

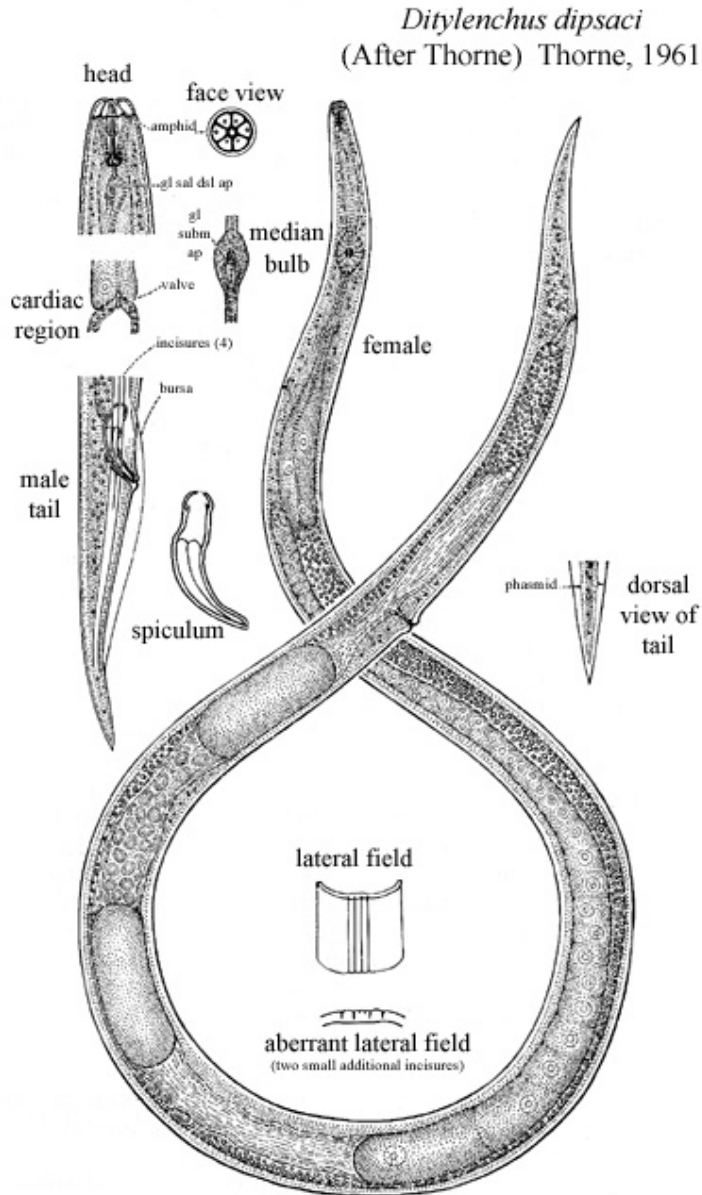


Stem and Bulb
(and seeds and leaves.....)
Nematode

Ann MacGuidwin



THE UNIVERSITY
of
WISCONSIN
MADISON



Common names

Stem nematode

Stem & bulb nematode

Bloat nematode

Anguinidae

Ditylenchus

Anguina

Subanguina

Pseudhalenchus

Pterotylenchus

Chitinotylenchus

Sychnotylenchus

- more than 80 species
- difficult to distinguish morphologically
- many host races
- host range of many “races” overlap

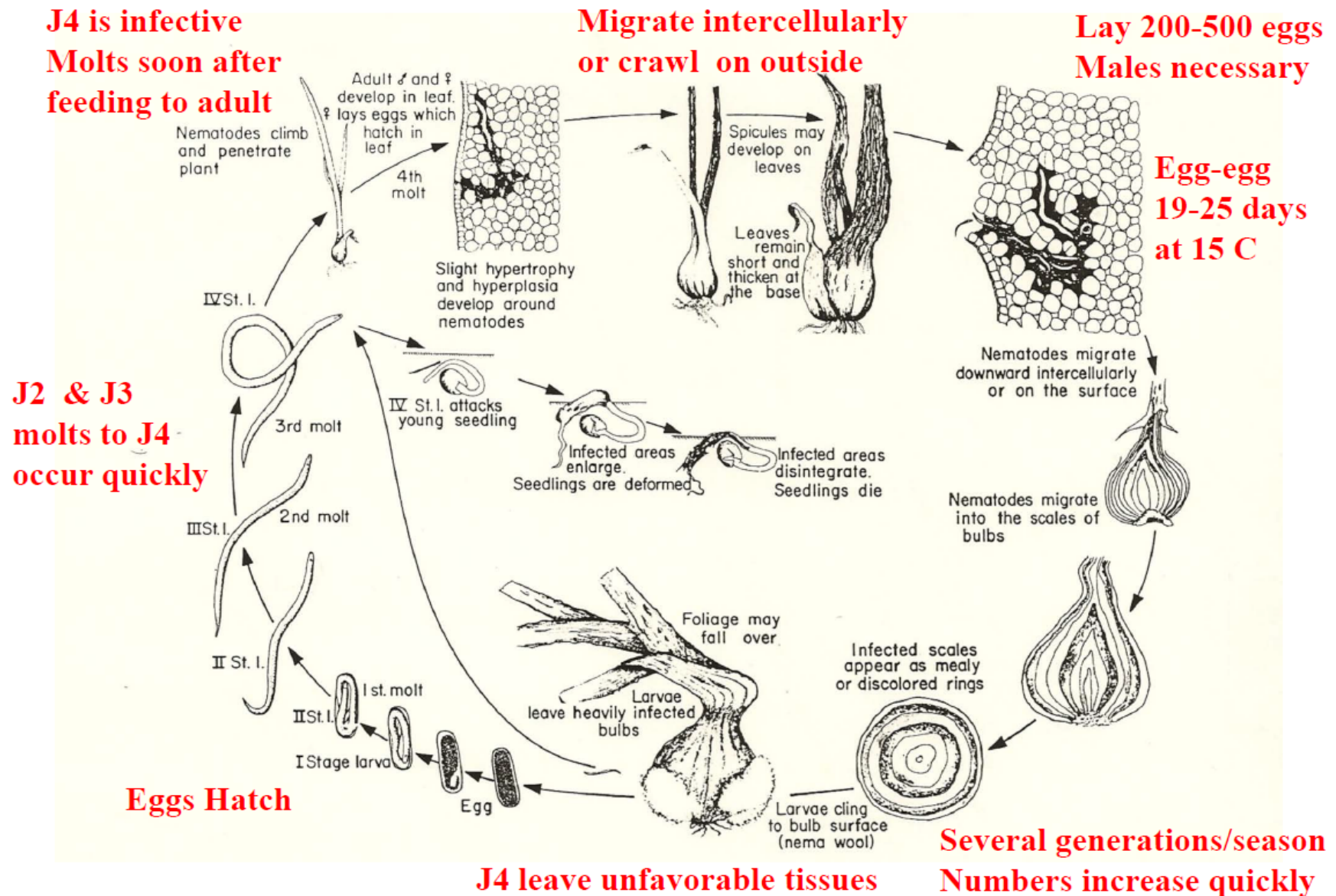
Table 1. Host range of the two tested *Ditylenchus dipsaci* populations

	Onion	Garlic	Leek	Spinach	Chicory
Population from chicory	0	1	0	1	2
Population from garlic	2	2	0	0	1

0 – no nematodes survived; 1 – only single adult individuals survived; 2 – life cycle of the parasite completed

DOUDA O. (2005): *Host range and growth of Stem and Bulb Nematode (Ditylenchus dipsaci) populations isolated from garlic and chicory. Plant Protect. Sci., 41: 104–108.*

Ditylenchus dipsaci – stem and bulb nematode



***Ditylenchus dipsaci* – stem and bulb nematode**

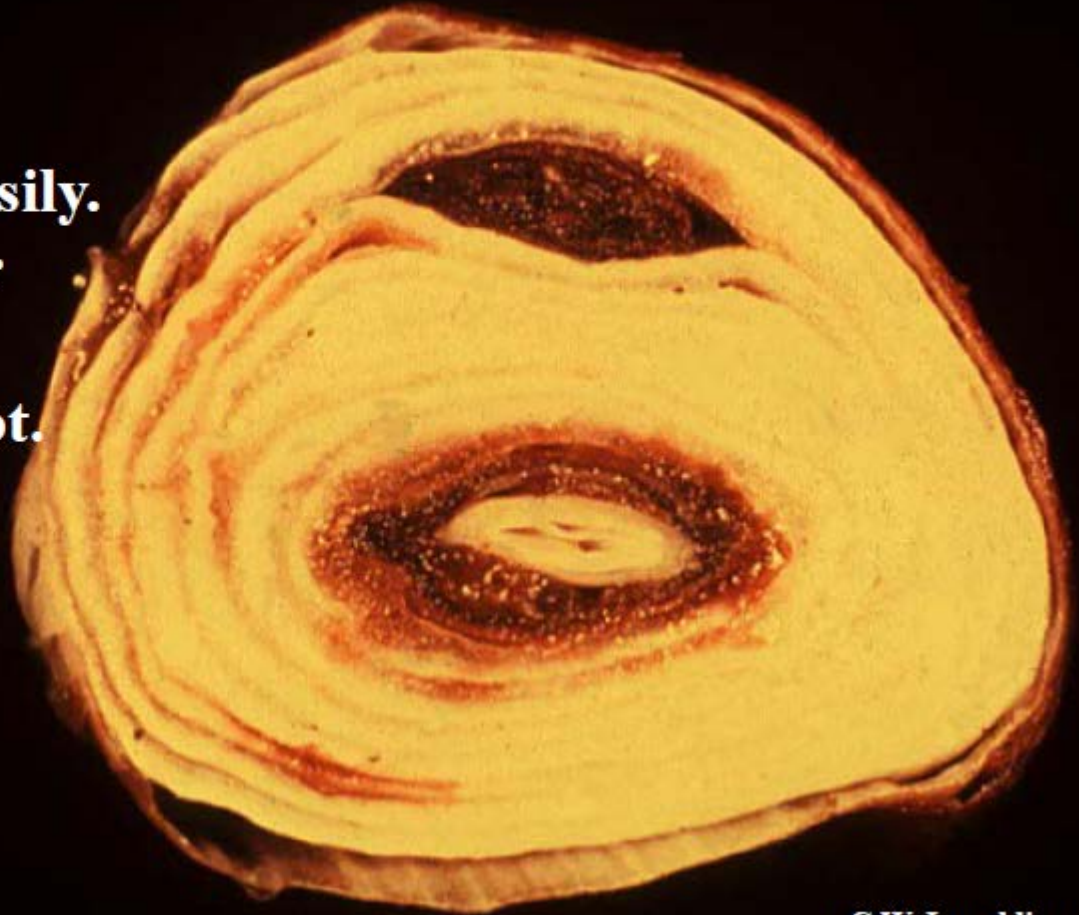
Bulb Symptoms

“Onion Bloat”

Tissues separate easily.

**Bulb may be larger
but not heavier.**

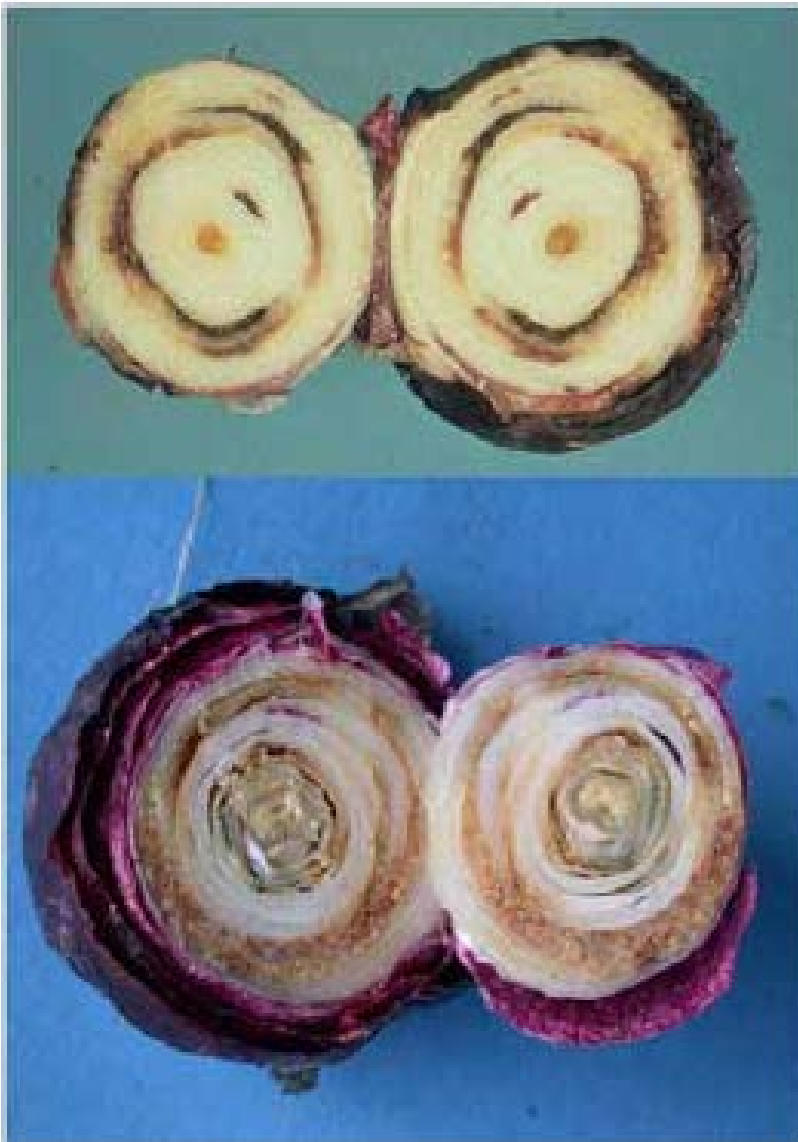
**Individual scales rot.
= brown rings.**



C.W. Laughlin



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LNPV Nematology,, Rennes FT

Source: (top photo) PPO; (bottom photo) BKD

Figure 5-39 Cross Section of *Hyacinthus* Bulbs Showing Discolored Leaf Scales Caused by Infection of *Ditylenchus dipsaci*



G. Abawi, Cornell University



G. Abawi, Cornell University



G. Abawi, Cornell University



Minnesota Department
of Agriculture



absence of roots on the
basal plate

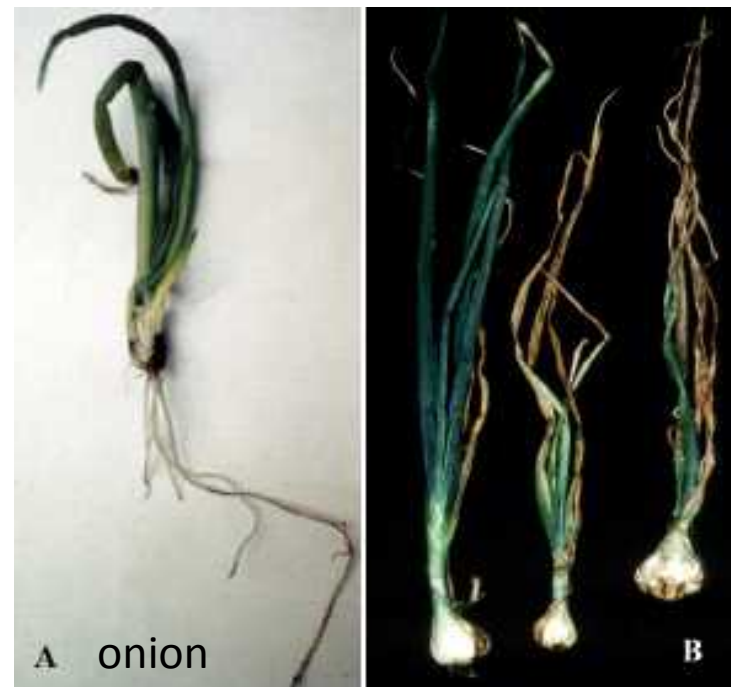


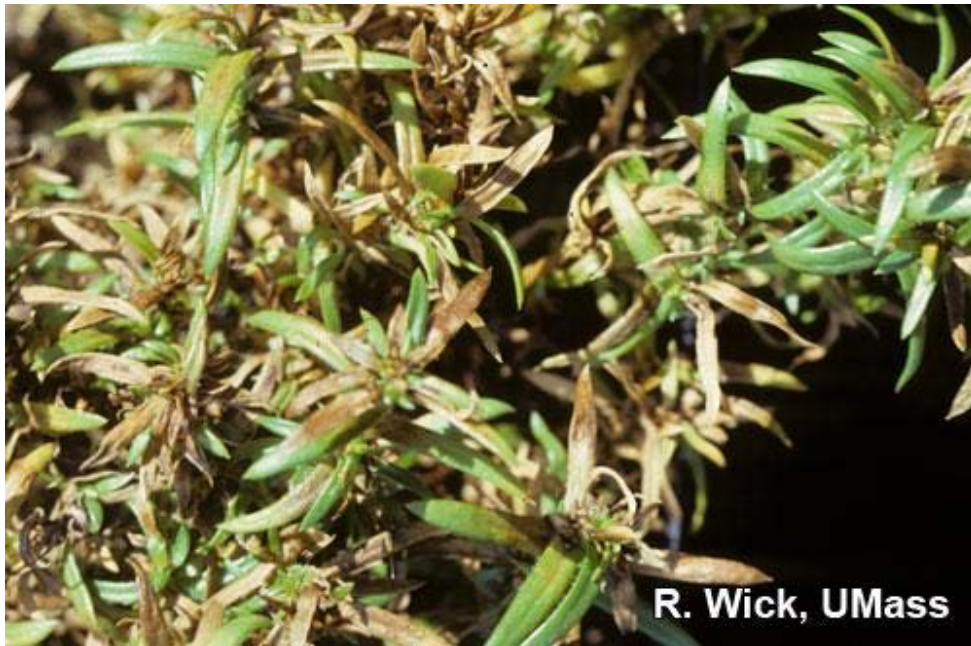
swollen deformed bulbs

chlorosis



twisting





D. dipsaci on phlox
showing necrotic leaves
and twisted stems.



Kathy Merrifield

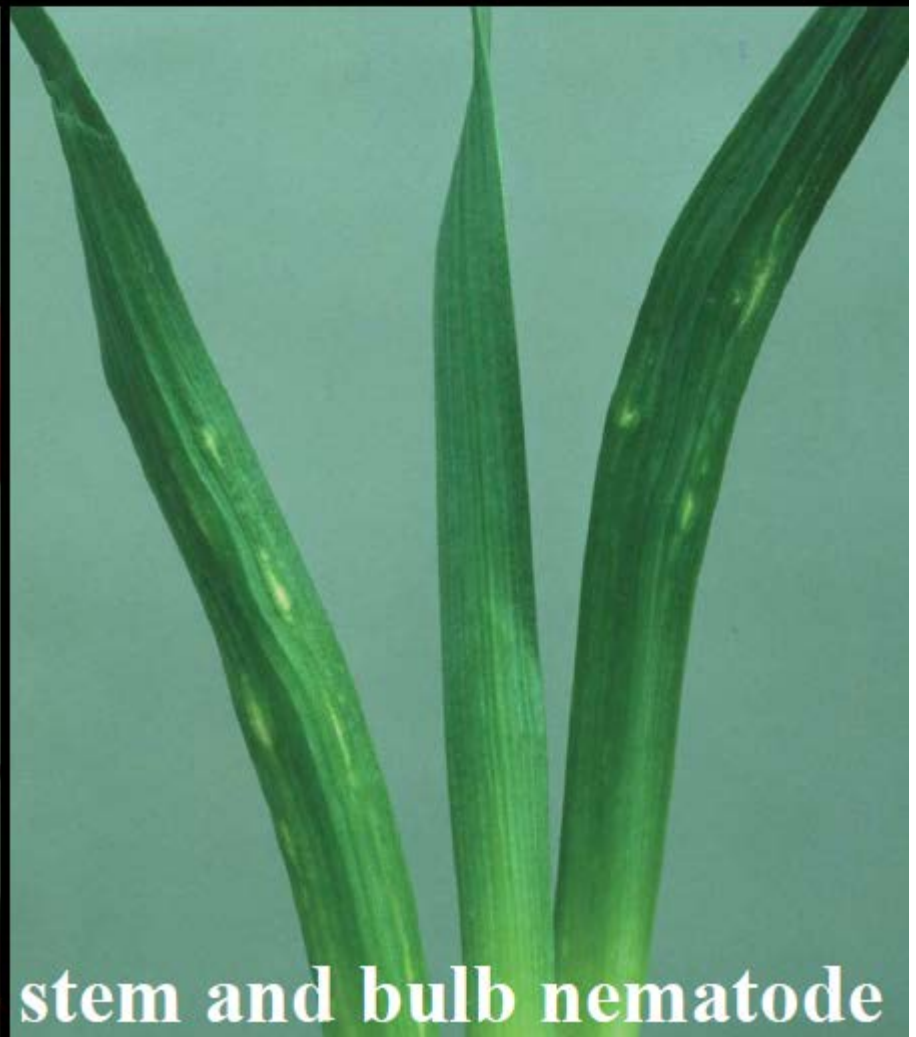


Melodie Putnam

**Stem lesions, necking
& green petals on tulip**



**Spickels = hard nodules
on narcissus leaves**



Ditylenchus dipsaci – stem and bulb nematode



stems

seeds



Cultural practices:

- plant clean, uninfested cloves
- grow nonhost crops
- do not bring infested soil into fields

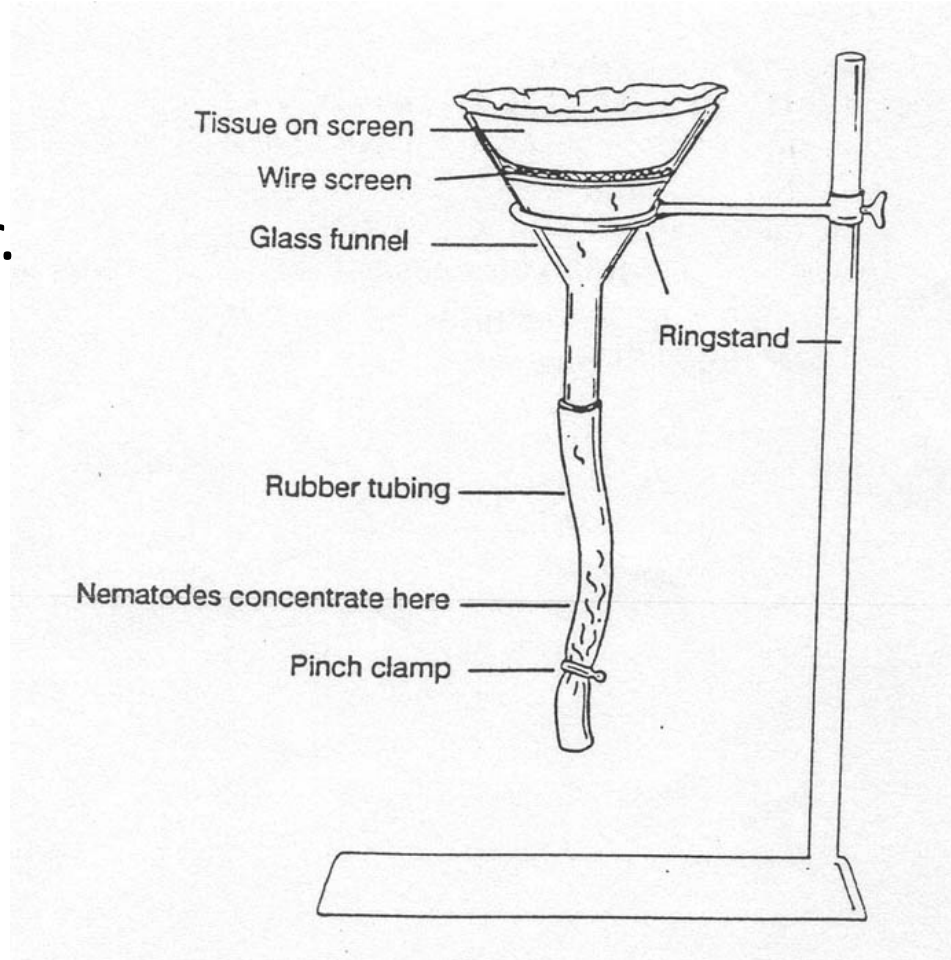
Chemical control:

- pre-plant fumigation
- oxymyl

Recovery and Identification

Incubation Basics

Cover plant tissues with water. To obtain a clean prep, place plant tissues on Kleenex - nematodes will crawl through the tissue and collect in the water reservoir.



Baermann Funnel

Table 1 Key to distinguish *Ditylenchus* spp. from other tylenchid genera (modified from Brzeski, 1998)

1	Females mobile	2
	Females swollen, globose or lemon-shaped	Other genera
2	Female gonads prodelphic and outstretched	3
	Female gonads paired or reflex when prodelphic	Other genera
3	Pharyngeal glands offset from intestine or slightly overlapping it	4
	Pharyngeal glands distinctly overlapping intestine	Other genera
4	Metacarpus offset from procorpus, metacorporeal plates short or absent	5
	Procorpus gradually expands into large metacarpus, metacorporeal plates long	Other genera
5	Sperm large, head usually low, spermatheca not off-set.	<i>Ditylenchus</i>
	Sperm small, head usually high, spermatheca off-set in most genera	Other genera

Table 2 Discriminating morphological characteristics of *D. destructor*, *D. dipsaci*, *D. convallariae* and *D. myceliophagus* (after Decker, 1969)

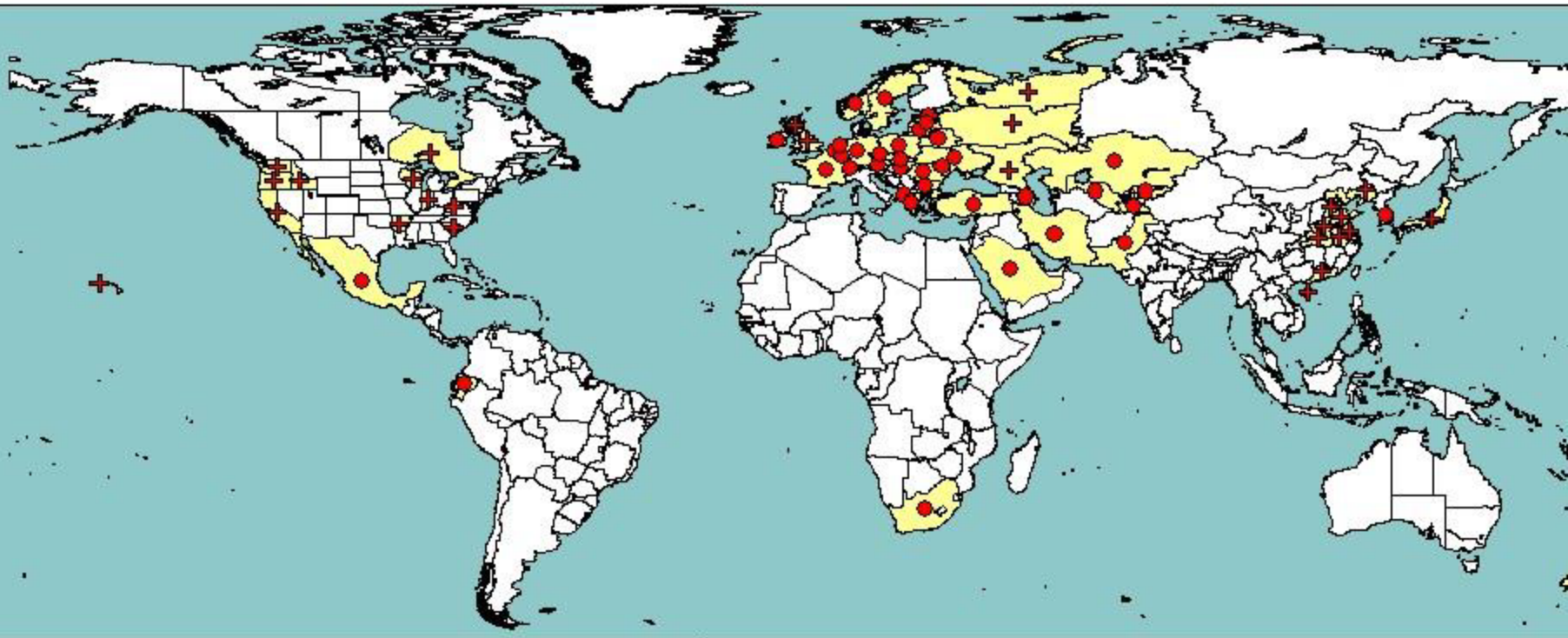
	<i>D. destructor</i>	<i>D. dipsaci</i>	<i>D. convallariae</i>	<i>D. myceliophagus</i>
A ratio ♀	32 (18–41)	37 (36–40)	42 (32–54)	30 (23–44)
Body length ♀ (mm)	1.0 (0.8–1.4)	1.1 (0.9–1.3)*	1.1 (0.9–1.3)	0.9 (0.6–1.0)
Stylet length (µm)	10–12	11–13	11–13	7–10
Posterior bulb	short, dorsally overlapping	not overlapping	not overlapping	short, dorsally overlapping
Number of lateral lines	6	4	6	6
Vulva position (%)	80 (78–83)	82 (79–82)	77 (74–79)	82.5 (74–90)
Post-vulval sac length	2/3–3/4 of vulva-anus distance	1/2 of vulva-anus distance	1/4–1/2 of vulva-anus distance	2–2 1/4 vulva-anus distance
Vulva-anus length	1 3/4–2 1/3 tail length	1 3/4–2 1/4 tail length	2–2 1/4 tail length	2–2 1/4 tail length
Tail shape	conoid, usually slightly bent to ventral side in posterior part	conoid	conoid	broadly conoid
Tail tip	finely rounded	sharply pointed	sharply pointed	finely rounded
Spiculum length (µm)	9–12	10–12	8–11	9
Length of cone/total stylet length	About 50%	About 50%	<< 50%	<< 50%

*The ‘giant’ race of *D. dipsaci* in *Faba* bean can be up to 2.0 mm long.



Ditylenchus destructor

EPPO C



Legend

- Present (national)
- ✚ Present (subnational)
- ▲ Transient



Source: nVWA

Figure 5-108 *Ditylenchus dipsaci* on *Tulipa*¹

- 1 Infection is well-advanced in bulb on left, with the basal plate almost completely rotted.



United States Department of Agriculture

Bulb Preclearance Program

Identification Manual



Source: nVWA

Figure 5-107 *Ditylenchus destructor* on *Tulipa*¹

- 1 Characteristic streaking from base is evident in the bulb on the right.

Ditylenchus dipsaci vs *D. destructor*

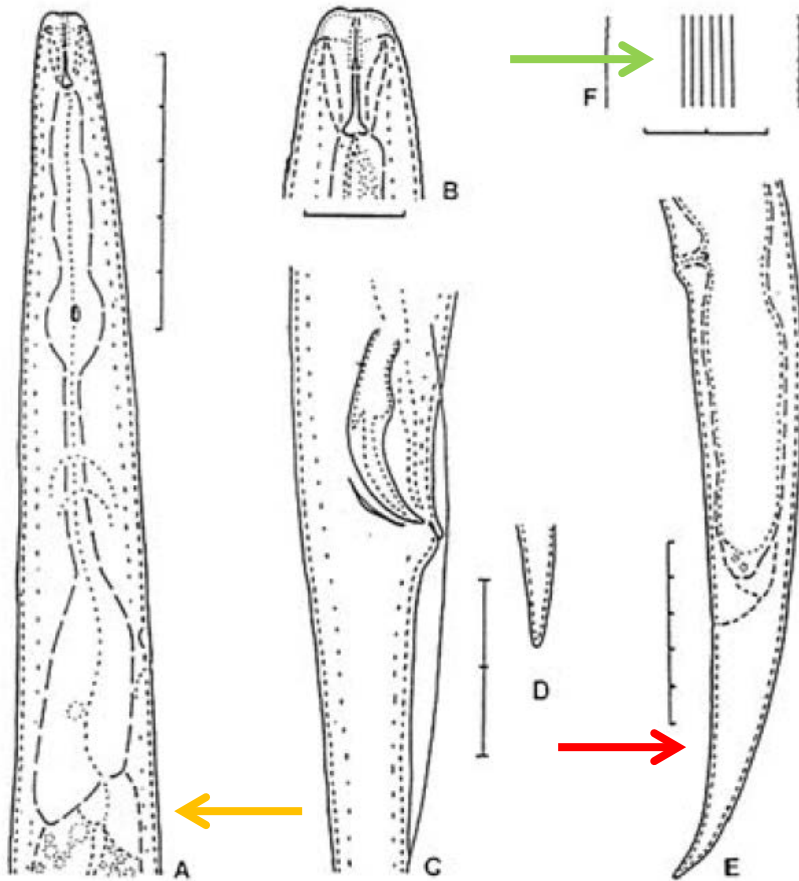


Fig. 12 *Ditylenchus destructor* (A) Female, pharyngeal region. (B) Head of female. (C) Male, spicule region. (D) End of female tail. (E) Posterior portion of female. (F) Lateral field at midbody. Each unit on bars = 10 μm (After Sturhan & Brzeski, 1991).

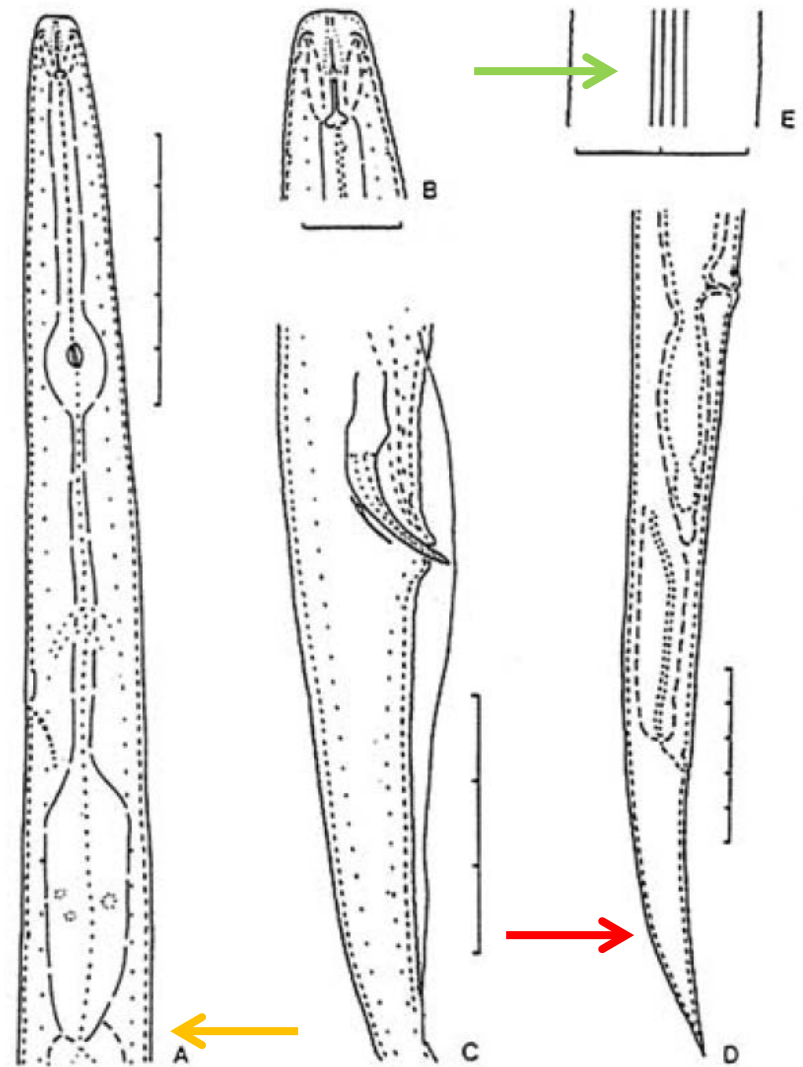


Fig. 13 *Ditylenchus dipsaci*. (A) Female, pharyngeal region. (B) Head of female. (C) Male, spicule region. (D) Posterior portion of female. (E) Lateral field at midbody. Each unit on bars = 10 μm (After Sturhan & Brzeski, 1991).

***Ditylenchus dipsaci* J4 – nematode wool on basal plate**



**Appendix 1 ITS-RFLP analysis according to
Wendt *et al.* (1993)**

**Appendix 2 Specific SCAR-PCR according to
Esquibet *et al.* (2003)**

**Appendix 3 Specific PCR according to
Subbotin *et al.* (2005)**

**Appendix 4 Specific PCR according to Marek
et al. (2005)**

**Appendix 5 Specific PCR according to
Kerkoud *et al.* (2007)**

Madani et al., 2015
Can. J. Plant Pathol., 2015
 Vol. 37, 212 - 220

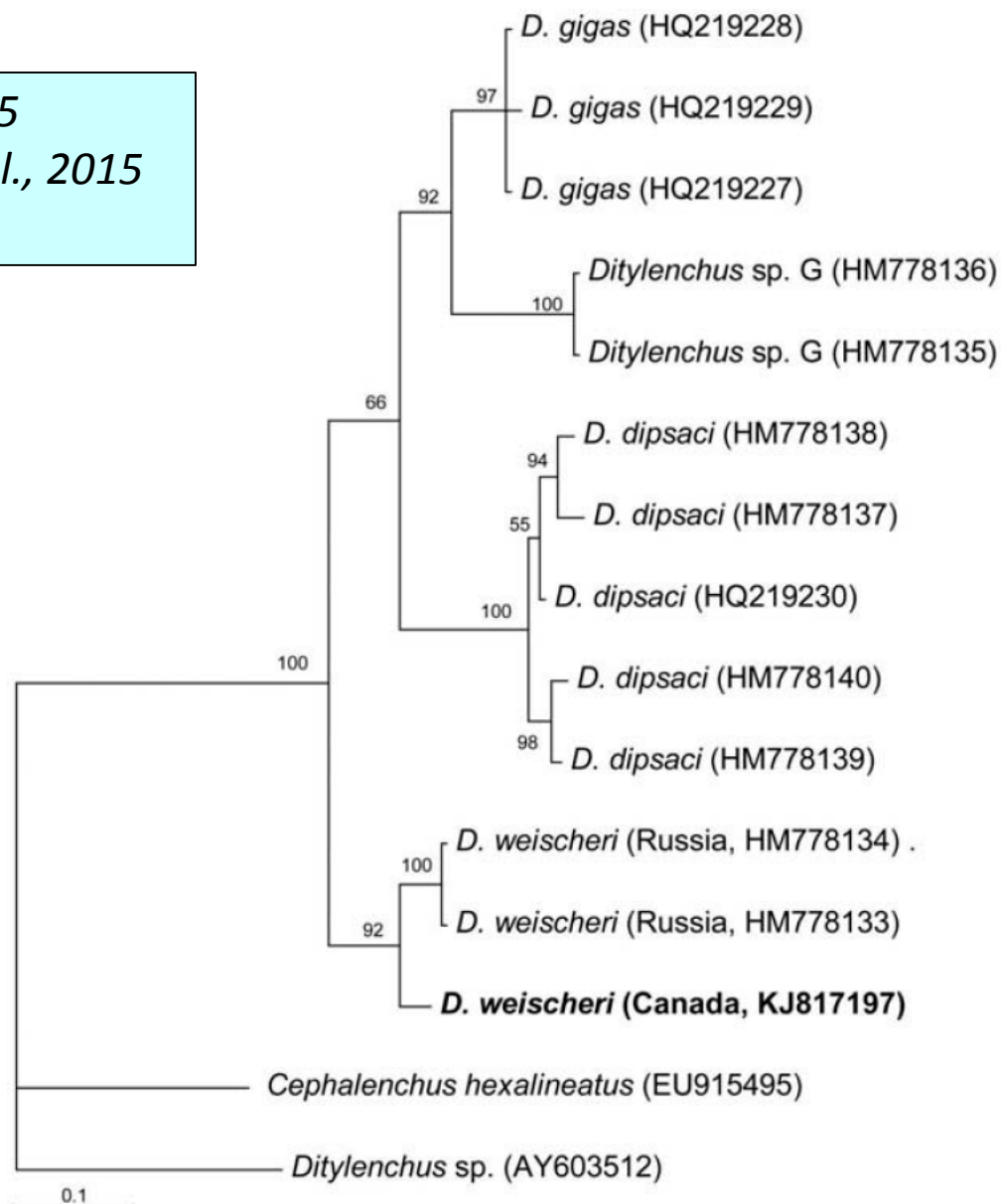
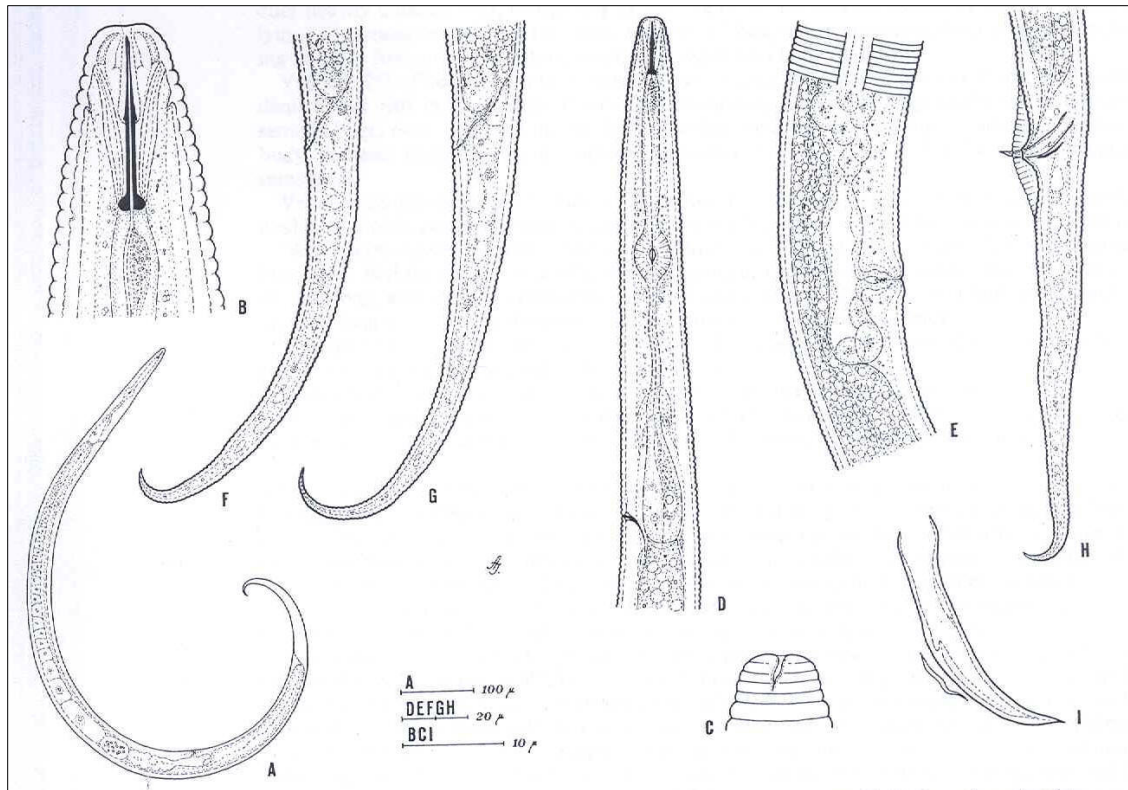
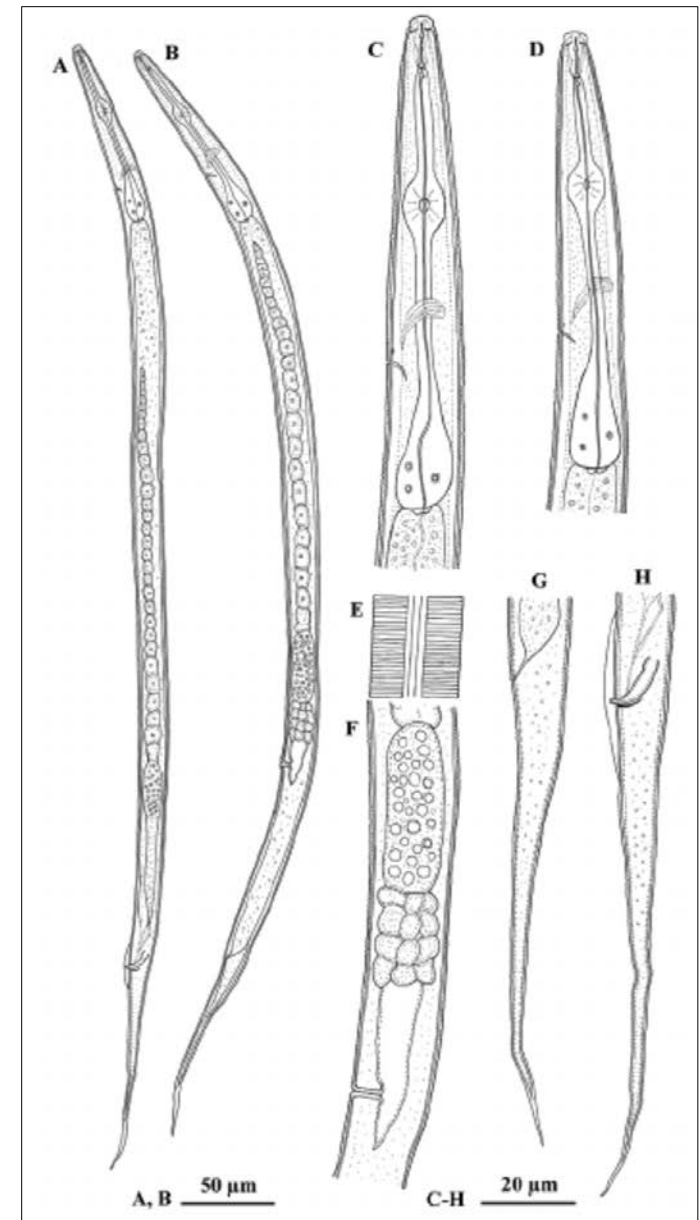


Fig. 2 Phylogenetic relationships of *D. weischeri* with other species of the genus *Ditylenchus* as inferred from the Bayesian analysis of the *hsp90* gene sequences under the GTR+I + G model. Posterior probabilities are given on appropriate clades.

Don't confuse these genera
with *Ditylenchus*.....



Tylenchus



Filenchus

The genus *Aphelenchoides* resembles *Ditylenchus* for some features – but not from the median bulb.

