

Starting ERC project

Filip Kolář

(StG, 2021-2025)

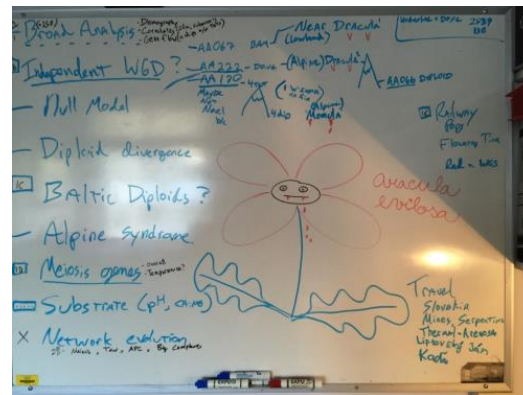
My background

- Botany & Plant evolution
 - MsC in Č. Budějovice
 - PhD at UK Prague + assistant lecturer
 - 2yr M Curie postdoc fellowship in Oslo, Norway



Why applying for ERC - motivation

- Independence & stability
 - 5yrs !!, flwxible money, meaningful alternative to GACR
- ERC – “good name”
 - Easier to attract & recruit good people from abroad
- Experience from teams of ERC grant holders
 - Labs at JIC Norwich UK, Univ. Stockhlom



- ... and obligatory condition to apply for the PRIMUS prolongation

When applying for ERC

- PhD in 2014, app submitted 2018 (last chance 2020)

When applying for ERC

- PhD in 2014, app submitted 2018 (last chance 2020)
- Feedback from ERC pipeline (L. Součková, Z. Strakoš) – my CV:

podat !
workshopy !

Kolář

Part B1

PLOIDY CHALLENGE

ERC Starting Grant 2018
Research proposal [Part B1]¹
*(Part B1 is evaluated both in Step 1 and Step 2,
Part B2 is evaluated in Step 2 only)*

- Do not try to write ERC but **do write ERC**

What?

Innovative question

Why?

Relevance in the field

How?

Methods

Who?

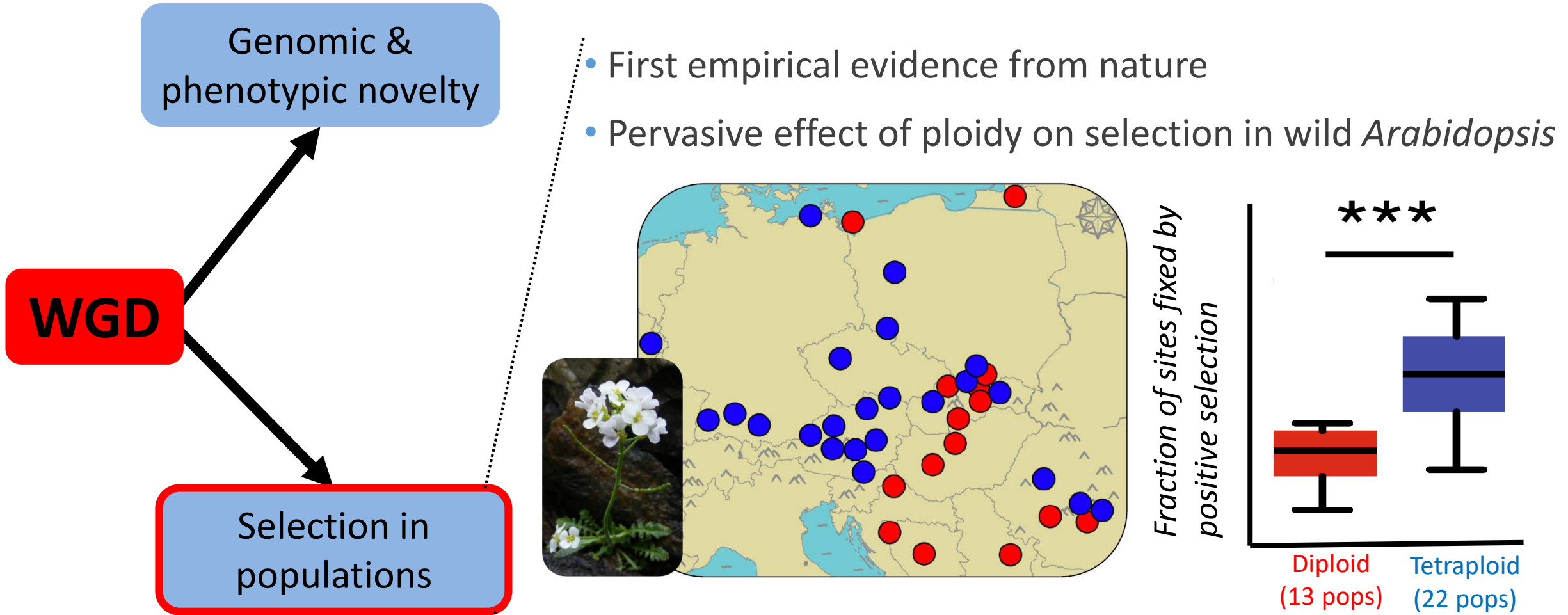
The applicant & their match with the project

What & Why?

- Originality, consistent with my field of interest
 - Whole genome duplication (WGD) – an engine of adaptive evolution?
 - Ubiquitous mutation in nature
- Controversy
 - Evolutionary drawback vs. opportunity
 - *Why some such hopeful monsters win?*



Proof-of-concept



Monnahan*, Kolář*, Baduel* et al. 2019, *Nature Ecology and Evolution*

How?

- Challenge, 5-yrs project, why not GACR project?
- Evolution experiments + multi-species study
- Use toxic soil as a model selective factor

How?

- Challenge & **risk**, 5-yrs project, why not GACR project?
- Evolution experiments + multi-species study
- Use toxic soil as a model selective factor

pairs provides excellent replication of the research and should lead to generalizable results about the adaptive potential of autopolyploids, although there was some discussion about the extension beyond species with small genomes (such as the four Brassicaceae species), similar life-history characteristics, and similar habitats and distributions. The choice of serpentine in the selection experiments was seen as positive by some reviewers and negative by others, but the panel was convinced by the PI that serpentine serves as a general environmental stressor that is appropriate for the proposed work.

There is a lot here. It seems to me that much needs to be cut out for this project to be feasible.

The ability of these approaches to separate off the effects of ploidy per se versus the effects of evolution after ploidy was elegant.

Who?

- CV – no “big” papers
- But these **consistent** with the research proposed

Paper 1: Kolář F[✉], Píšová S, Závěská E, Fér T, Weiser M, Ehrendorfer F, Suda J (2015) The origin of unique diversity in deglaciated areas: traces of Pleistocene processes in north-European endemics from the *Galium pusillum* polyploid complex (Rubiaceae). – **Molecular Ecology**, 24: 1311–1334. (Non-self citations: 5, Impact factor: 6.1)

Paper 2: Čertner M, Sudová R, Weiser M, Suda J, Kolář F[✉] (2018) Ploidy-altered phenotype interacts with local environment and may enhance polyploid establishment in *Knautia serpentinicola* (Caprifoliaceae). – **New Phytologist**, doi 10.1111/nph.15426 (Impact factor: 7.4)

Paper 3: Kolář F[✉] *, Fuxová G*, Závěská E*, Nagano AJ, Hyklová L, Lučanová M, Kudoh H, Marhold K (2016) Northern glacial refugia and altitudinal niche divergence shape genome-wide differentiation in the emerging plant model *Arabidopsis arenosa*. – **Molecular Ecology** 25: 3929-3949, *equal contribution (Non-self citations: 15, Impact factor: 6.1)

Paper 4: Monnahan P*, Kolář F*, Baduel P*, Sailer C, Koch J, Horvath R, Laenen B, Schmickl R, Paajanen P, Šrámková G, Bohutínská M, Arnold B, Weismann C, Marhold K, Slotte T, Bomblies K, Yant L[✉]: Pervasive population genomic consequences of genome duplication in *Arabidopsis arenosa*. – **preprint** at www.biorxiv.org/content/early/2018/09/06/411041. *equal contribution

Paper 5: Kolář F, Čertner M, Suda J, Schönswetter P, Husband BC[✉] (2017) Mixed-ploidy species: progress and opportunities in polyploid research. – **Trends in Plant Science**, 22:1041-1055. (Non-self citations: 13, Impact factor: 11.9)



Without PhD supervisor !!!

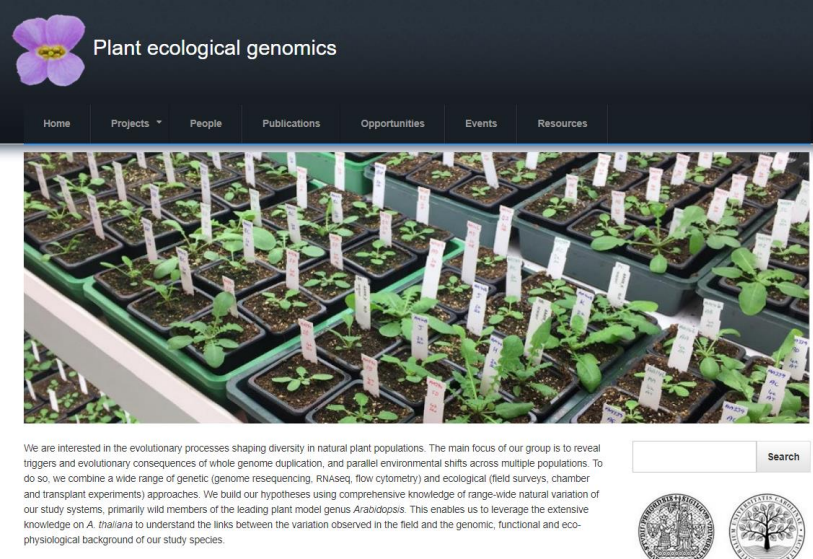
Who – competitive advantages?

- To link the 2 approaches I already used
 - Ecological experiments with polyploids (incl. toxic substrate)
 - Population genomics of polyploids
 - here integrate those in Ecological genomics (of polyploids)
- Already a (small) group & grants (!! PRIMUS)
 - advantage of PŘF UK environment

Project 2: 2017-2019 Junior researcher project, Czech Science Foundation (17-20357Y): Parallel adaptation to alpine environments in wild *Arabidopsis* (principal investigator, total € 220.000)

Project 3: 2017-2019 Junior group leader research project, Charles University (Primus/SCI/35): Wild *Arabidopsis* adaptomics (principal investigator total € 330.000)

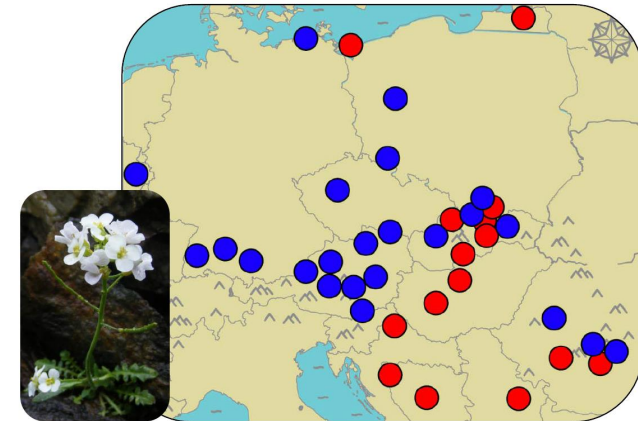
Project 4: 017-2020 FRIPRO Mobility project, Norwegian Research Council (262033): Parallel adaptation to changing environments in wild *Arabidopsis* populations (principal investigator, total € 350.000)



We are interested in the evolutionary processes shaping diversity in natural plant populations. The main focus of our group is to reveal triggers and evolutionary consequences of whole genome duplication, and parallel environmental shifts across multiple populations. To do so, we combine a wide range of genetic (genome resequencing, RNAseq, flow cytometry) and ecological (field surveys, chamber and transplant experiments) approaches. We build our hypotheses using comprehensive knowledge of range-wide natural variation of our study systems, primarily wild members of the leading plant model genus *Arabidopsis*. This enables us to leverage the extensive knowledge on *A. thaliana* to understand the links between the variation observed in the field and the genomic, functional and eco-physiological background of our study species.

My experience with genomics & ecology

- Population genomics of polyploidy
- Marie Curie individual fellowship (2014-2016)
- *Monnahan**, *Kolář**, *Baduel** ... *Yant 2019, Nature Ecology and Evolution*



- Ecological experiments with polyploids
- Head of the Ecological Genomics lab (2017-) (2 postdocs, 2 PhD students)
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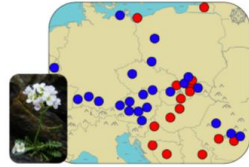


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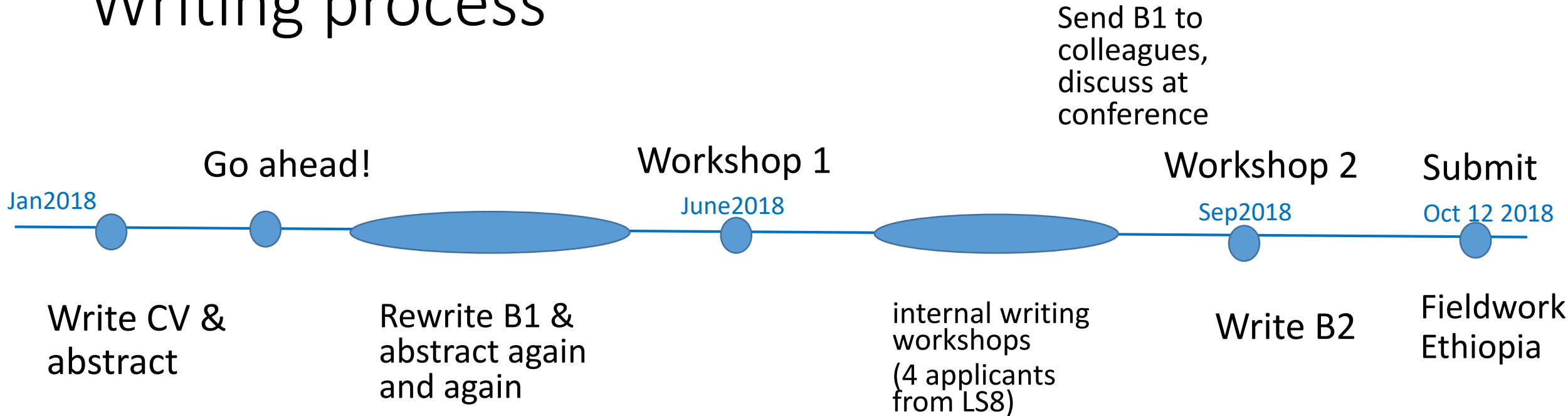
The PI has extensive experience in the study of polyploidy in plants and has a strong publication record. His training and independent and collaborative work demonstrate that he has the skills to complete the proposed work successfully.

The extent of creative and independent thinking is difficult for me to gauge. The proposed project seems to have high overlap with projects of Levi Yant, who has an ERC-funded project to address similar questions and who has recently written perspectives and papers that seem highly interconnected with this proposal. He is listed as a collaborator for future research but it is not clear whether this research would be in conflict or collaboration with Yant's.

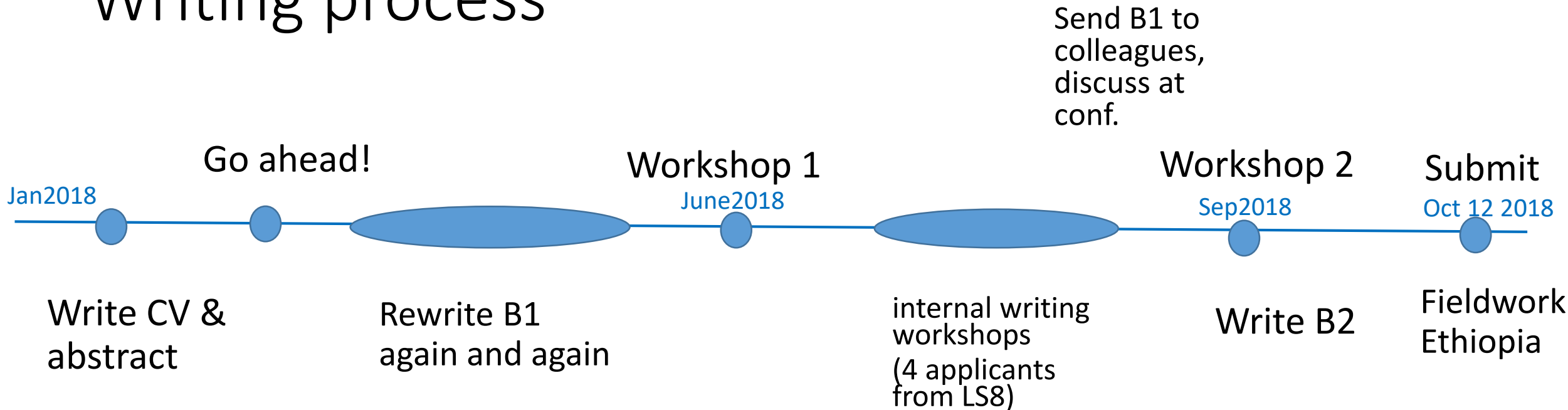
The PI has published 29 papers, about half in prominent journals for the field. He also has collaborations with excellent groups at the John Innes Institute. Overall, he is well suited for the proposed research.

The PI has a very strong track record in the study of plant polyploids in top plant evolution journals. Despite the lack of higher profile papers, I think this record is the type that bodes well for the success of the project.

Writing process



Writing process



- Gains

- Lots of feedback!
- Part of the community – further motivation!
- Make a research plan for next 5-10 yrs
- **Leave your comfort zone**
- ERC CZ

Implementation

- The panel therefore recommends the proposal to be retained for funding with a grant not exceeding 1,993,750 Euro.
 - ~500 M investment !
 - No restrictions within calendar years
 - Freedom, flexibility



Acknowledgements

- Zdeněk Strakoš, Ludmila Součková
- Our „LS8 gang“ (Jenda Hrček, Tonda Machač, Clément Lafon Placette)
- All my colleagues for feedback
- My colleagues from the group
- Family...

