A BRIEF REVIEW AND DISCUSSION ON THE TERM ENDOTOKIA MATRICIDA

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Abstract
This short review was written with the objective to look over the concepts of endotokia matricida, bring back the memorable article by Luc, Taylor and Netscher (1979). The term endotokia matricida has been misused in scientific publications and should be avoided. This fact is evident when involving plant-parasitic nematodes and requires more academic and scientific considerations.
Key words: endotokia matricida, intra-uterine development, intra-uterine hatching.

Resumo
Esta curta revisão foi escrita com o objetivo de rever e discutir os conceitos sobre endotoquia matricida, trazendo de volta o memorável artigo de Luc, Taylor and Netscher (1979). Aparentemente, o termo endotoquia matricida vem sendo usado erroneamente em publicações científicas, fato evidente especialmente em publicações envolvendo nematoides parasitas de planta. A questão merece mais considerações acadêmicas e científicas.
Palavras-chave: desenvolvimento intra-uterino, eclosão intra-uterina, endotoquia matricida,

According to Luc, Taylor and Netscher (1979), the term endotokia matricida, *endotokia matricide* in Franch (SEURAT, 1914) and *endotoquia matricida* in Portuguese (LORDELLO, 1951), was primarily used by Seurat (1914) *apud* Luc, Taylor and Netscher (1979). In his paper, Seurat described an unusual phenomenon in the reproductive system of *Oxyuris spinicauda* Dujardin = *Pharyngodon spinicauda* (Dujardin) Diesing, an intestinal parasite of a type of gecko, collected in Algeria. In his pioneer observations, the French scientist found in the nematode ovaries a high amount of eggs arranged in several lines inside of a strongly distended uterus occupying nearly all body cavity (LUC; TAYLOR; NETSCHER, 1979). The inside pressure of the eggs over the internal organs was the possible cause the death of the nematode parasite. In that situation, the nematode cuticle detached from the body, acting as a protective sheath, covering a veritable sac stuffed with eggs, similarly to one cyst. Earlier references on the use of the endotokia matricida were not found, even though the biology of the cyst nematode was perfectly known at that time. Only six year later of his first founding and publication, the same Seurat (1920) *apud* Luc, Taylor and Netscher (1979), applied again the term endotokia matricida to describe the cyst forming process in *H. schachtii* Schmidt. In conclusion, Luc, Taylor and Netscher (1979) admitted that the term endotokia matricida should be

discontinued in the way it has been used and must be substituted by the term female encystment (*Seurat senso*). They also indicated that the term should be only applied to characterize the death of the nematode female due to the pressure of egg accumulation inside of the body, acting as a surviving mechanism like a cyst. Lordello (1951), in Brazil, however, applied the term endotokia matricida with a different meaning, when described an unusual phenomenon in *Rhabiditis* sp. That author found females dead due to the hatching of juveniles inside of their bodies as can be seen in figure 1A. Apparently, that was the first use of the term endotokia matricida after Seurat's publications. Due to the new use of the term and the scientific credibility of the author, a new concept was raised: *Lordello senso*, according to Paetzold (1958), in his article: *Bemer zur endotokia matricida von Lordello* (1951).

Figura 1 – (A) **Above**: a case of intra-uterine hatching (matricidal hatching) in *Aphelenchus avenae* resulting several juvenile (J2) moving inside of a death female body. (B) **Below***:* Inter-uterine development of J2s in *Turbatrix aceti* inside of an active female. The photo depicts all eggs carrying fully developed juveniles in a live female

Fonte: Moura (unpublished data).

Female encystment is a natural phenomenon, with phylogenetic roots. This mechanism is aimed to ensure the nematode surviving during adverse conditions. On the other hand, during nematode reproduction "accidents" may occur due to female injuries or environmental disturbance (LOOS, 1962). In many cases, these accident may provoke the female death. However, Luc, Taylor and Netscher (1979), supported the opinion that these accidents should never be referred as endotokia matricida, because they are not coherent with Seurat's concept.

According to the literature, two types of accidents may occur during nematode reproduction:

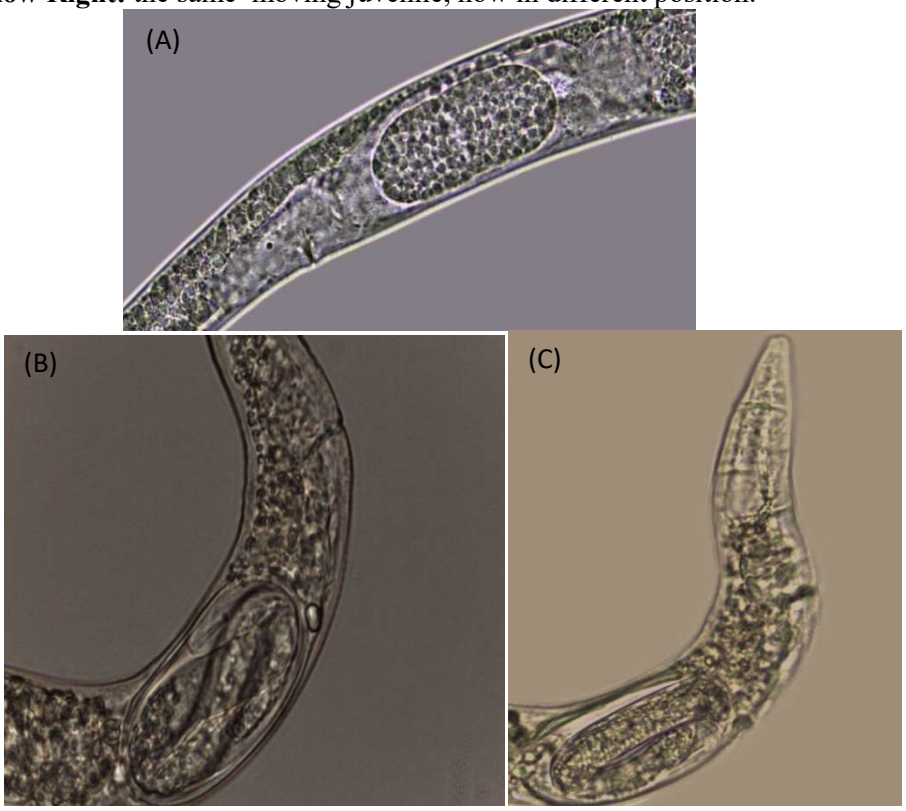
1- **Intra-uterine hatching**: the presence of J2 full developed inside of the body of a dead female (LORDELLO, 1951;

MOURA (Figure 1A, unpublished data). A different situation, close related to the hereby matter, very rare in occuring, is when males and juveniles are found inside of a death female body, as reported in *Anguina tritici* (Steibach) Chitwood, described by Gupta and Swarup (1968). This fact was only reported in this nematode. Luc, Taylor and Netscher (1979) suggested the term "matricidal hatching" as a synonym of intra-uterine hatching;

2- **Intra-uterine development**: defines the presence of egg or eggs containing J2 fully developed located in the reproductive tract of the nematode, especially in the uterus. This phenomenon may or may not causes the female's death (Figures 1B and C, respectively). In most the cases, when a dead female is found holding one egg or many eggs with fully developed J2s it is always difficult to affirm if the embryonic development occurred before or after the female death. This is especially true in species that in normal conditions produce in majority unsegmented eggs or eggs in the two or three blastomeres stages. In the *Turbatrix aceti* Borelus (the vinegar nematode) the adult females are very active moving species and the majority of adult females carries many intra-uterine developed eggs (Figure 1C). This occurence may be seen in Moura, Oliveira e Torres (2006).

Moura during a routine soil analyses found a dead adult female of *Pratylenchus coffeae* (*Zimmerman*) Filipjev & Shurmans Stekhoven in one apparent case of intra-uterine development with death of the female (Figure 1B and Figure 2B,C). The female inside had not individual organs, but only remains. On the other hand, in the uterus region, it was found an egg with a fully developed J2 in constant moving. The egg dimensions, especially the width, were larger then the uterus, indicating a possible inside over pressure and destruction of the organ. The J2 kept moving for several hours but hatching did not occurred. This phenomenon in *P. coffeae* was first reported by Wehant et Edwards (1971).

Figure 2 – (A) **Above**: *Pratylenchus coffeae* shortly before egg expelling. The unsegmented egg has dimensions compatible with the uterus size. (B) **Below**: **left**: the fully intra-uterine embryonic development of a moving J2 in *P. coffeae*. Apparently the egg is pressing the uterus wall of the dead female. (C) **Below Right:** the same moving juvenile, now in different position.



Luc, Taylor and Netscher (1979) in their final conclusions, affirmed that most of the authors that followed Seurat (1914) misapplied the term endotokia matricida, because in all cases were not female encystment, indicating as examples: Hirchmann (1960), Jatala (1975), Lordello (1951), Lordelllo and Kogut (1962), among others. They added that: "even Caveness (1964) gave an erroneous definitions of endotokia matricida in his famous Nematological Glossary".

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