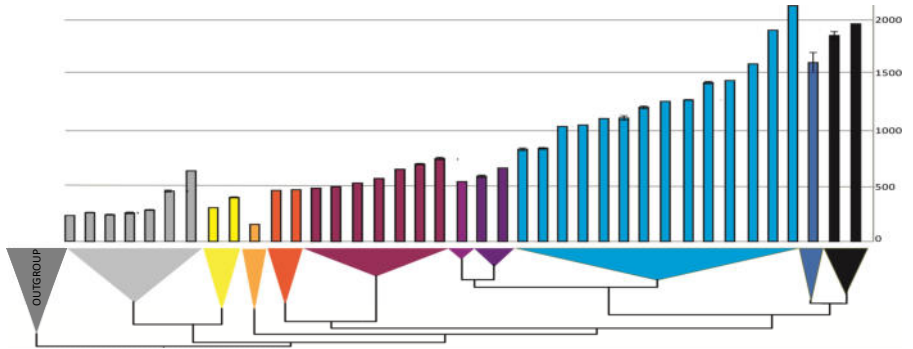


Motivation and Results

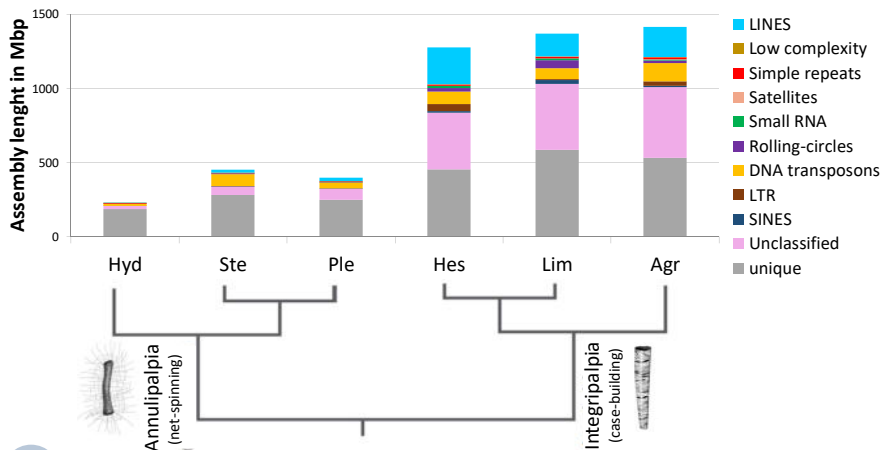
Properties of caddisfly silk (**polymerization in aquatic environments, high tensile strength/extensibility, sticks under water**) make this material an interesting target for **inter-disciplinary and industrial research**.

- We identified termini of the **heavy (h-)** and assembled the **genomic region that encodes for light (l)-fibroin**, proteins that form the basis of caddisfly silk¹
- **Genome size varies 12.6-fold**, from 170MB in net-spinning to 2130MB in case-building species (Fig. 2)
- Genome size variation may be linked to the **functional diversification of silk characteristics and use** in caddisflies



1 Caddisfly larval silk is used to construct a variety of underwater architectures

2 Genome size evolution in Trichoptera.³ Genome sizes are given on the y-axis in Mbp. Illustrations from Thomas *et al.* 2020*



3 Examples for repeat abundance in two caddisfly suborders.² Illustrations from Thomas *et al.* 2020*

Contribution to SGN Program Portfolio

- **From ideas to application: Collaborative projects** with bio-technologists will gauge the potential of **caddisfly silk as technical material**
- **Infrastructure: Our data is part of a newly established taxonomically broad genome collection: Senckenberg Biodiversity Genome Collection**
- **Documenting and analyzing biodiversity** in an Earth system context

Outlook

- We are beginning to **disentangle strands of silk** to predict the underlying metabolism and mediation of silk characteristics
- We are applying **new sequencing technologies** to solve the problem of assembling the **highly repetitive h-fibroin**
- We will characterize the **pattern of genome size evolution in a phylogenetic context**

Acknowledgements

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References

¹Heckenhauer *et al.* 2019. Annotated Draft Genomes of Two Caddisfly Species *Plectrocnemia conspersa* CURTIS and *Hydropsyche tenuis* NAVAS (Insecta: Trichoptera). *Genome Biology and Evolution* 11: 3445–3451. ²Olsen & Heckenhauer *et al.* In preparation. De Novo Whole Genome Assemblies of Two Case Making Caddisflies *Agrypnia staminea* HAGEN, and *Hesperophlox magnus* BANKS. To be submitted to *Genome Biology and Evolution*. ³Heckenhauer *et al.* In preparation. Genome size evolution in caddisflies (Insecta: Trichoptera). To be submitted to *Genome Biology*. *Thomas *et al.* 2020. © 2020 The Royal Entomological Society, *Systematic Entomology*, 45, 670–686