and knowledge about the many interdependencies between evolution, genetics, and ecology.

When Japanese biologist Natsumi Kanzaki and his German colleague Matthias Herrmann collected a stag beetle from an oak forest in Fukushima province, they had no idea at the time about the surprise the impressive insect concealed: a microscopic threadworm, completely unknown to the zoologists until then, was hidden on the beetle's body.

The official name Pristionchus maxplancki was bestowed on the new discovery in honour of theoretical physicist Max Planck (1858 – 1947). The worm, only a millimetre long, becomes the first organism to carry the name of the Nobel laureate from Göttingen.

At Herrmann's main laboratory at the Tübingen-based Max Planck Institute for Developmental Biology, Ralf Sommer leads a Research Group for integrative evolutionary biology that focuses exclusively on the inconspicuous invertebrates of the genus Pristionchus. Biologist Erik Ragsdale is also part of this Group. His assignment in the project was to identify and characterise the mouth tools of the Pristionchus species.

Working together with Kanzaki, who conducts research at a forestry institute northeast of Tokyo, Sommer's team carried out a series of experiments on the surprising discovery from the Far East and were able to prove beyond any doubt that the Asian worm was not identical to any known species of the genus. The researchers recently published the results of these investigations in the scientific journal *Zoological Science*;

with publication, the name Pristionchus maxplancki enters the official annals of zoology.

Sommer had originally brought back another representative of the genus, Pristionchus pacificus, to the MPI in Tübingen following a research residency in the USA in order to study the developmental phases – from the egg, through the larval stages, to the fully-grown animal. In the meantime, specialists from a spectrum of disciplines here began to closely examine the entire Pristionchus genus. Geneticists, ecologists, neuroscientists, and bio-information scientists are investigating the threadworms from each of their highly specialised perspectives, but with the common goal of understanding the evolutionary relationships, free from the often-narrow bounds in the biological sub-disciplines.

The scientists are paying particular attention, for example, to the shapes of the mouths, of which there are two clearly differentiated variants for every Pristionchus species - narrow and long, or broad and short. It is not the genes that determine whether an individual worm evolves with a narrow or a broad mouth, but rather environmental influences and available food supply. The newly discovered P. maxplancki also occurs in both of these forms, but displays several additional characteristic features in its oral cavity. Erik Ragsdale is now hoping "that P. maxplancki will finally reveal more to us about the role of the different mouth tools during the complex life cycle."

To this effect, the researchers are searching for knowledge beyond the boundaries of their Petri dishes populated by the worms. This is because representatives of the Pristionchus genus live in close association with various species of beetles. The worms do not harm their hosts through this association, they simply hold out in a dormant state until the beetle dies. These hitchhikers and their numerous progeny then nourish themselves from the cadaver of the beetle and from the fungi and bacteria that grow on the insect's remains insect. This lifestyle has

evidently favoured the broad spreading of the inconspicuous little creatures, as examples of Pristionchus in the Tübingen worm zoo come from discovery sites on all of the continents.

Sommer's associate Matthias Herrmann, a specialist in biogeography and a tireless explorer and collector, would therefore like to know where the original habitat of the genus lies, and how it conquered the world. The new discovery from Japan is providing important leads here as well: genetic trees constructed with DNA data from P. maxplancki together with an additional, newly discovered species, suggest that the origin of the genus lies in Southeast Asia and thus in the habitat of P. maxplancki. Accordingly, Pristionchus spread from there throughout the entire world – possibly piggybacked on invasive beetle species.

Over the coming years, the Tübingen-based team wants to learn in detail how the complex life cycle, the variety of forms of the worms, and their global spread are connected – and thereby understand how evolution continues to produce new forms through the interplay of external and internal influences, of habitat and genes.

Max Planck constantly emphasised the importance of exact observations and precise inspection as the actual core of scientific work. In that regard, it is also completely appropriate for a worm living in concealment, yet illuminating fundamental processes of nature to keen-eyed observers, to now be named after him.

More information: Two New Species of Pristionchus (Nematoda: Diplogastridae) Support the Biogeographic Importance of Japan for the Evolution of the Genus Pristionchus and? the Model System P. pacificus. *Zoological Science* 30, August 2013. DOI: 10.2108/zsj.30.000

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