



A look into genome of *L. loa* a parasite to human

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Intro to genomics – 485
18/01/2022



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Genomics of *Loa loa*, a *Wolbachia*-free filarial parasite of humans

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Loa loa, the African eyeworm, is a major filarial pathogen of humans. Unlike most filariae, *L. loa* does not contain the obligate intracellular *Wolbachia* endosymbiont. We describe the 91.4-Mb genome of *L. loa* and that of the related filarial parasite *Wuchereria bancrofti* and predict 14,907 *L. loa* genes on the basis of microfilarial RNA sequencing. By comparing these genomes to that of another filarial parasite, *Brugia malayi*, and to those of several other nematodes, we demonstrate synteny among filariae but not with nonparasitic nematodes. The *L. loa* genome encodes many immunologically relevant genes, as well as protein kinases targeted by drugs currently approved for use in humans. Despite lacking *Wolbachia*, *L. loa* shows no new metabolic synthesis or transport capabilities compared to other filariae. These results suggest that the role of *Wolbachia* in filarial biology is more subtle than previously thought and reveal marked differences between parasitic and nonparasitic nematodes.

Loa loa: Taxonomy

- SK: Eukaryota
 - K: Metazoa
 - P: Nematoda
 - C: Chromadorea
 - O: Rhabditida
 - SO: Spirurina
 - F: Onchocercidae
 - G: *Loa*
 - S: *loa*

Loa loa: Physical characteristic

- Round worm nematodes.
- Cylindrical shape + irregular curves.
- Life span from 1-15 years
- **Female** ranges from 40-70 mm in long and 0.45-0.60 mm wide.
- **Male** ranges at 30-34 mm long and 0.35-0.40 mm wide.
- **Microfilariae** (wormlike eggs) 250–300 μm (0.25mm) long, 6–8 μm wide.



***Loa loa*: Physical characteristic**



***Loa loa*: Inflectional information**

- chronic infection and affects around 13 million people.
- Cause **Loiasis**
- angioedema or subconjunctival migration.
- Encephalopathy and entrapment neuropathy

Loa loa: Parasitism

- Intermediate host = Chrysops (deerfly)



- Definitive host **human** and can be seen in eye (only as adult form).

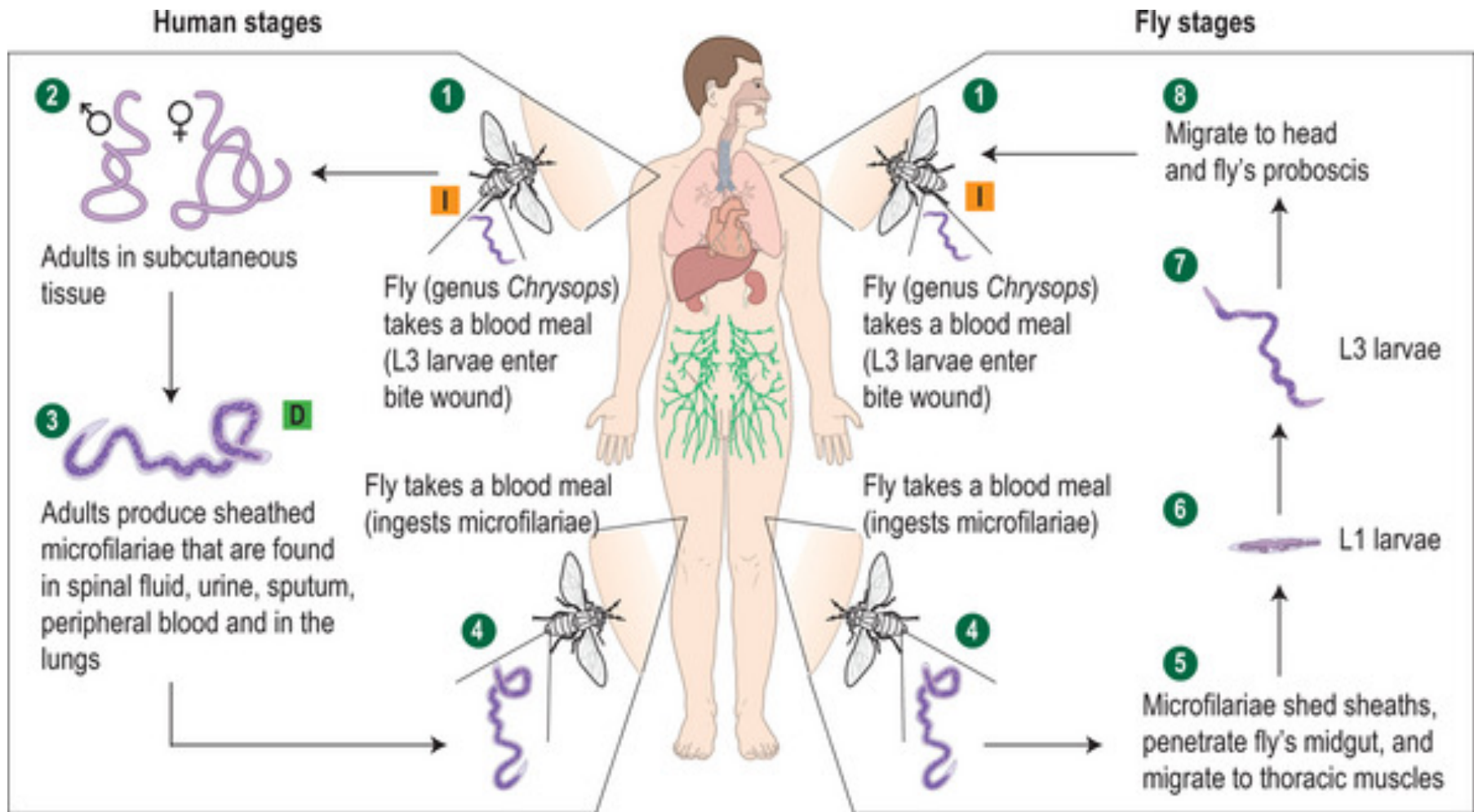


Loa loa: Geographic Distribution

- *L. loa* is restricted geographically to equatorial **west and central Africa**, where its deerfly vector *Chrysops* spp breeds.



Loa loa: Life cycle



*L3 infective larvae

***Loa loa*: Significance**

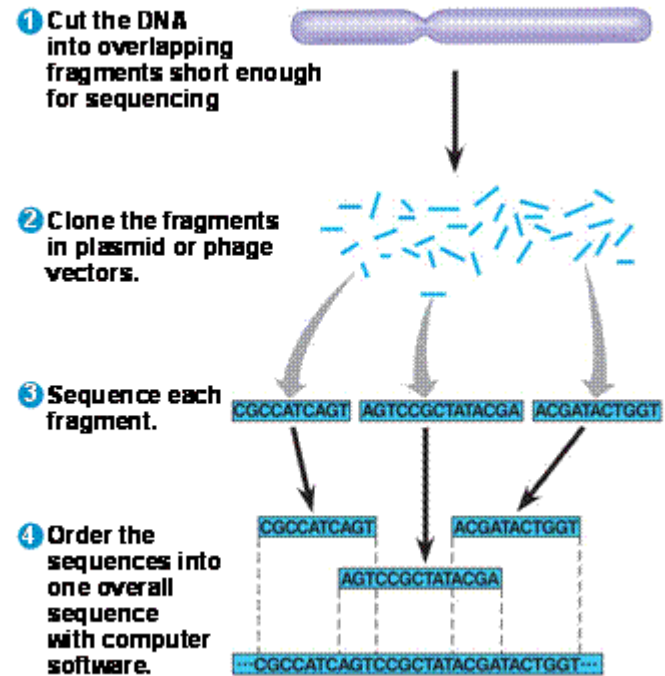
- Adverse events (encephalopathy and death) after using ivermectin treatment.
- Lack of endosymbionts *Wolbachia*.
- Gaining clinical information about post-treatment reaction.

***Loa loa*: Sequencing sample information**

- Microfilariae of *L. loa* were purified from a patient infected in Cameroon.
- Single unfertilized adult *W. bancrofti* worm was under ultrasonic guidance.
- *O. volvulus* single adult male was isolated from nodule in Ecuador.

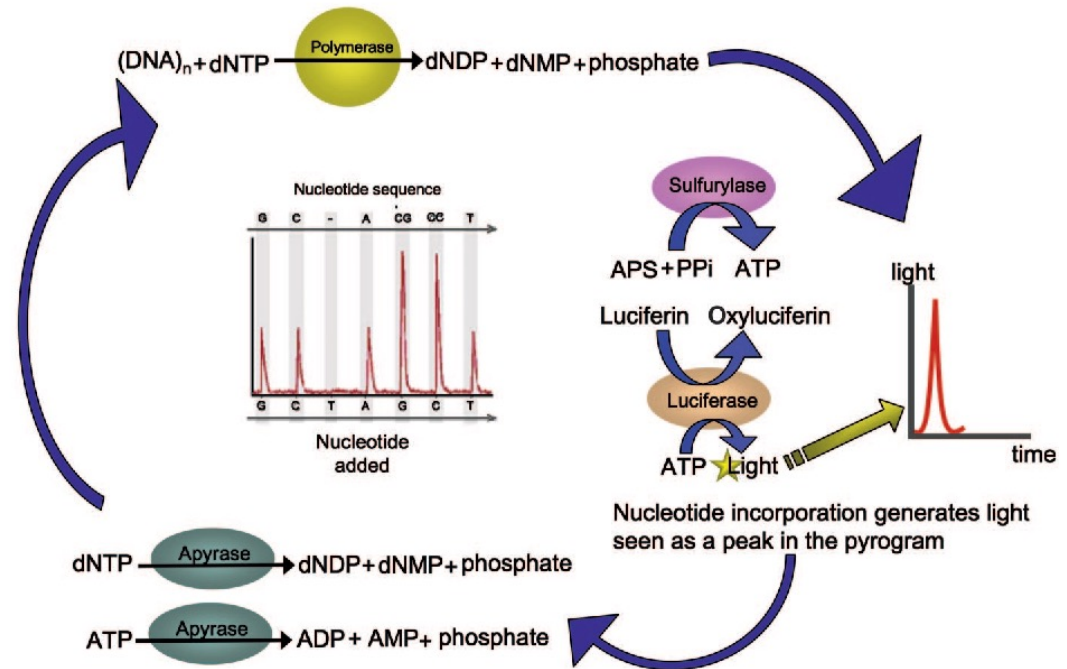
Loa loa: Sequencing strategy

Whole genome shotgun Sequencing



Loa loa: Sequencing method

- Pyrosequencing
- Roche 454 life sciences



Loa loa: Genome assembly

Table 1 Genome features of filarial worms and their *Wolbachia* endosymbionts

Organism	Coverage	Sequence (Mb)	Scaffolds	Scaffold N50 (kb)	GC (%)	Repetitive (%)	Low complexity (%)	Genes (<i>n</i>)
<i>L. loa</i>	20x	91.4	5,774	172	31.0	9.3	1.7	14,907 ^a
<i>W. bancrofti</i>	12x	81.5	25,884	5.16	29.7	6.2	3.9	19,327 ^a
<i>O. volvulus</i>	5x	26.0	22,675	1.27	32.5	–	–	–
<i>B. malayi</i>	9x	93.7	8,180	94	30.2	12.1	1.1	18,348

- **Coverage = 20x**
- **Genome size = 91.4 Mb**
- **Scaffolds = 5774**
- **Scaffolds N50 = 172 Kb**

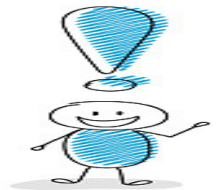
***Loa loa*: Interesting genome outcome**

- *O. volvulus* genome was not included in further analyses.
- *L. loa* assembly was the most contiguous between them.
- No large transfers of nuwts was revealed in *L. loa* genome.

Questions

1. Does *L. loa* necessarily cause blindness?

2. why do you think pyrosequencing was used as sequencing method ?



Thank You for Listening

