

**The signatures of recombination and gene conversion in the bdelloid rotifer
*Adineta vaga***

Olga A. Vakhrusheva

Institute for Information Transmission Problems (Kharkevich Institute), Russian Academy of Sciences, Bolshoi Karetny pereulok 19, Moscow 127994, Russia, vakh57@gmail.com

Elena A. Mnatsakanova

Biological faculty, M.V. Lomonosov Moscow State University, Leninskie Gory 1-12, Moscow 119234, Russia, mnatsakan@yandex.ru

Yan Galimov

Koltsov Institute of Developmental Biology, Russian Academy of Sciences, 119334 Moscow, Russia, yangalimov@gmail.com

Tatiana V. Neretina

N.A.Pertsov White Sea Biological Station, Biological faculty, M.V. Lomonosov Moscow State University, Leninskie Gory 1-12, Moscow 119234, Russia, nertata@wsbs-msu.ru

Aleksey A. Penin

Belozersky Institute of Physico-Chemical Biology, M.V. Lomonosov Moscow State University, 119991, Moscow, Russia, alekseypenin@gmail.com

Maria D. Logacheva

Belozersky Institute of Physico-Chemical Biology, M.V. Lomonosov Moscow State University, 119991, Moscow, Russia, maria.log@gmail.com

Georgii A. Bazykin

Institute for Information Transmission Problems (Kharkevich Institute), Russian Academy of Sciences, Bolshoi Karetny pereulok 19, Moscow 127994, Russia, gbazykin@iitp.ru

Alexey S. Kondrashov

Department of Bioengineering and Bioinformatics, M. V. Lomonosov Moscow State University, Vorobyevy Gory 1-73, Moscow 119992, Russia; Life Sciences Institute and Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, Michigan 48109, USA, kondrash@umich.edu

Transition to asexual reproduction is often regarded as an evolutionary dead-end.

However the mere existence of ancient asexuals challenges this point of view [1].

Bdelloid rotifers are a large group of putative ancient asexuals that have presumably abandoned sexual reproduction tens of millions of years ago. Neither males nor meiosis have ever been observed in this clade [2]. In line with that genome structure of bdelloid rotifers seems to be incompatible with conventional meiosis [3].

However several studies based on the sequences of individual genes report that genetic exchange appears to occur in bdelloid rotifers.

To address the possibility of recombination in the bdelloid rotifer *Adineta vaga* on a whole-genome scale we sequenced genomes of 10 *A. vaga* clonal lineages.

Genomes of bdelloid rotifers pose substantial challenges for standard genome assembly approaches due to high degree of heterozygosity and atypical genomic structure devoid of homologous chromosome pairs. We obtained the draft genome assembly for one of 10 clonal *A. vaga* lineages using a combination of short insert paired-end libraries sequenced on the MiSeq platform and large insert mate-pair libraries sequenced on the HiSeq platform. The resulting assembly is used as a reference for downstream analysis of other sequenced samples.

We employ reference-based mapping approaches to look for recombination signatures in the whole genome polymorphism data for 10 *A. vaga* individuals.

A decay of LD with physical distance is observed in *A. vaga* population suggesting that *A. vaga* might engage in some form of sexual reproduction.

We noted a significant excess of homozygotes in the sequenced samples. Sliding-window analysis of the genome revealed extended tracts of homozygosity some of which are shared between samples. These observations are consistent with widespread gene conversion in the genomes of bdelloid rotifers.

References

1. J. M. Smith (1986) Evolution: contemplating life without sex, *Nature*, **324**:300–301.
2. C. W. Birky (2010) Positively negative evidence for asexuality, *J.Hered.*, **101**:S42–45.
3. J.-F. Flot et al. (2013) Genomic evidence for ameiotic evolution in the bdelloid rotifer *Adineta vaga*, *Nature*. **500**: 453–457.

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