

COMPARATIVE ANALYSIS OF ARTHROPOD SILKS

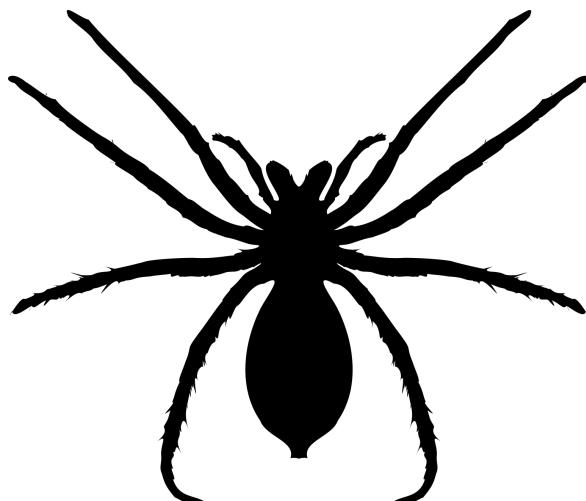
Amanda Markee | CG2 Final Project | December 12th, 2024

ARTHROPODS ARE DIVERSE... AND USE LOTS OF SILKS

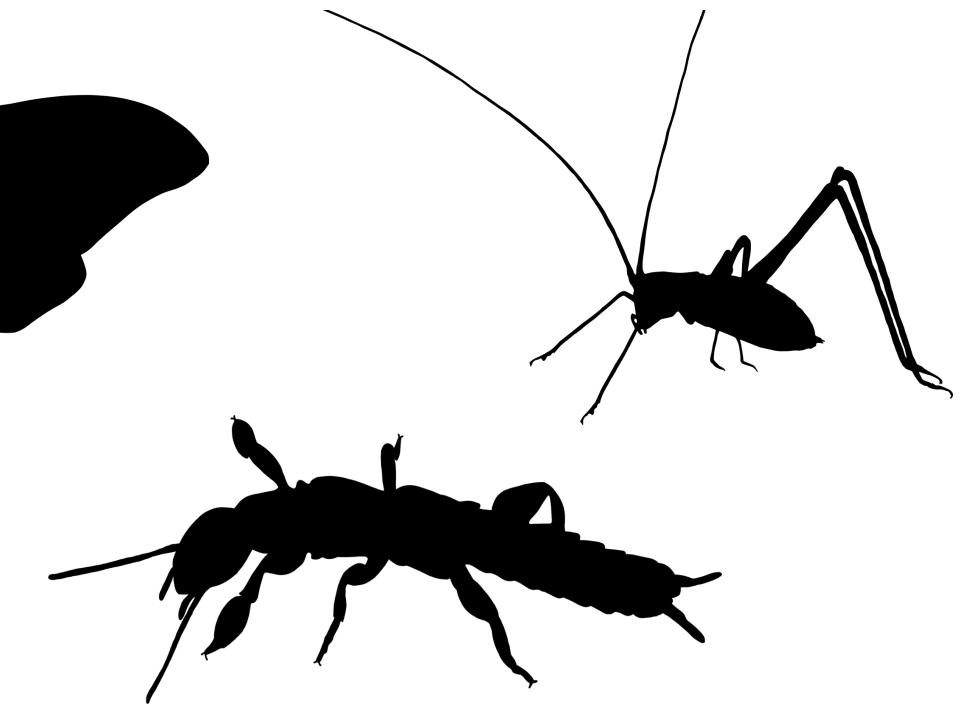


WE CAN USE SPIDER SILKS TO UNDERSTAND INSECT SILKS

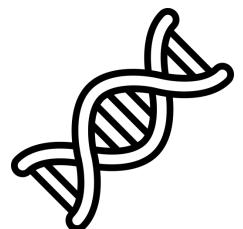
*How can we take what we know about model silks...
...to understand the genetics of silk production?*



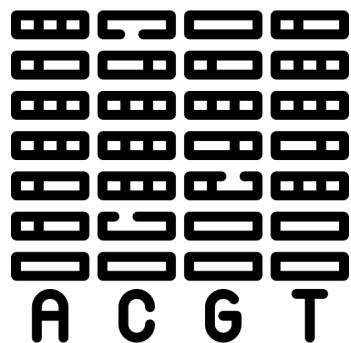
SPIDERS
30 silk genes



INSECTS
1 silk gene



BIOINFORMATIC METHODS FOR COMPARING SILK GENES



Genome Assembly



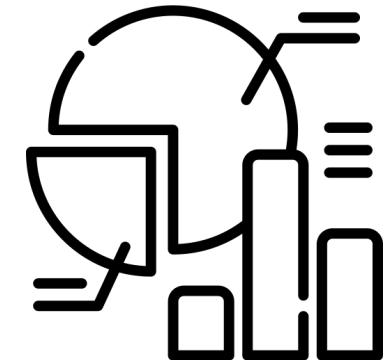
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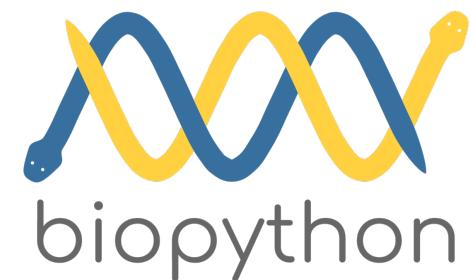
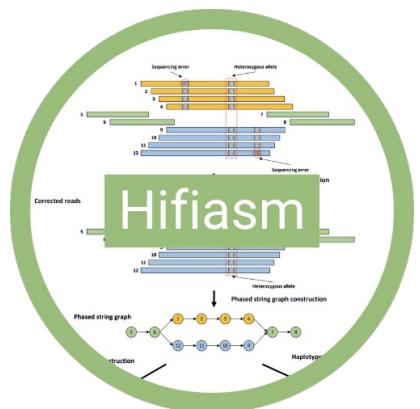
Gene Extraction



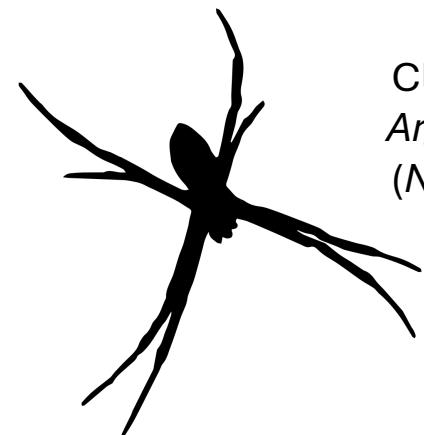
Annotation



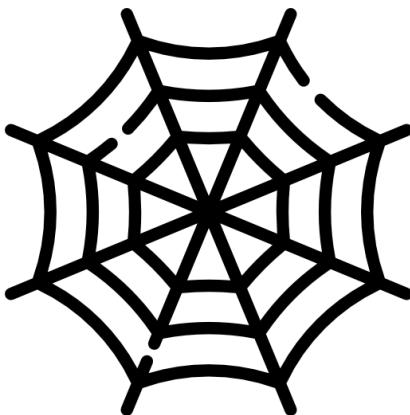
Analysis



RESULTS: WHOLE GENOME STATISTICS



Class: Arachnida
Argiope argentata
(N=34 silk genes)

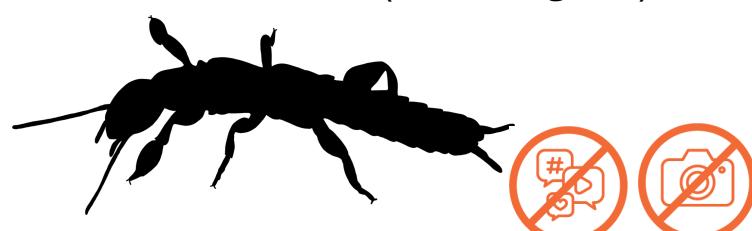


Genome Statistic	Result
Total Size	1.92 Gbp
N50	20.2 Mbp
L50	30
BUSCO (C)	98.5%
BUSCO (Duplicate)	6.3%

Genome Statistic	Result
Total Size	3.19 Gbp
N50	12.0 Mbp
L50	78
BUSCO (C)	98.4%
BUSCO (Duplicate)	3.7%



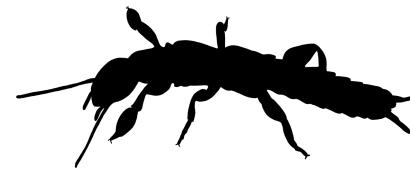
Class: Insecta
Oligotoma nigra
(N=1 silk gene)



RESULTS: SILK GENES – MOLECULAR CONVERGENCE



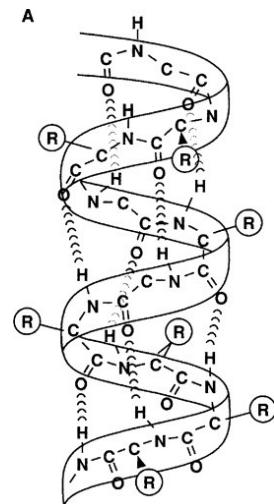
Oligotoma nigra (e-fibroin)



Characteristic	Value
gene name	<i>fibroin</i>
CDS size	5447 aa
dominant motif	(GS) _n



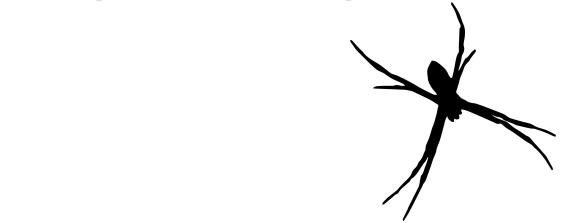
GGA
GAGQ
GGY



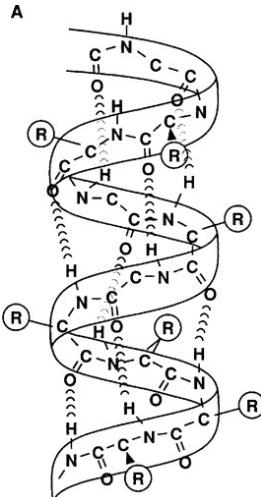
RESULTS: SILK GENES – MOLECULAR CONVERGENCE



Argiope argentata (spidroin)

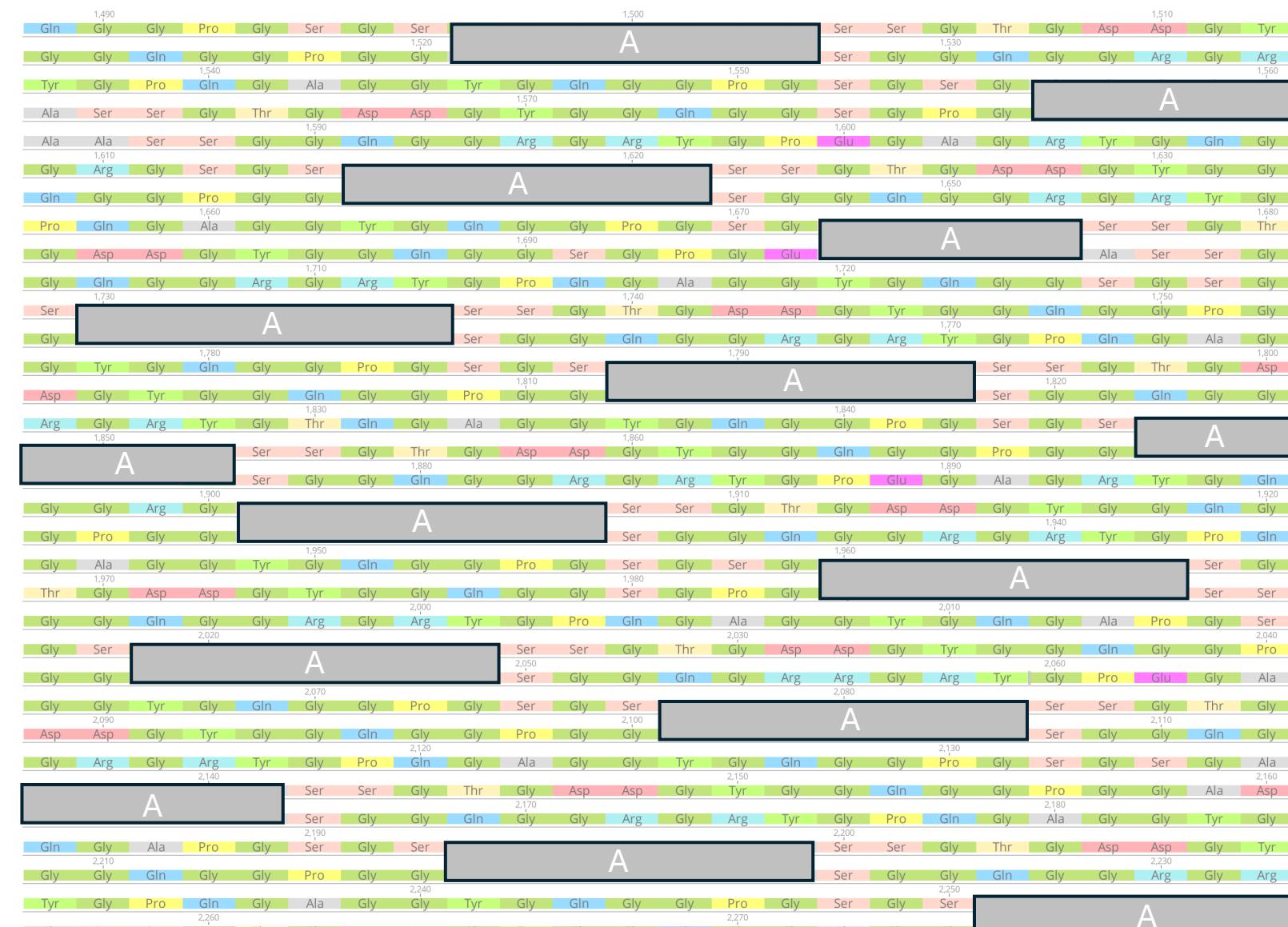


Characteristic	Value
gene name	<i>MiSp1</i>
CDS size	2563 aa
dominant motif	(GX) _n

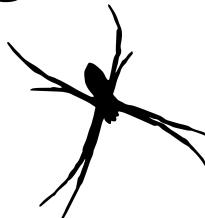


GGA
GAGQ
GGY

RESULTS: SILK GENES – MOLECULAR CONVERGENCE

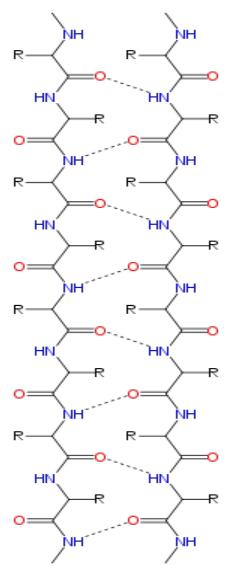


Argiope argentata (*spidroin*)



Characteristic	Value
gene name	<i>MaSp3b</i>
CDS size	2997 aa
dominant motif	(GGX) _n (AAAAAA) _n

AAAAAAA



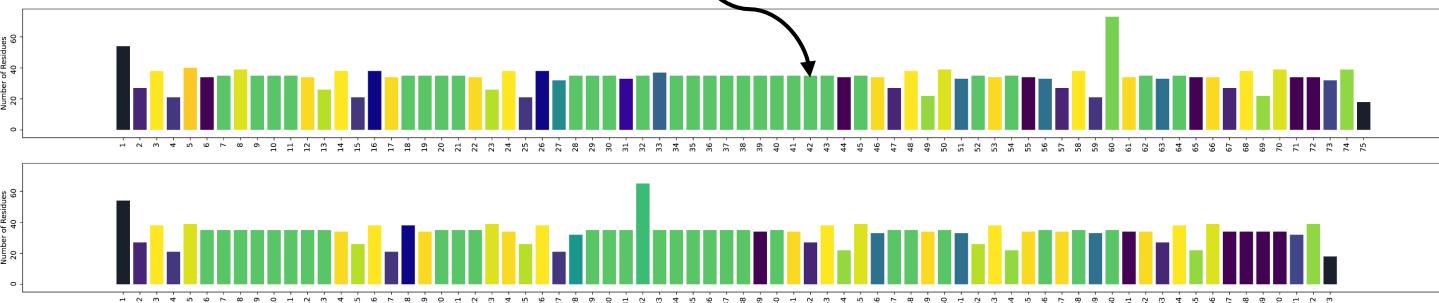
RESULTS: SILK GENES – MOLECULAR CONVERGENCE



Cocoon Silk



GSGGRGLGGLYGLGVGDGYDSGSSAAAAAAAAAGSSGRGLG
GLYGLDVGDGYDSGSSAAAAAAAAAGSGGRGLGGLYGLVD

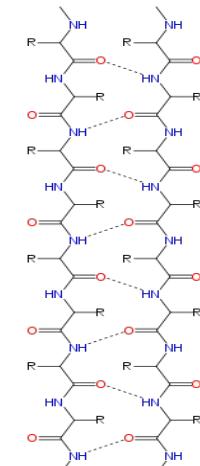


Actias luna (h-fibroin)



Characteristic	Value
gene name	<i>h-fibroin</i>
CDS size	2,679 aa
dominant motif	(GGX) _n (AAAAAA) _n

AAAAAAA



CONCLUSIONS & TAKE-HOME MESSAGE

