# Mycobacteriophage CrimD

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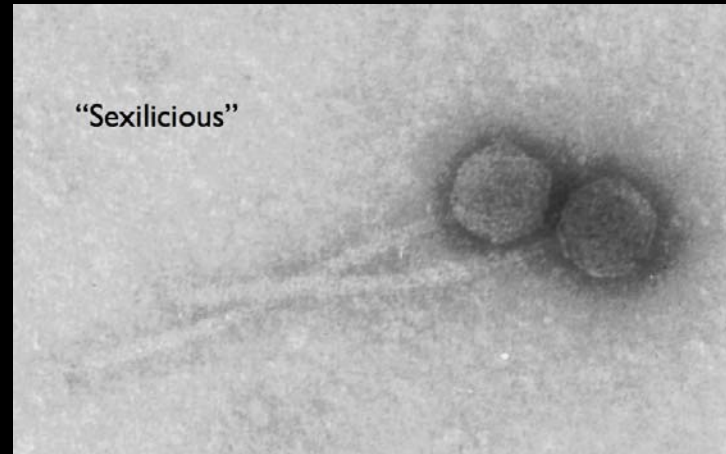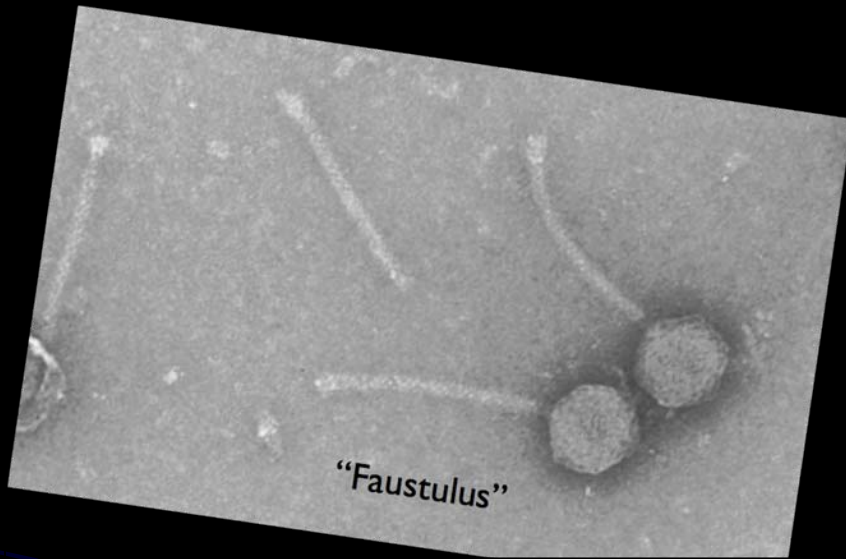
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# Phage Isolation

- 28 putative mycobacteriophages isolated in total.

- Most were isolated using enrichment rather than direct plating of extracts.

- Could not obtain DNA from 4 of the isolates – despite repeated attempts!

- DNA from 5 isolates were submitted to JGI as candidates for sequencing.
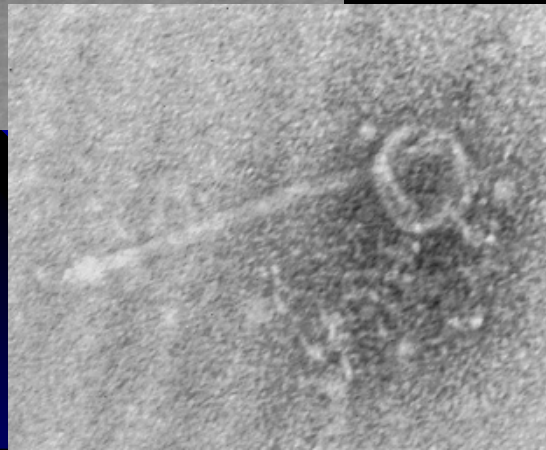
# Electron Microscopy



"Faustulus"

"Sexilicious"

"Pink Unicorn"

"Napoleon"

Sequenced Isolate "CrimD" – named after the Crim Dell, where it was isolated

# CrimD

- Lytic growth on *Mycobacterium smegmatis* MC$^2$500
- Obtained through enrichment
- *Siphoviridae*



Capsid diameter: 54 nm
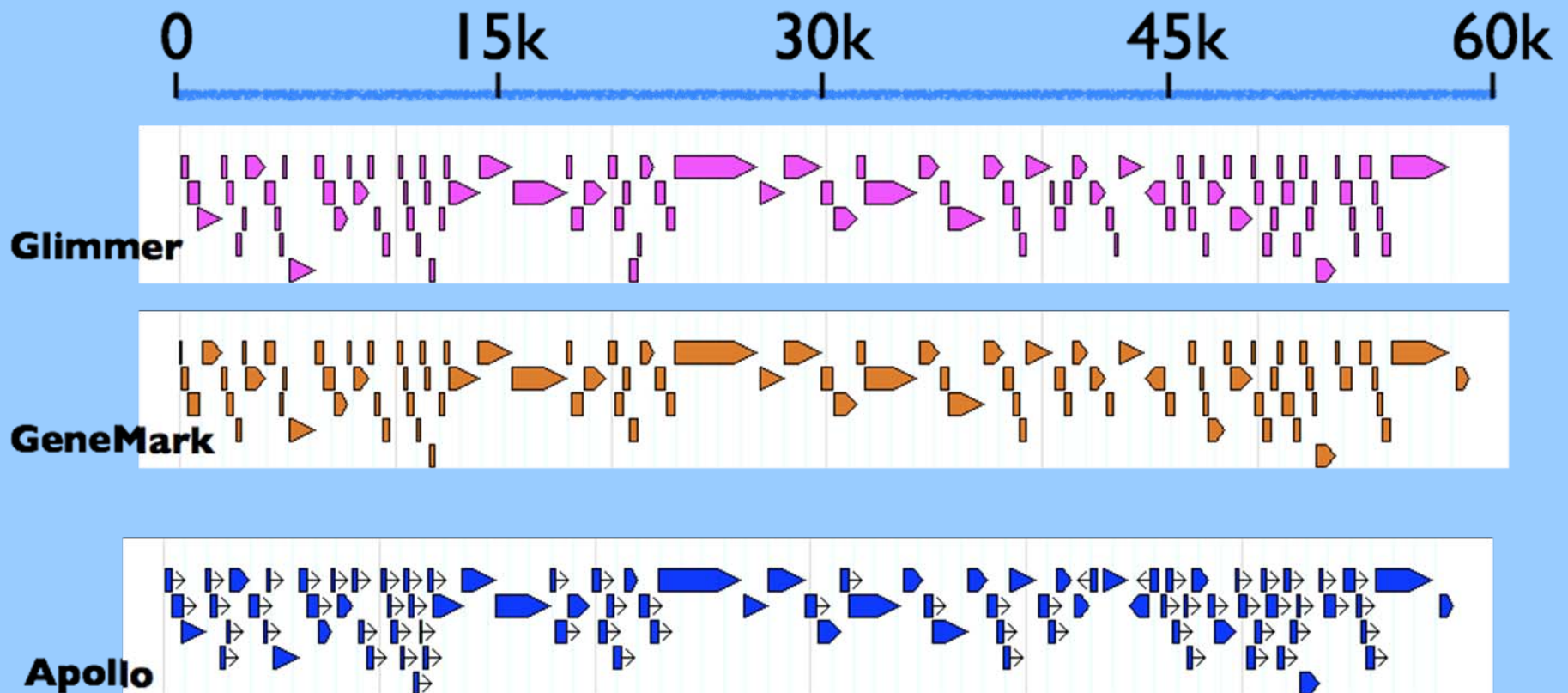Tail length: 158 nm

Slightly Turbid Plaques
3 mm in diameter

# CrimD - Genome Statistics

Genome size: 59,798 bp.
90 predicted protein cds
1 predicted tRNA gene

# 11% of the CrimD genome is completely unique!

## 29 Genes - BLASTp homologues with E values less than $10^{-3}$

| | |
|---|---|
| gp1 (102aa) (104-409) | gp56 (114aa) (38637-38978) |
| gp2 (154aa) (402-863) | gp64 (50aa) (43467-43318) |
| gp4 (78aa) (1982-2205) | gp70 (113aa) (46790-47128) |
| gp6 (93aa) (2587-2865) | gp71 (56aa) (47302-47469) |
| gp7 (44aa) (2953-3084 | gp76 (58aa) (49685-49858) |
| gp11 (51aa) (4792-4944) | gp80 (67aa) (50895-51095) |
| gp14 (184aa) (6644-7195) | gp82 (102aa) (51657-51962) |
| gp15 (185aa) (7203-7757) | gp83 (89aa) (51962-52228) |
| gp16 (54aa) (7754-7915) | gp84 (99aa) (52249-52545) |
| gp20 (90aa) (9429-9698) | gp85 (55aa) (52542-52706) |
| gp21 (77aa) (10121-10351) | gp87 (53aa) (53578-53772) |
| gp22 (45aa) (10396-10530) | gp89 (72aa) (54302-54517) |
| gp24 (65aa) (10965-11159) | gp90 (40aa) (54517-54636) |
| gp25 (62aa) (11156-11341) | gp93 (70aa) (55569-55778) |
| gp26 (85aa) (11338-11592) | |

# CrimD orthologues in TM4

gp17 (210aa) (8087-8716)

gp29 (70aa) (12035-12244)

gp30 (76aa) (12237-12464)

gp39 (94aa) (20556-20837)

gp57 (84aa) (38975-39226)

gp59 (144aa) (40615-41046)

gp60 (93aa) (41043-41321)

gp72 (72aa) (47463-47678)

gp73 (264aa) (47675-48466)
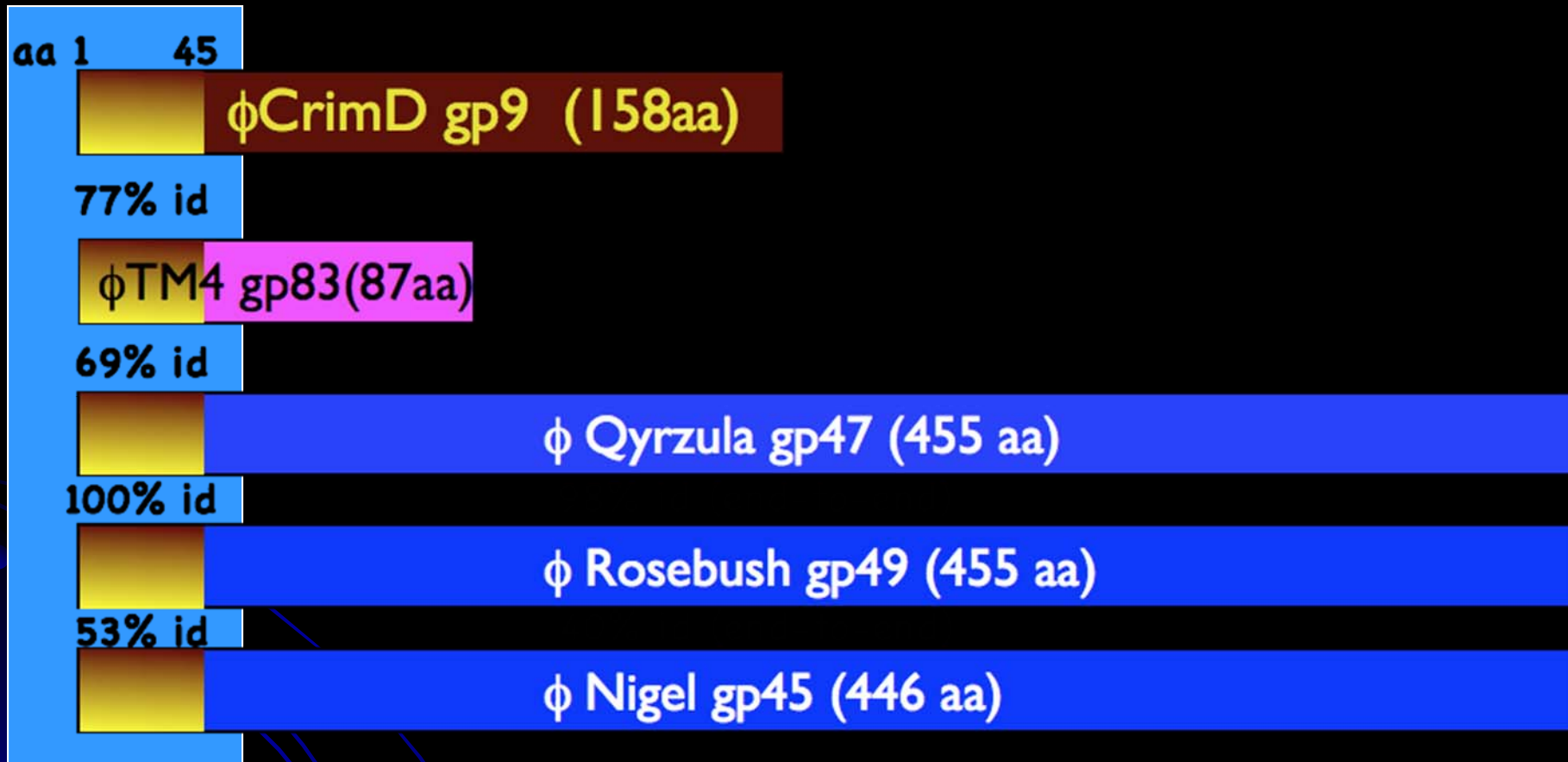
gp78 (127aa) (50239-50619)

gp79 (93aa) (50620-50898)

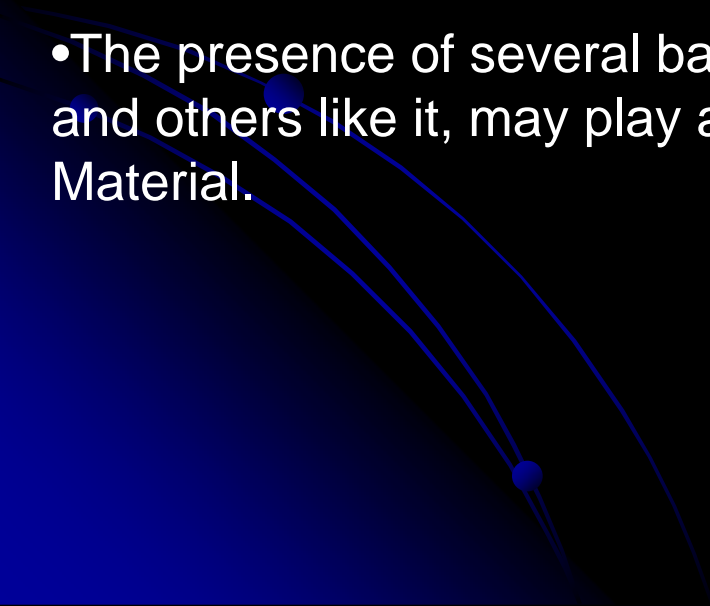gp88 (160aa) (53826-54305)

gp94 (124aa) (55775-56146)

13 genes from CrimD have orthologues in the currently unclustered mycobacteriophage TM4 - and nowhere else.

# Comparative Genomics



This 45 aa domain is exclusive to mycobacteriophages, but only found in 12 of 65 sequenced mycobacteriophages!

# Conclusions

- The fact that CrimD possesses ~29 genes that have no homologues in GenBank indicates the large degree of genetic diversity among phages, that has yet to be examined!

- CrimD appears to be most closely related to TM4, a currently unclustered Mycobacteriophage.

- The presence of several bacterial genes in CrimD suggests that this phage, and others like it, may play a role in horizontal transfer of bacterial genetic Material.

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