



HOKKAIDO UNIVERSITY

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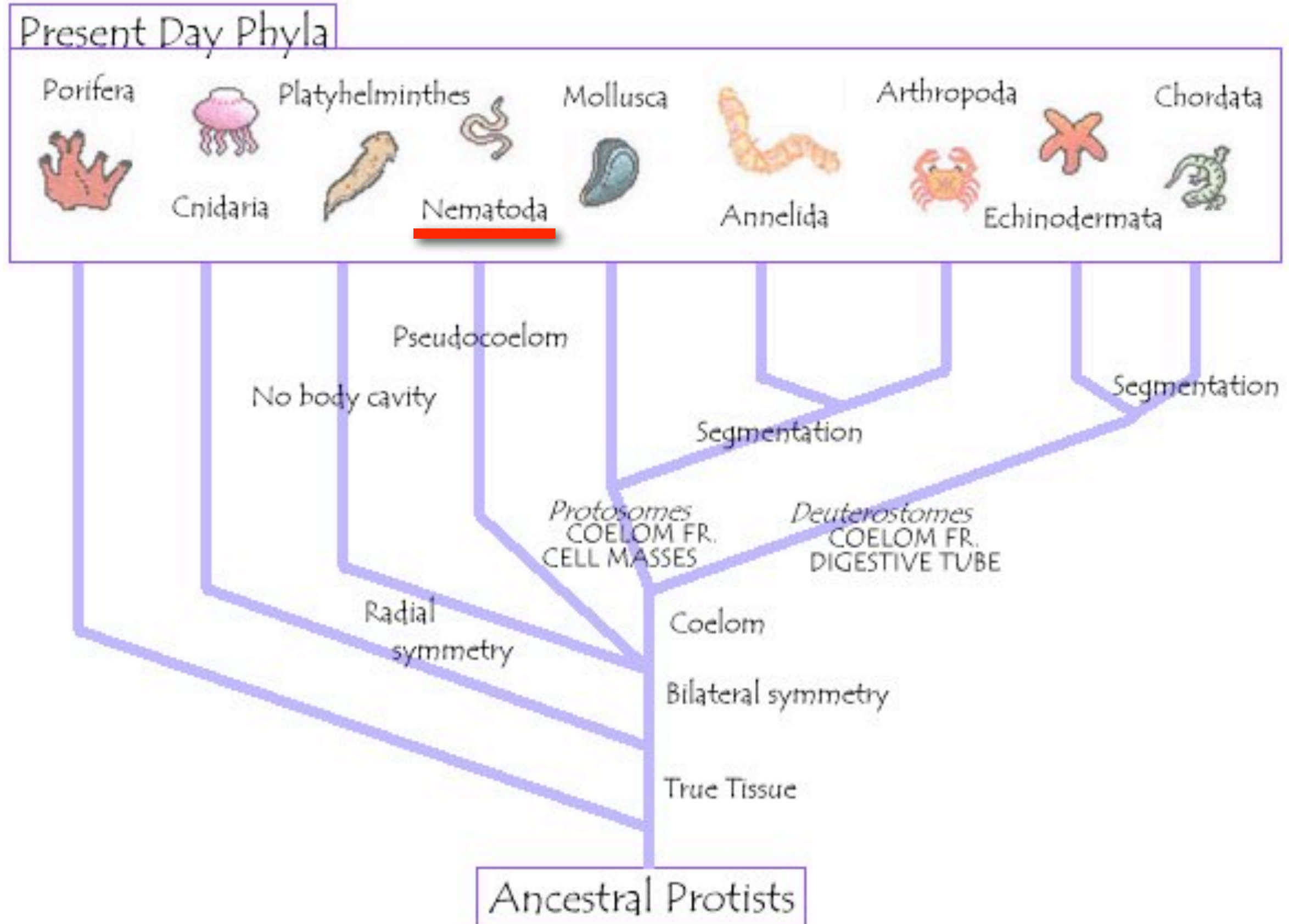
Investigating the parasitic interaction between root-knot nematodes and plant root cells

Yosuke Maruyama, Takashi Ikeno, Derek Goto

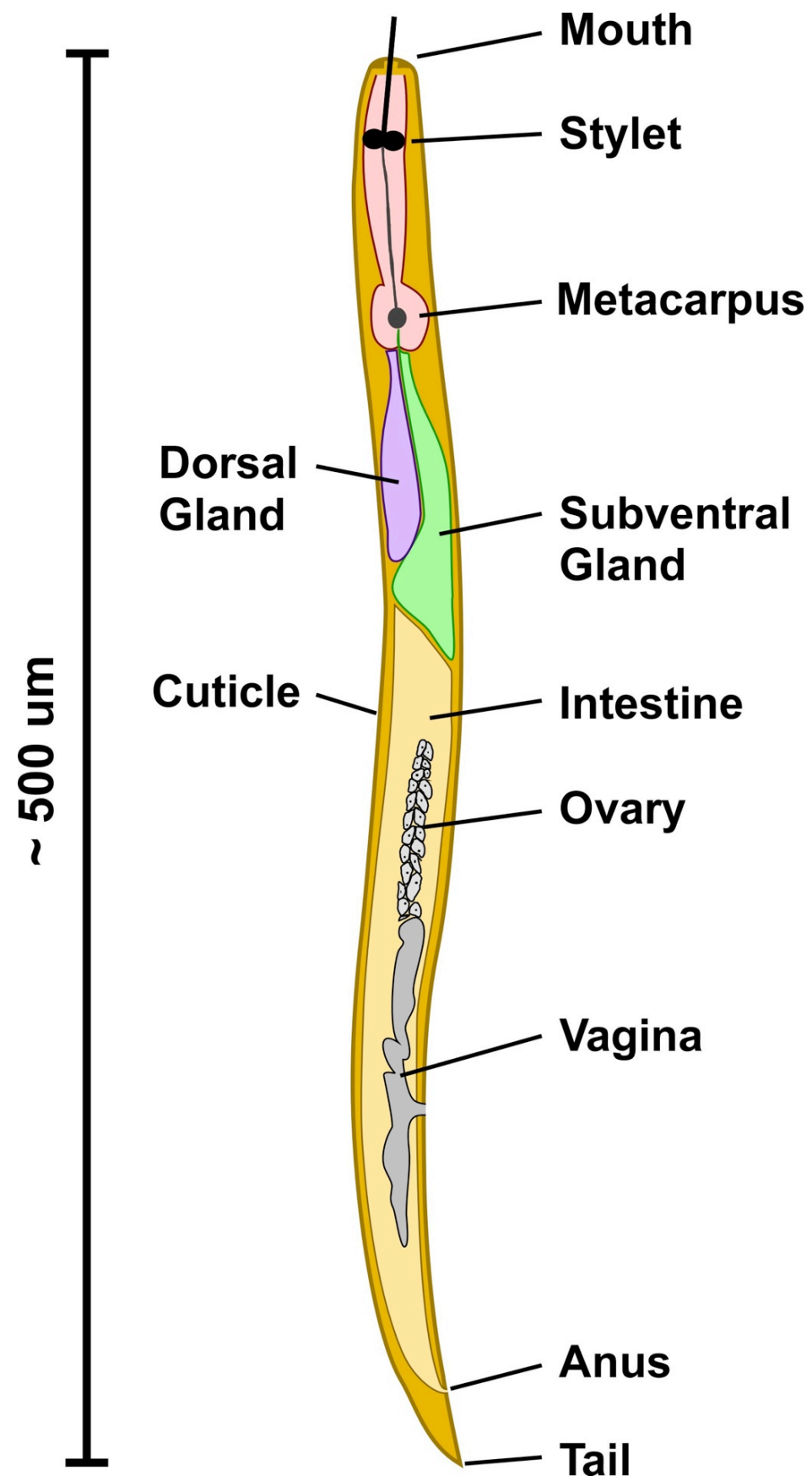
Creative Research Initiative Sousei,
Hokkaido University, Sapporo Japan

<http://gotolab.cris.hokudai.ac.jp>

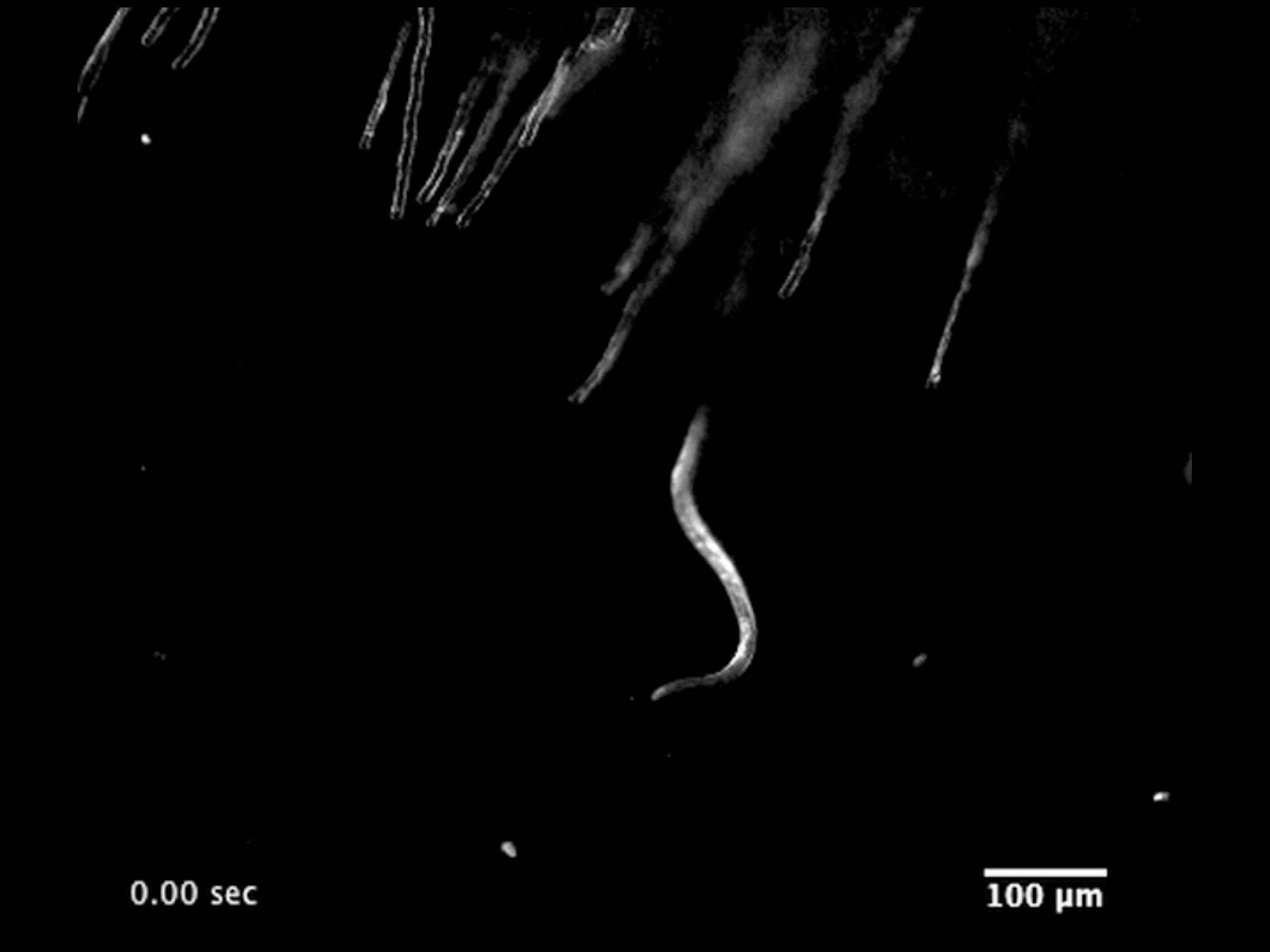
Nine major animal phyla (approx. 35 in total)



Root-knot nematodes: Sedentary endoparasites



Infective J2 stage juvenile



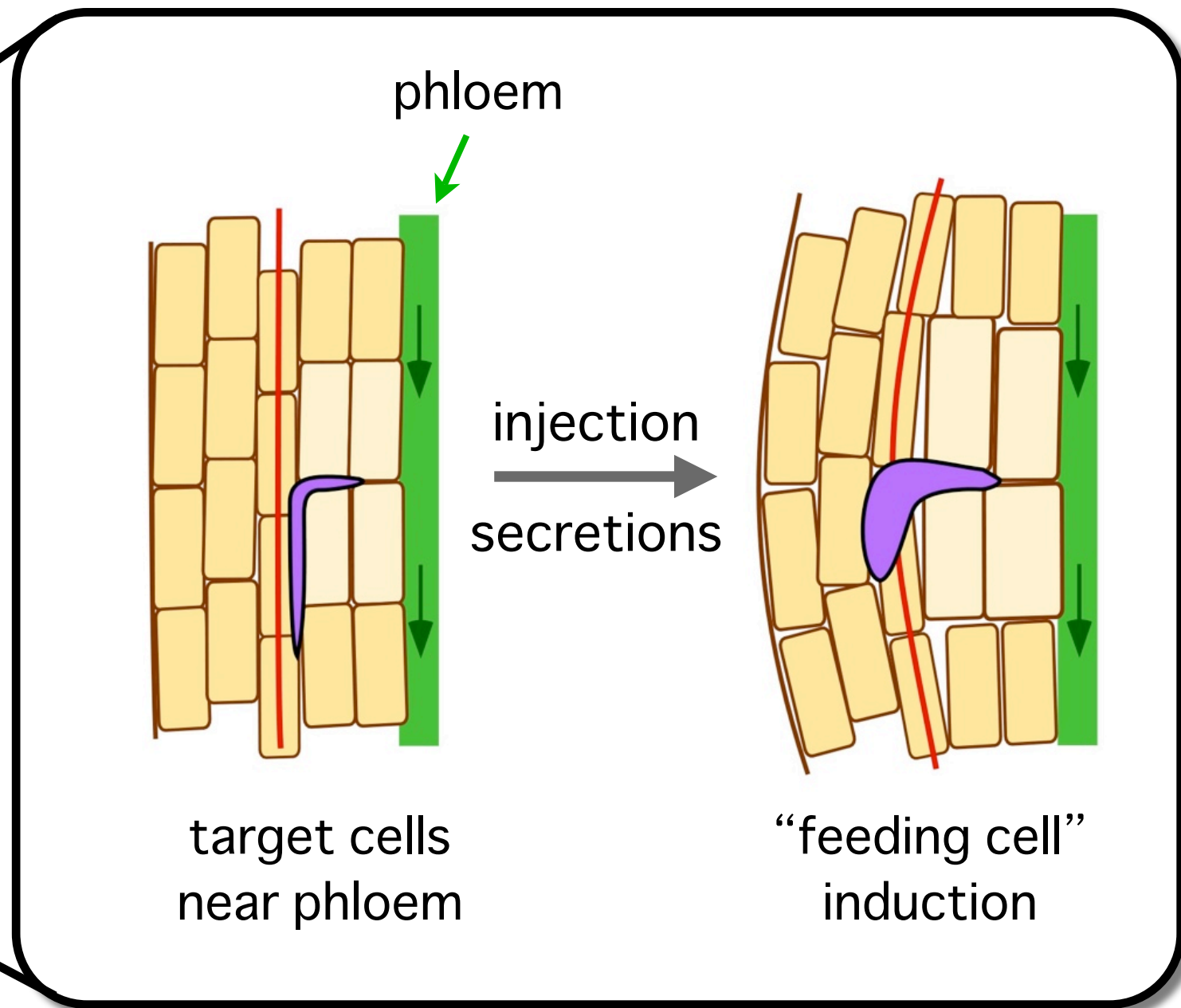
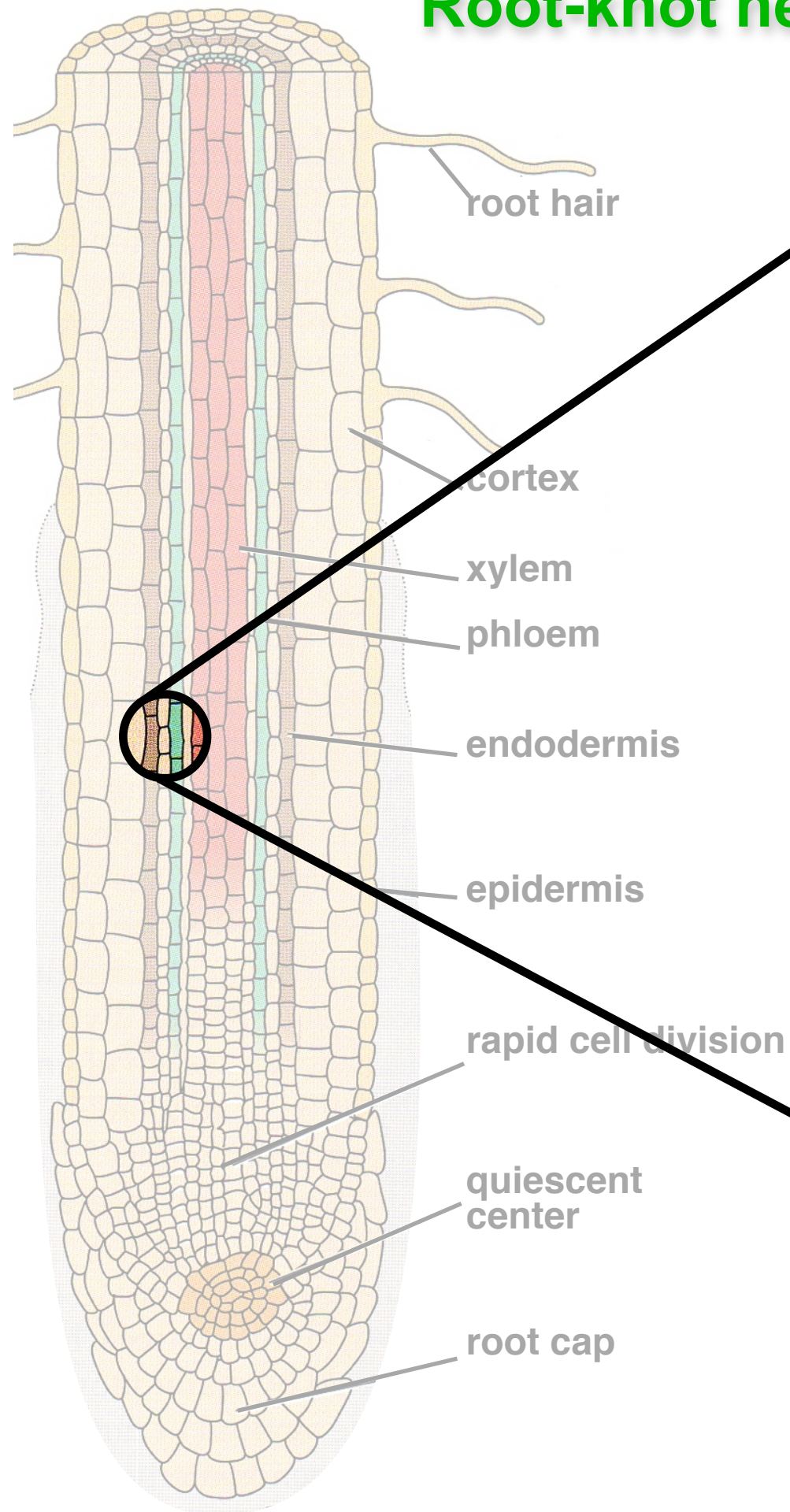
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100 μm

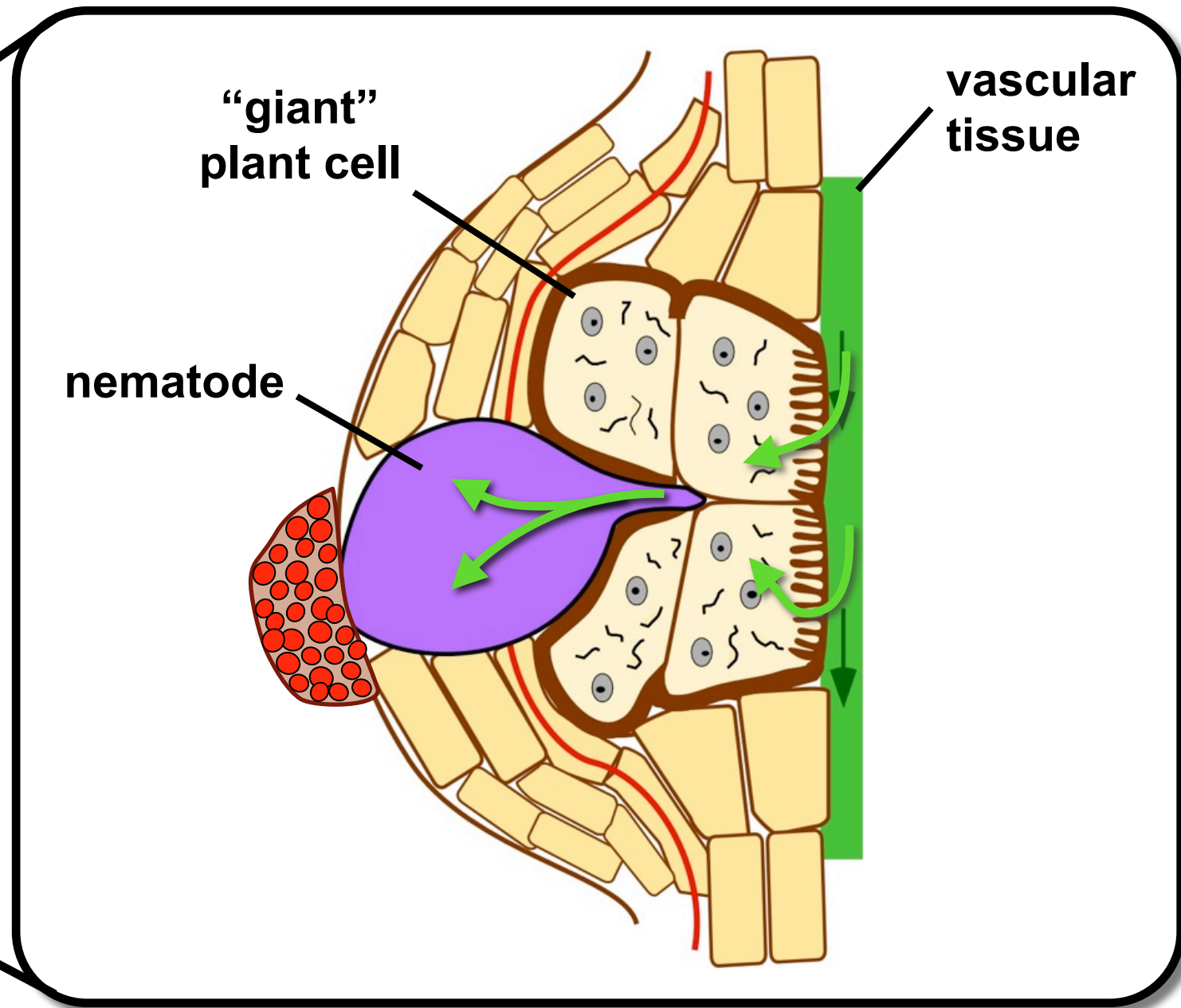
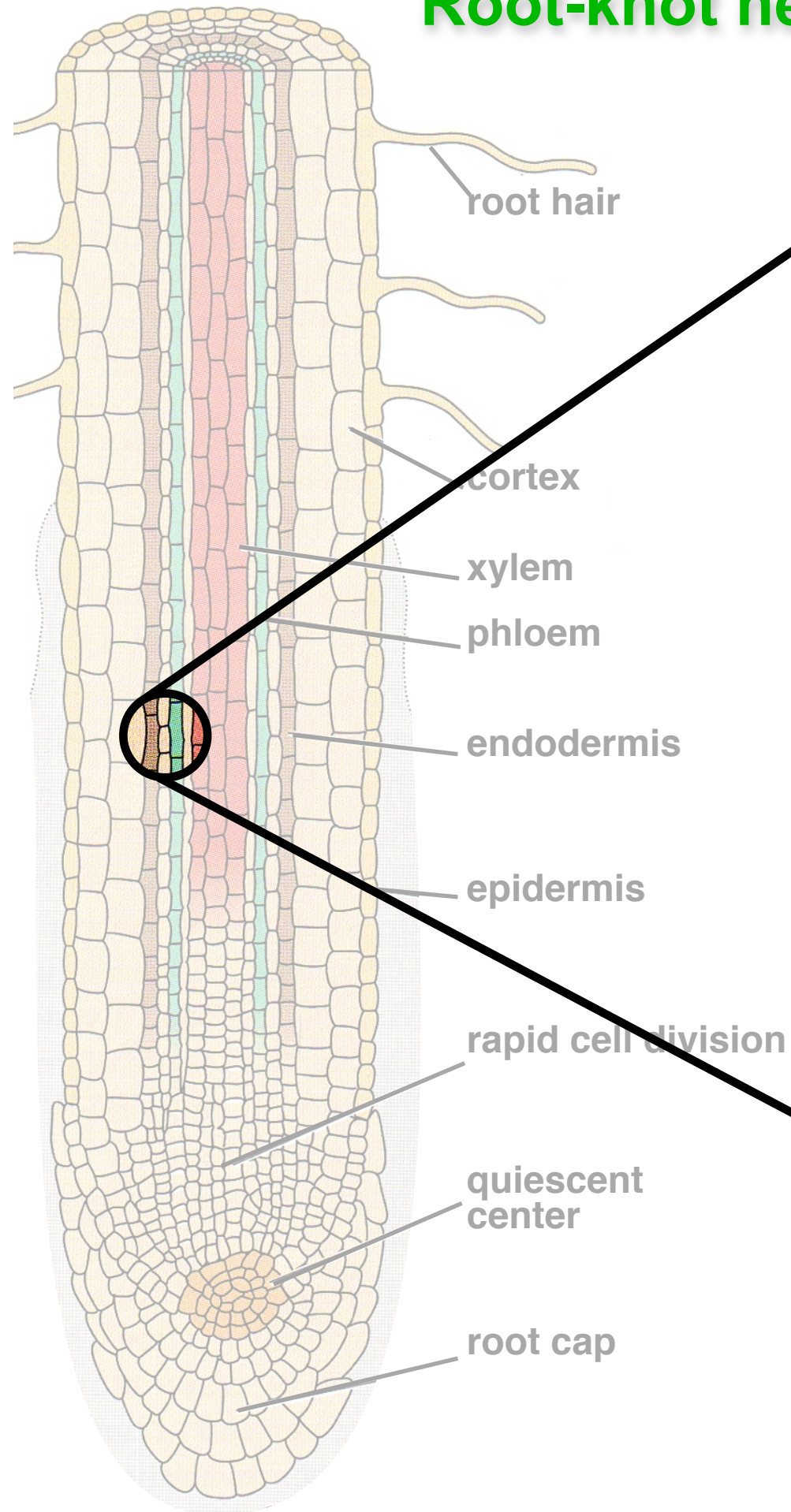


Root-knot nematode invading tomato root
(courtesy of USDA-ARS)

Root-knot nematode feeding cells



Root-knot nematode feeding cells



Root-knot nematode egg mass on tomato root



Root-knot nematodes

Responsible for loss of approximately
5% of agricultural crops worldwide

Control methods are limited

Nematocides

- eg. dibromochloropropane, ethylene dibromide, methyl bromide
- **HIGHLY TOXIC:** groundwater contamination, contribute ozone depletion
- Increasingly becoming banned or restricted in many countries



Methyl Bromide application
(www.trical.com)

New, safer control measures are needed

THE JAPAN TIMES • MONDAY, OCTOBER 8, 2007

WORLD NEWS BRIEFS

U.S. approves use of toxic fumigant

Los Angeles Times

LOS ANGELES — Despite the protests of more than 50 scientists, including five Nobel laureates in chemistry, the U.S. Environmental Protection Agency (EPA) on Friday approved use of a new, highly toxic fumigant, mainly for strawberry fields.

The new pesticide, methyl iodide, is designed for growers, mainly in California and Florida, who need to replace methyl bromide, which has been banned under an international treaty because it damages the Earth's ozone layer.

In a letter sent last month to EPA Administrator Stephen Johnson, 54 scientists, mostly chemists, warned that “pregnant women and the fetus, children, the elderly, farm workers and other people living near application sites would be at serious risk.” Methyl iodide is a neurotoxin and carcinogen; in lab animals, it causes thyroid tumors, neurological damage and miscarriages.

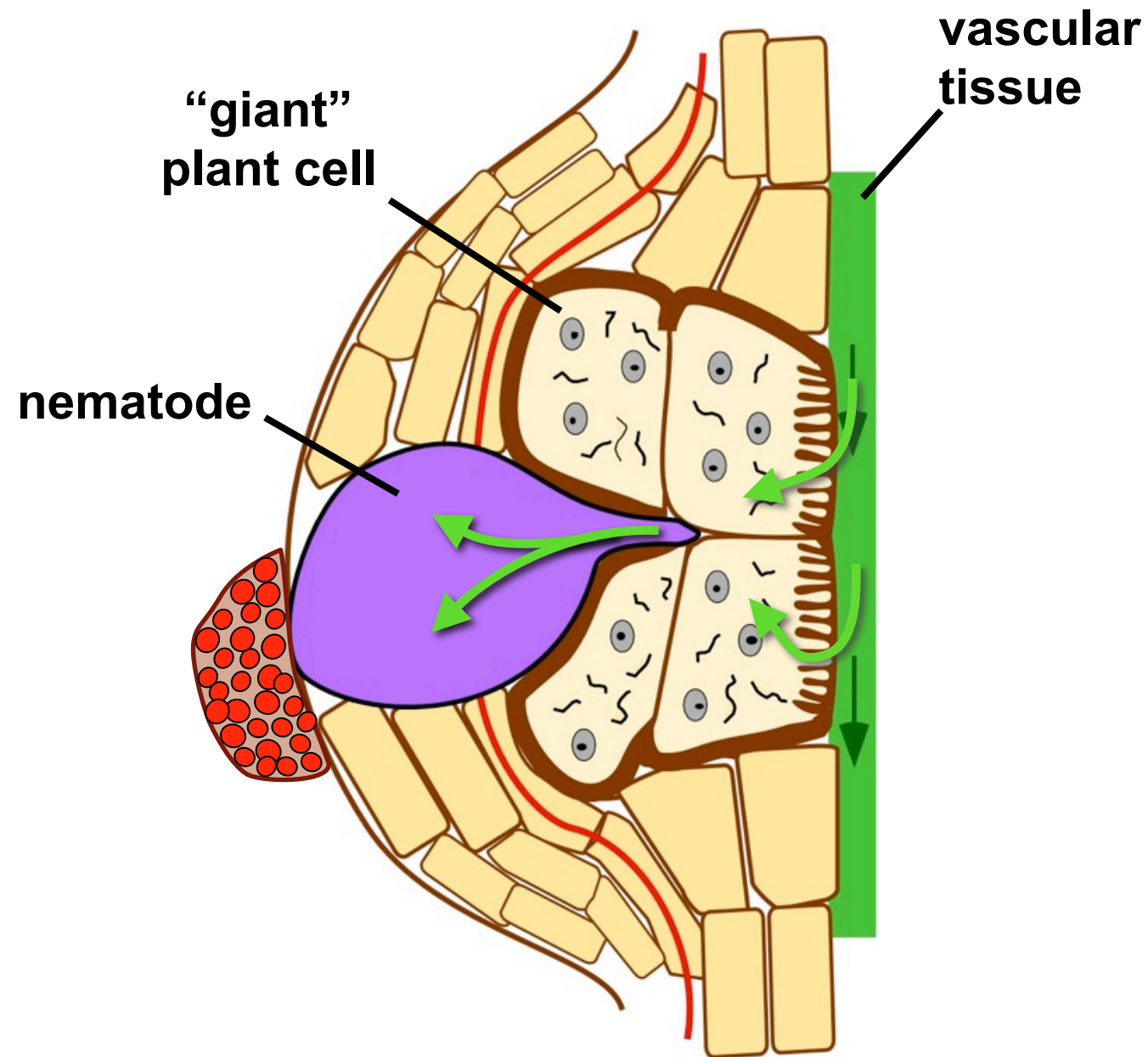
But EPA officials said Friday that they carefully evaluated the risks and decided to approve its use for one year, imposing restrictions such as buffer zones in an effort to protect farmworkers and neighbors.

Growers, particularly those who grow strawberries and tomatoes, have been searching for 15 years for a new soil fumigant to replace methyl bromide. Fumigants are valuable to growers because injections into the soil before planting will sterilize the field and kill a broad spectrum of insects and diseases without leaving residue on crops.

***“...protests of more than 50 scientists...
five Nobel laureates in chemistry...”***

***“...neurotoxin and carcinogen; in
lab animals it causes thyroid
tumors...miscarriages.”***

Root-knot nematode feeding cells



Giant Cells in
"Root-knot"

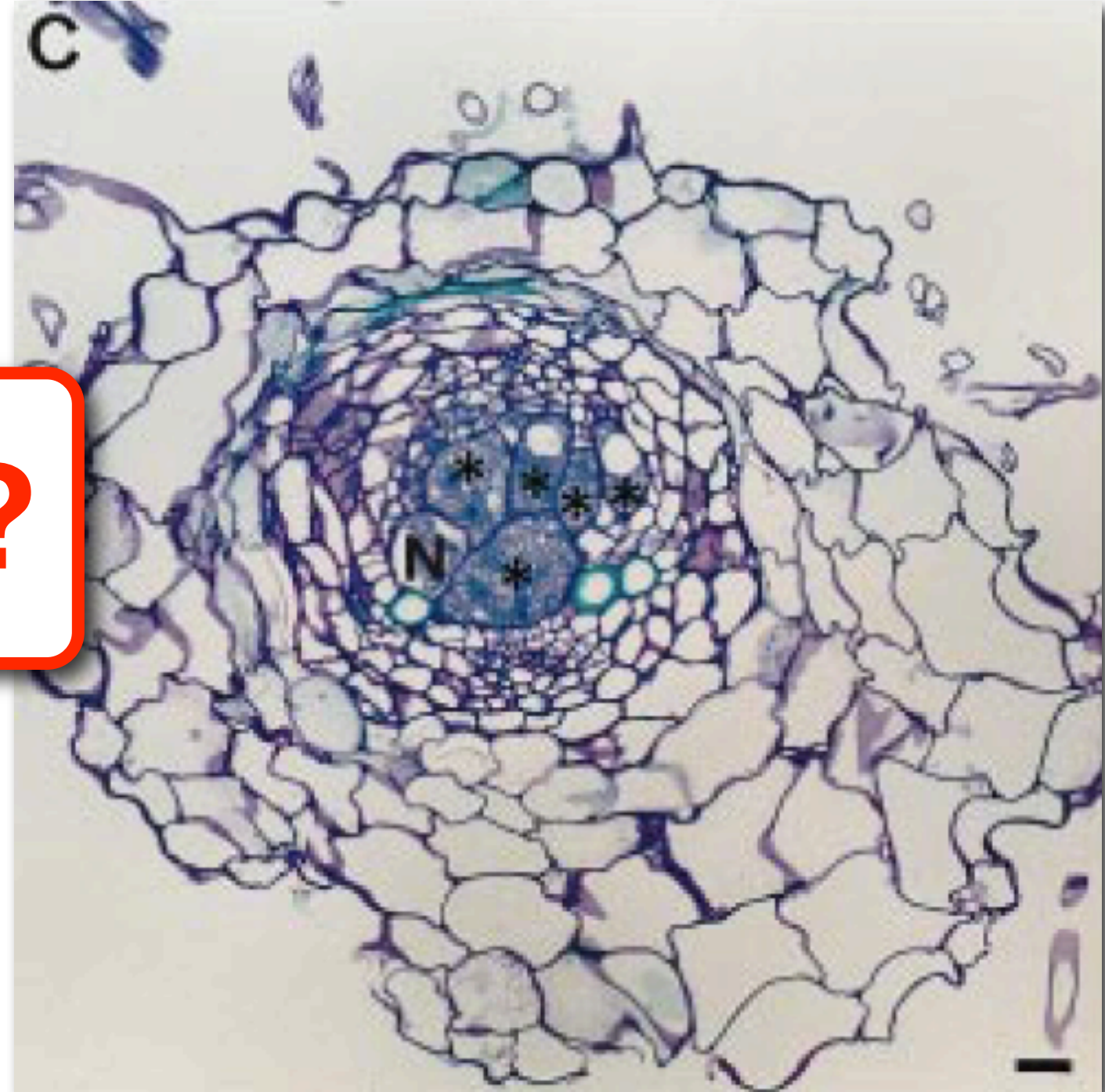
How do normal cells get “reprogrammed”?

WHAT ARE the molecular mechanisms for this reprogramming?

normal root

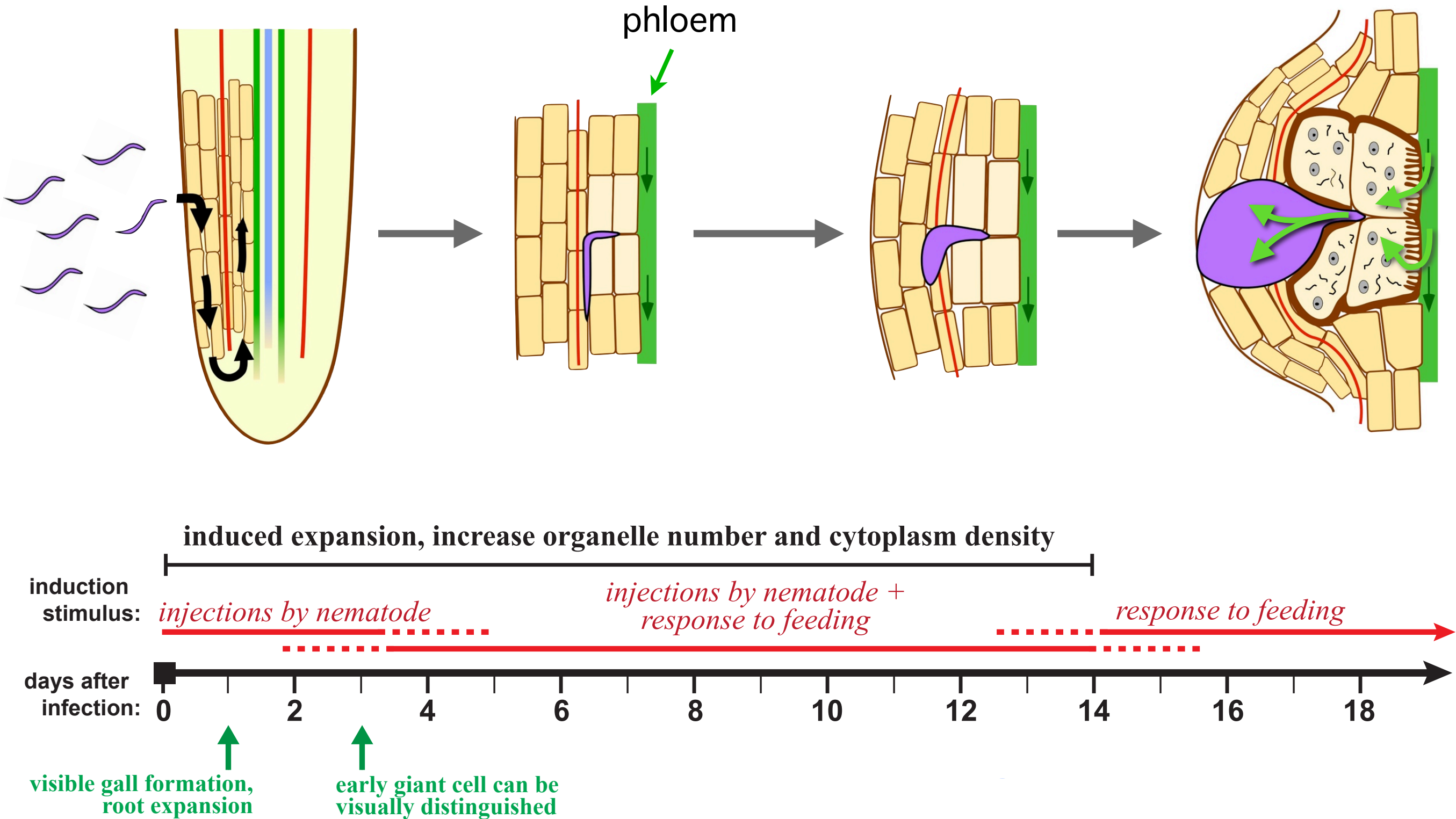


infected root



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Elucidating the infection mechanism



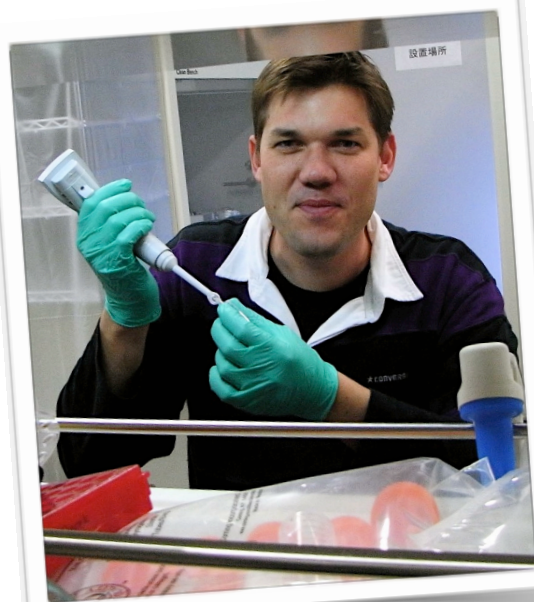
Root-knot nematodes attacking roots in sterile culture



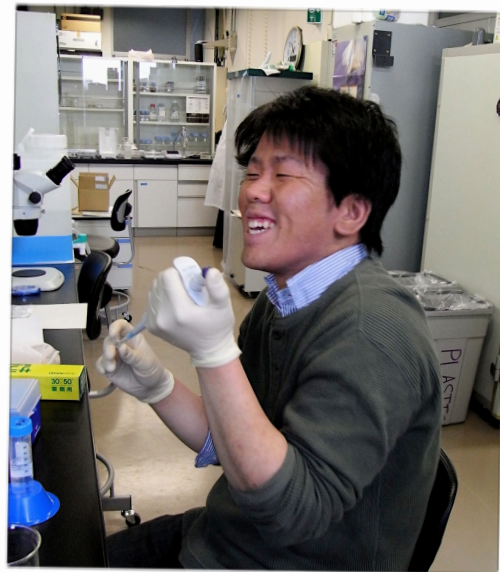
Root-knot nematodes attacking roots in sterile culture



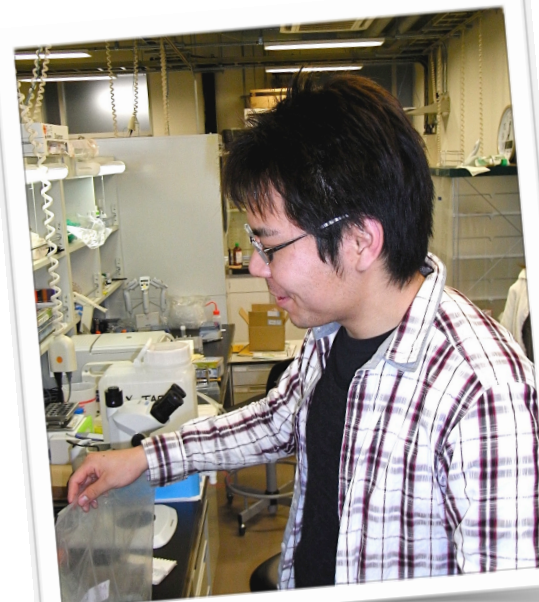
The Goto Lab



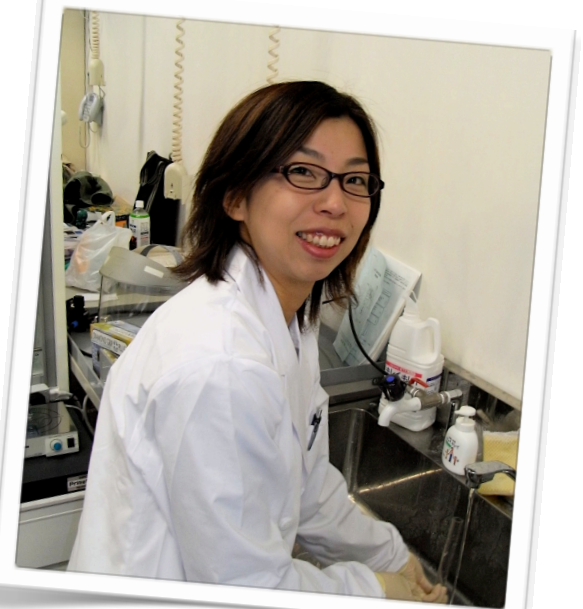
Derek



Yosuke



Takashi



Nao

<http://gotolab.cris.hokudai.ac.jp>