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GENOME NOTE

The genome sequence of greater pond-sedge, *Carex riparia* Curtis (Poales: Cyperaceae)

[version 1; peer review: 1 approved]

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Abstract

We present a genome assembly of *Carex riparia* (greater pond-sedge; Streptophyta; Magnoliopsida; Poales; Cyperaceae). The assembly consists of two haplotypes with total lengths of 418.51 megabases and 411.14 megabases. Most of the haplotype 1 assembly (96.25%) was scaffolded into 36 chromosomal pseudomolecules. Haplotype 2 was assembled to scaffold level. Multiple mitochondrial sequences were also assembled. The plastid genome assembly has a length of 216.81 kilobases. This assembly was generated as part of the Darwin Tree of Life project, which produces reference genomes for eukaryotic species found in Britain and Ireland.

Keywords

Carex riparia, greater pond-sedge, genome sequence, chromosomal, Poales

This article is included in the Tree of Life gateway.

Open Peer Review

Approval Status ✓

	1
version 1 27 Nov 2026	✓ view

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Any reports and responses or comments on the article can be found at the end of the article.

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Species taxonomy

Eukaryota; Viridiplantae; Streptophyta; Streptophytina; Embryophyta; Tracheophyta; Euphyllophyta; Spermatophyta; Magnoliopsida; Mesangiospermae; Liliopsida; Petrosaviidae; commelinids; Poales; Cyperaceae; Cyperoideae; Cariceae; *Carex*; *Carex subgen. Carex*; *Carex riparia* Curtis (NCBI:txid312765)

Background

Carex riparia Curtis (greater pond-sedge) spreads by long, creeping rhizomes and has stiff, upright, blue-green leaves. Its flowering stems reach 1.3 m and bear several male spikes above the female spikes (Jermy *et al.*, 2007). In Britain and Ireland, it grows mainly in base-rich lowland wetlands, including reed swamps, lake margins and the banks of slow-flowing rivers and canals (Porter & Foley, 2023). Its native range extends from Europe to Central Asia and includes Algeria and Morocco. It has been introduced to New Zealand's North Island (POWO, 2026).

We sequenced the genome of *Carex riparia* as part of the Darwin Tree of Life Project, which aims to generate high-quality reference genomes for all named eukaryotic species in Britain and Ireland to support research, conservation, and the sustainable use of biodiversity. The sequenced specimen was collected at Radbrook Common, Wytham Woods, Oxfordshire, UK (Figure 1).


HERB. HORT. KEW.
ROYAL BOTANIC GARDENS KEW
K001527202
Flora of the United Kingdom
England
Cyperaceae
Carex riparia Curtis
Oxfordshire, Wytham Woods, Radbrook Common, Pond edge
100 m elevation; 51.7643° N; -01.3374° W
Coll. Maarten J. M. Christenhusz no.: 9571
with Keith Kirby, Ilia Leitch, Paul Kersey and José Ignacio Márquez-Corro
21 June 2023
duplicates: E, K.
Darwin Tree of Life project KDTOL10864
https://www.darwintreeoflife.org
M000648
Kew
copyright reserved

Figure 1. ***Carex riparia*** **(lpCarRipa1) from which samples were taken for genome sequencing.**

Methods

Sample acquisition, flow cytometry and DNA barcoding

A specimen of *C. riparia* (specimen ID KDTOL10864, ToLID lpCarRipa1; Figure 1) was used for genome sequencing. It was collected at a pond edge on Radbrook Common, Wytham Woods, Oxfordshire, UK (latitude 51.7643, longitude −1.3374) on 21 June 2023 by Maarten Christenhusz, Keith Kirby, Paul Kersey, José Ignacio Márquez-Corro and Ilia Leitch, and identified by José Ignacio Márquez-Corro. We recorded specimen and sample metadata using the Darwin Tree of Life Sample Manifest and the guidance developed by the project's Samples Working Group (Lawniczak *et al.*, 2022). The herbarium voucher for the sequenced plant (collector number 9571) is deposited at Kew (K001527202).

The genome size was estimated by flow cytometry following the 'one-step' method outlined in Pellicer *et al.* (2021) and using propidium iodide as the fluorochrome. The General Purpose Buffer (GPB) supplemented with 3% PVP was used for isolation of nuclei (Loureiro *et al.*, 2007). The internal calibration standard was *Solanum lycopersicum* L. 'Stupické polní rané' with an assumed 1C-value of 968 Mb (Doležel *et al.*, 2007).

The initial identification was verified by an additional DNA barcoding process according to the framework developed by Twyford *et al.* (2024). Part of the plant specimen was preserved in silica gel desiccant (Chase & Hills, 1991). DNA extracted from the dried plant was amplified by PCR for standard barcode markers, with the amplicons sequenced and compared to public sequence databases including GenBank and the Barcode of Life Database (BOLD) (Ratnasingham & Hebert, 2007). Following whole-genome sequencing, the relevant DNA barcode region was also used alongside the initial barcoding data for sample tracking at the WSI (Twyford *et al.*, 2024). The standard operating procedures for Darwin Tree of Life barcoding are available on protocols.io.

Sample preparation

We followed the Tree of Life triage protocol described by Howard *et al.* (2025). During triage, we weighed the material supplied and, where necessary, divided it into portions according to the tissue type, the amount available and the intended use. Genomic DNA extraction and Hi-C used aliquots of the same leaf preparation from specimen lpCarRipa1. The leaf was ground to a powder by cryogenic bead beating.

DNA extraction

We extracted high molecular weight DNA from 68 mg of leaf tissue using the plant MagAttract v4 protocol. The DNA was sheared on a Megaruptor 3 and then purified using automated SPRI with 1× AMPure beads on a KingFisher. We measured the mean fragment length on an Agilent Femto Pulse system and the DNA concentration with a Qubit fluorometer and the dsDNA High Sensitivity Assay Kit. The mean fragment length was 14.7 kb, and the DNA concentration after SPRI clean-up was 17.99 ng/μL. The eluate contained 989.45 ng of DNA.

PacBio HiFi library preparation and sequencing

We prepared a library with the SMRTbell Prep Kit 3.0. The library was sequenced in a four-plex pool on a PacBio Revio using the Revio sequencing plate at a loading concentration of 274 pM with 24 h of data collection per SMRT Cell.

Hi-C tissue preparation, library preparation and sequencing

We isolated nuclei from the Hi-C leaf aliquot and fixed them for 10 min in phosphate-buffered saline containing 2% formaldehyde, following the Tree of Life plant protocol. After proximity ligation with the Arima-HiC v2 kit, we enriched fragments containing biotin-labelled ligation junctions and prepared a library with the NEBNext Ultra II DNA Library Prep Kit. The library was sequenced in paired-end mode on an Illumina NovaSeq X.

Genome assembly

Prior to assembly of the PacBio HiFi reads, a database of *k*-mer counts ($k = 31$) was generated from the filtered reads using FastK. The *k*-mer frequency distribution was analysed with GenomeScope 2.0 (Ranallo-Benavidez *et al.*, 2020), providing fitted point estimates of haploid genome size, heterozygosity and repeat content.

The HiFi reads were assembled using Hifiasm in Hi-C phasing mode (Cheng *et al.*, 2021, 2022), producing two haplotypes. Hi-C reads (Rao *et al.*, 2014) were mapped to contigs using bwa-mem2 (Vasimuddin *et al.*, 2019). Contigs were further scaffolded with

Hi-C data in YaHS (Zhou *et al.*, 2023), using the --break option for handling potential misassemblies. The scaffolded assemblies were evaluated using Gfastats (Formenti *et al.*, 2022), BUSCO (Manni *et al.*, 2021; Tegenfeldt *et al.*, 2025) and MerquryFK (Rhie *et al.*, 2020). The organelle genomes were assembled using OATK (Zhou *et al.*, 2025). The comparator for the mitochondrial assembly was the mitochondrial genome of *Carex pseudochinensis* (NC_087862.1). The comparator for the plastid assembly was the chloroplast genome of *Carex siderosticta* (PP790566.1).

Assembly curation

The assembly was decontaminated using the Assembly Screen for Cobionts and Contaminants (ASCC) pipeline. The flat files and maps for curation were generated with TreeVal. Manual curation was conducted primarily in PretextView. Scaffolds were visually inspected and corrected as described by Howe *et al.* (2021). The two haplotype assemblies were combined for curation. Manual corrections included five breaks, 14 joins, and removal of five haplotypic duplications. This reduced the scaffold count by 3.2% and increased the scaffold N50 by 1.0%. The curation process is described at sanger-tol/curation-resources. A Hi-C contact map of the haplotype 1 assembly was generated with PretextSnapshot.

Assembly quality assessment

The MerquryFK tool (Rhie *et al.*, 2020) was run in a Singularity container (Kurtzer *et al.*, 2017) to evaluate *k*-mer completeness and assembly quality for both haplotypes using the *k*-mer database (k = 31) computed prior to genome assembly. The analysis outputs included assembly QV scores and completeness statistics.

Gene-set completeness was assessed with BUSCO (Tegenfeldt *et al.*, 2025), using the poales_odb12 lineage dataset (n = 6,282) in eukaryotic genome mode, with miniprot (Li, 2023). This assessment was produced by sanger-tol/busco.

The haplotype 1 assembly was assessed using BlobToolKit (Challis *et al.*, 2020). PacBio reads were mapped to the assembly to derive sequence coverage. Within this workflow, BUSCO (Tegenfeldt *et al.*, 2025) was used to assess gene-set completeness. DIAMOND BLASTp searches of extracted BUSCO proteins and DIAMOND BLASTx searches of assembly sequences against UniProt Reference Proteomes (Buchfink *et al.*, 2021), followed by BLASTn searches of sequences without DIAMOND BLASTx hits against the NCBI nt database (Altschul *et al.*, 1990), supported taxonomic assignment. Coverage, sequence composition, taxonomic assignment and the workflow's BUSCO results were integrated into a BlobDir for interactive inspection and visualisation. The snail and blob plots were rendered locally from this hosted BlobDir using BlobTk. The scaffold-length radial scale function for the snail plot was set to linear (Challis & Blaxter, 2026). The blob plot used circular markers with area proportional to scaffold length (Challis *et al.*, 2020).

Genome sequence report

Sequence data

The genome of a specimen of *C. riparia* was sequenced using Pacific Biosciences single-molecule HiFi long reads, generating 16.15 Gb (gigabases) from 1.45 million reads. These reads were used to assemble the genome. GenomeScope 2.0 analysis using a p = 2 model gave a *k*-mer-based haploid genome size estimate of 431.61 Mb, with heterozygosity of 1.54% and repeat content of 38.61%; the full-model fit was 98.11% (Figure 2). Using flow cytometry, the genome size (1C-value) of the sample was estimated to be 0.47 pg, equivalent to 460.00 Mb. These estimates guided expectations for the assembly. The NCBI assembly record reports 36× genome coverage. Hi-C sequencing produced 149.79 Gb from 495.99 million read pairs, which were used to scaffold the haplotype 1 assembly. Table 1 summarises the specimen and sequencing details.

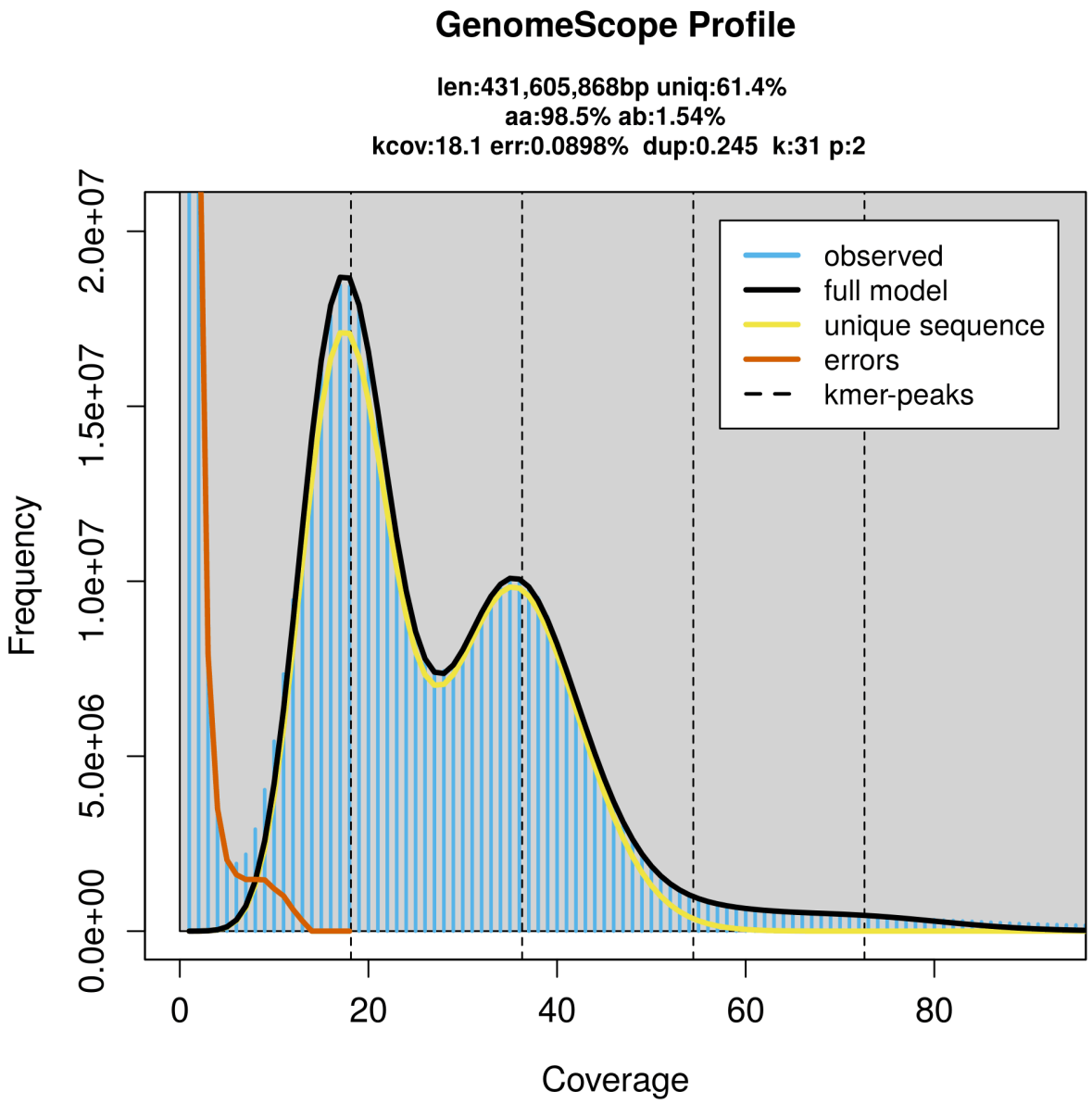

Figure 2. GenomeScope 2.0 model fitted to the *k*-mer frequency distribution. The plot shows the observed and modelled *k*-mer spectra used to estimate haploid genome size, heterozygosity and repeat content from unassembled sequencing reads.

Table 1. Specimen and sequencing data for *C. riparia* (BioProject PRJEB81075)

Platform	PacBio HiFi	Hi-C
ToLID	lpCarRipa1	lpCarRipa1
Specimen ID	KDTOL10864	KDTOL10864
BioSample (source individual)	SAMEA114563348	SAMEA114563348
BioSample (tissue)	SAMEA114563446	SAMEA114563446

Platform	PacBio HiFi	Hi-C
Tissue	leaf	leaf
Instrument	Revio	Illumina NovaSeq X
Library ID & run accession(s)	DTOL14809424: ERR13800622	SQPP-57740-N:G1: ERR13802754
Read count total	1.45 million reads	495.99 million read pairs
Base count total	16.15 Gb	149.79 Gb

Assembly statistics

The genome was assembled into two haplotypes using Hi-C phasing. The haplotype 1 assembly was curated to chromosome level, while haplotype 2 was assembled to scaffold level. The haplotype 1 assembly, which is proposed as the reference assembly for this species, has a total length of 418.51 Mb in 175 scaffolds (excluding organelle sequences), with 199 gaps, and its scaffold N50 is 11.22 Mb (Table 2). The scaffold auN for the haplotype 1 assembly is 11.7 Mb.

Table 2. Genome assembly statistics for *C. riparia*

Genome assembly	Haplotype 1	Haplotype 2
Assembly name	lpCarRipa1.hap1.2	lpCarRipa1.hap2.2
Assembly accession	GCA_964374305.2	GCA_964374325.2
Assembly level	chromosome	scaffold
Span (Mb)	418.51	411.14
Number of chromosomes	36	-
Number of contigs	374	315
Contig N50 (Mb)	2.77	3.21
Number of scaffolds (excluding organelle sequences)	175	148
Scaffold N50 (Mb)	11.22	11.23
Scaffold auN (Mb)	11.7	11.6
Longest scaffold length (Mb)	20.89	19.47
Organelles	Mitochondrial genomes: 412.50; 146.99; 105.27; 67.72; 91.36; 94.56; 273.31 kb; Plastid genome: 216.81 kb	-

Most of the haplotype 1 assembly sequence (96.25%) was assigned to 36 chromosome-level scaffolds. These chromosome-level scaffolds, confirmed by Hi-C data, are named according to size (Figure 3; Table 3).

Multiple mitochondrial genomes (7) and the plastid genome (length 216.81 kb, OZ335705.1) were also assembled. These sequences are included as contigs in the multifasta file of the haplotype 1 genome submission and as standalone records.

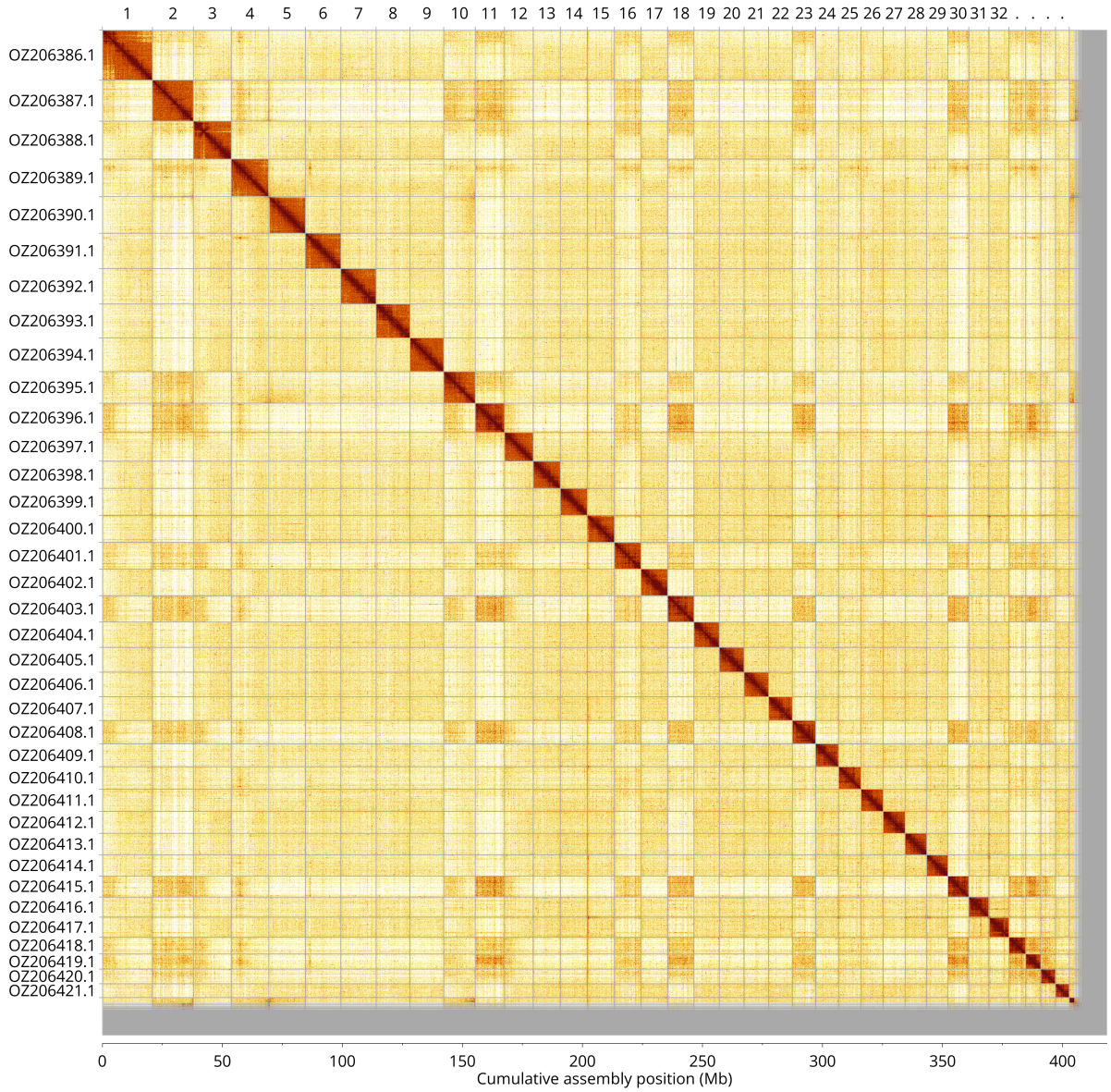

Figure 3. Hi-C contact map of the *C. riparia* haplotype 1 assembly. Assembled chromosomes are shown in order of size and labelled along the axes, with a megabase scale shown below. The plot was generated using PretextSnapshot.

Table 3. Chromosomal pseudomolecules in the haplotype 1 genome assembly of *C. riparia* lpCarRipa1

INSDC accession	Molecule	Length (Mb)	GC%
OZ206386.1	1	20.89	33.50
OZ206387.1	2	17.07	33.50
OZ206388.1	3	15.84	33.50
OZ206389.1	4	15.66	34
OZ206390.1	5	15.14	34
OZ206391.1	6	14.84	33.50
OZ206392.1	7	14.62	33.50

INSDC accession	Molecule	Length (Mb)	GC%
OZ206393.1	8	14.16	33.50
OZ206394.1	9	14	34
OZ206395.1	10	13.16	33.50
OZ206396.1	11	12.19	33.50
OZ206397.1	12	12	33.50
OZ206398.1	13	11.28	34
OZ206399.1	14	11.22	33.50
OZ206400.1	15	11.22	34
OZ206401.1	16	11.12	34
OZ206402.1	17	11.11	33.50
OZ206403.1	18	10.92	33.50
OZ206404.1	19	10.61	34
OZ206405.1	20	10.29	33.50
OZ206406.1	21	10.24	34
OZ206407.1	22	9.86	34
OZ206408.1	23	9.68	33.50
OZ206409.1	24	9.59	34
OZ206410.1	25	9.31	33.50
OZ206411.1	26	9.24	33.50
OZ206412.1	27	9.18	33.50
OZ206413.1	28	8.97	33.50
OZ206414.1	29	8.82	34
OZ206415.1	30	8.69	33.50
OZ206416.1	31	8.42	33.50
OZ206417.1	32	8.30	34
OZ206418.1	33	7.04	34
OZ206419.1	34	6.23	33.50
OZ206420.1	35	6.08	34
OZ206421.1	36	5.80	34

Assembly quality metrics

For the haplotype 1 assembly, the estimated QV is 66.1, and for the haplotype 2 assembly, 65.9. When the two haplotypes are combined, the assembly achieves an estimated QV of 66.0. The *k*-mer completeness is 73.09% for the haplotype 1 assembly, 72.70% for the haplotype 2 assembly, and 99.17% for the combined haplotypes (Figure 4).

BUSCO analysis using the poales_odb12 reference set (n = 6,282) identified 97.7% of the expected gene set (single = 93.4%, duplicated = 4.3%) in the haplotype 1 assembly. For the haplotype 2 assembly, BUSCO analysis identified 97.7% of the expected gene set (single = 93.7%, duplicated = 4.1%).

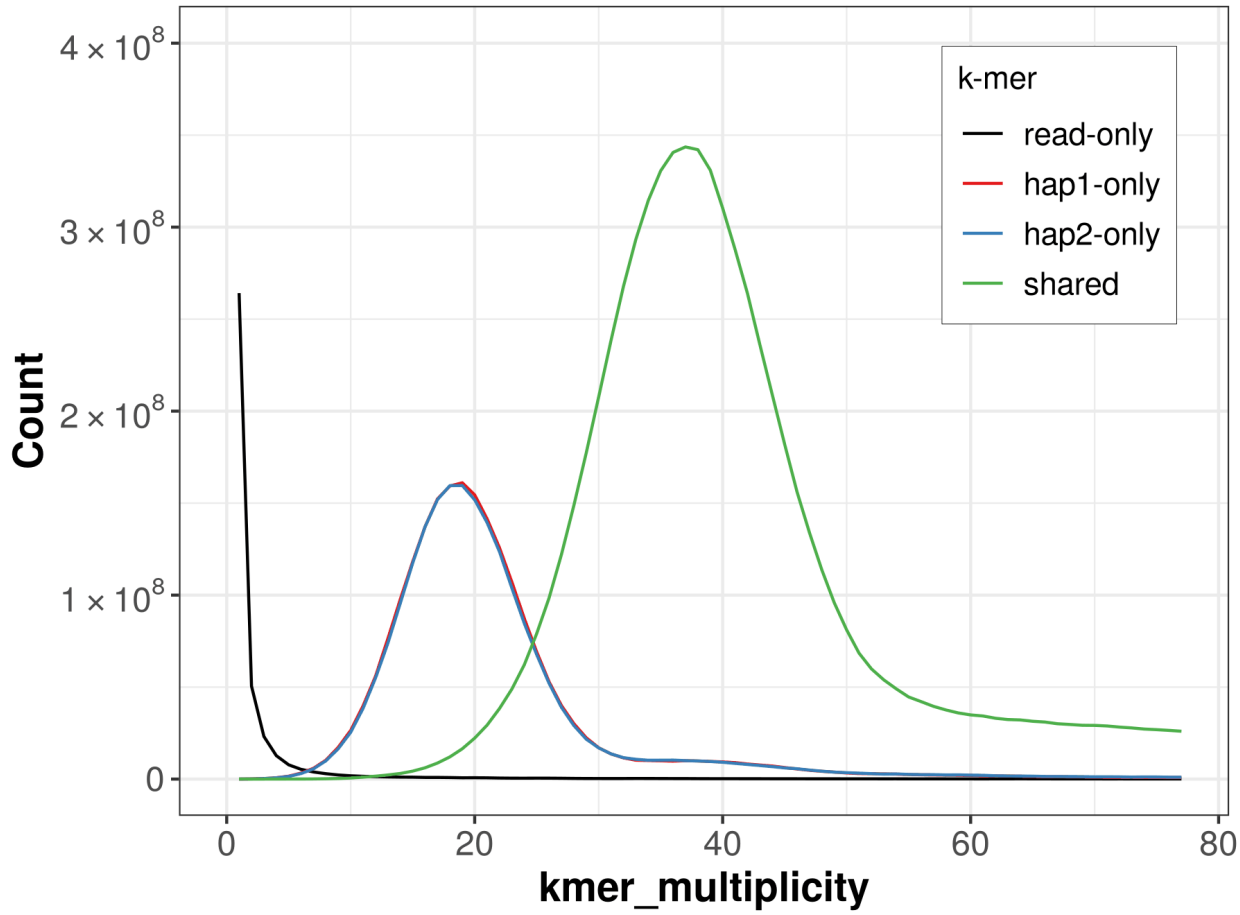

Figure 4. Evaluation of *k*-mer completeness using MerquryFK. This plot illustrates the recovery of *k*-mers from the original read data in the haplotype 1 assembly, the haplotype 2 assembly and the combined haplotypes. The horizontal axis represents *k*-mer multiplicity, and the vertical axis shows the number of *k*-mers. The black curve represents *k*-mers that appear in the reads but are not assembled, while the remaining curves correspond to *k*-mers recovered in the assemblies shown.

The snail plot in Figure 5 provides a summary of assembly contiguity, cumulative scaffold count and sequence composition for the haplotype 1 assembly (Challis & Blaxter, 2026). The relative sizes of the longest scaffold, scaffold N50 and N90, together with the dark-grey scaffold-length distribution, show how much of the assembly is contained in long scaffolds. The outer composition track shows variation in GC, AT and N content, while the central track shows the cumulative scaffold count.

The blob plot in Figure 6 displays scaffolds from the haplotype 1 assembly by GC proportion and base coverage. Marker area is proportional to scaffold length, and colour indicates taxonomic assignment (Challis *et al.*, 2020).

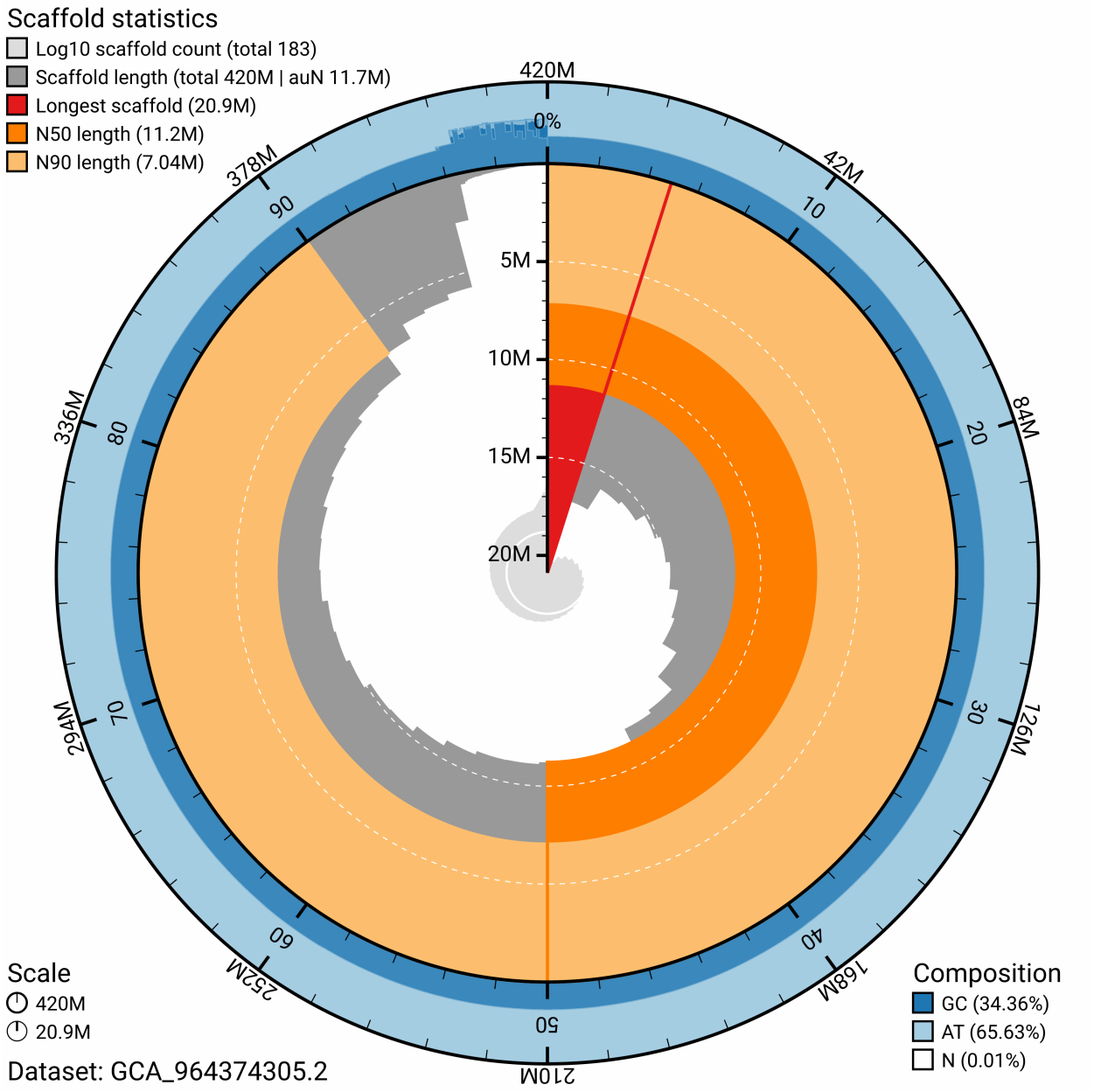

Figure 5. Assembly metrics for lpCarRipa1.hap1.2, the haplotype 1 assembly. The BlobToolKit snail plot provides an overview of assembly contiguity and sequence composition. The circumference represents the length of the haplotype 1 assembly, and the main plot is divided into 1,000 bins around the circumference. The outermost blue tracks display the distribution of GC, AT, and N percentages across the bins. Scaffolds are arranged clockwise from longest to shortest and are depicted in dark grey. Scaffold length is shown on a linear radial scale, scaled to the longest scaffold. Red shading indicates the longest scaffold, and the deeper orange and pale orange shading represent the N50 and N90 lengths. The summary statistics include scaffold auN, the area under the scaffold Nx curve. The light grey spiral at the centre shows the cumulative scaffold count on a logarithmic scale. The assembly can be explored interactively in the BlobToolKit viewer.

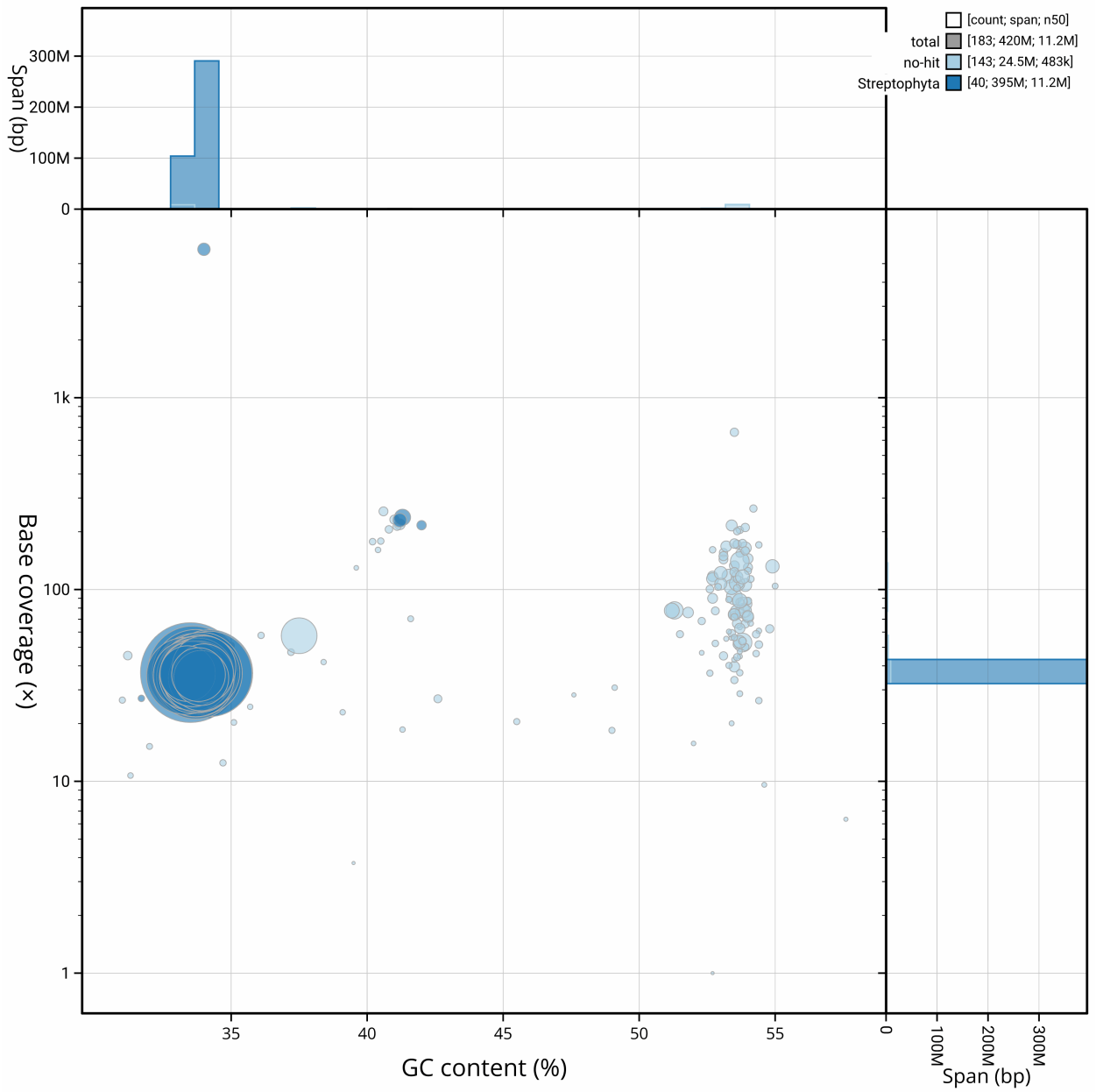

Figure 6. BlobToolKit blob plot for lpCarRipa1.hap1.2, the haplotype 1 assembly. The plot shows base coverage (vertical axis) and GC content (horizontal axis). Circles represent scaffolds; marker area is proportional to scaffold length, and colour indicates taxonomic assignment. The histograms along the axes display the total length of sequences distributed across different levels of coverage and GC content. The assembly can be explored interactively in the BlobToolKit viewer.

Table 4 presents assembly quality metrics alongside the Earth BioGenome Project (EBP) benchmarks described by Howe *et al.* (2026). The three-part EBP metric calculated for the haplotype 1 assembly is **6.C.Q66**.

Table 4. Earth BioGenome Project summary metrics for the *C. riparia* assembly

Measure	Value	*Benchmark*
EBP summary (haplotype 1)	6.C.Q66	*6.C.Q40*

Measure	Value	*Benchmark*
Contig N50 length	2.77 Mb	*> 1 Mb*
Scaffold N50 length	11.22 Mb	*= chromosome N50*
Consensus quality (QV)	Haplotype 1: 66.1; haplotype 2: 65.9; combined: 66.0	*# 40*
k-mer completeness	Haplotype 1: 73.09%; Haplotype 2: 72.70%; combined: 99.17%	*> 90% (combined assembly)*
BUSCO	Haplotype 1: C:97.7% [S:93.4%, D:4.3%], F:0.9%, M:1.4%, n:6,282; Haplotype 2: C:97.7% [S:93.7%, D:4.1%], F:0.8%, M:1.5%, n:6,282	*C > 90%*
Percentage of assembly assigned to chromosomes	96.25%	*# 90%*

Notes: The EBP summary reports log10(contig N50), rounded down; C for chromosome-scale scaffolding or log10(scaffold N50), rounded down; and Q for consensus quality (Merqury QV). BUSCO v6.1.0, poales_odb12: C=complete; S=single-copy; D=duplicated; F=fragmented; M=missing; n=orthologues. BUSCO short summaries: haplotype 1 and haplotype 2. For plants, total BUSCO completeness (C) replaces the EBP single-copy benchmark to accommodate biological duplication.

Data availability

European Nucleotide Archive: Carex riparia. Accession number PRJEB81075; https://identifiers.org/ena.embl/PRJEB81075. The genome sequence is released openly for reuse. The *C. riparia* genome sequencing initiative is part of the Darwin Tree of Life Project (PRJEB40665) and the Sanger Institute Tree of Life Programme (PRJEB43745). All raw sequence data and the haplotype assemblies have been deposited in INSDC databases. The genome will be annotated using available RNA-Seq data and presented through the Ensembl pipeline at the European Bioinformatics Institute. Raw data and assembly accession identifiers are reported in Table 1 and Table 2.

Pipelines used for genome assembly at the WSI Tree of Life are available at https://pipelines.tol.sanger.ac.uk/pipelines. Table 5 lists software versions used in this study.

Table 5. Software versions and sources

Software	Version	Source
bedtools	2.31.0; 2.31.1	https://github.com/arq5x/bedtools2
BLAST	2.14.0	https://ftp.ncbi.nlm.nih.gov/blast/executables/blast+/
BlobTk (hosted BlobDir)	0.5.1	https://github.com/genomehubs/blobtk
BlobTk (snail and blob plot renderer)	0.8.3	https://github.com/genomehubs/blobtk
BlobToolKit	4.3.9; 4.4.6	https://github.com/genomehubs/blobtoolkit
BUSCO	6.0.0; 5.5.0; 6.1.0	https://gitlab.com/ezlab/busco
bwa-mem2	2.2.1	https://github.com/bwa-mem2/bwa-mem2
DIAMOND	2.1.8	https://github.com/bbuchfink/diamond
fasta_windows	0.2.4	https://github.com/tolkit/fasta_windows
FastK	1.2	https://github.com/thegenemyers/FASTK
GenomeScope 2.0	2.1.0	https://github.com/tbenavi1/genomescope2.0

Software	Version	Source
Gfastats	1.3.6	https://github.com/vgl-hub/gfastats
Hifiasm	0.19.8-r603	https://github.com/chhylp123/hifiasm
MerquryFK	1.2	https://github.com/thegenemyers/MERQURY.FK
Minimap2	2.24-r1122; 2.28-r1209	https://github.com/lh3/minimap2
miniprot	0.18-r281	https://github.com/lh3/miniprot
MultiQC	1.14; 1.17 and 1.18	https://github.com/MultiQC/MultiQC
Nextflow	23.10.0; 24.10.4; 25.10.0; 25.10.4	https://github.com/nextflow-io/nextflow
Oatk	1.0	https://github.com/c-zhou/oatk
PretextSnapshot	0.0.9	https://github.com/sanger-tol/PretextSnapshot
PretextView	1.0.3	https://github.com/sanger-tol/PretextView
samtools	1.17; 1.18; 1.19.2; 1.2; 1.21; 1.6	https://github.com/samtools/samtools
sanger-tol/ascc	0.1.0	https://github.com/sanger-tol/ascc
sanger-tol/blobtoolkit	v0.9.0; 0.6.0	https://github.com/sanger-tol/blobtoolkit
sanger-tol/busco	v0.3.0; v0.3.1; 0.3.1	https://github.com/sanger-tol/busco
sanger-tol/curationpretext	1.4.2	https://github.com/sanger-tol/curationpretext
Seqtk	1.4-r122	https://github.com/lh3/seqtk
Singularity	3.9.0	https://github.com/sylabs/singularity
TreeVal	1.1.1	https://github.com/sanger-tol/treeval
YaHS	1.2a.2	https://github.com/c-zhou/yahs

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- Members of the Plant Genome Sizing Collective
- Members of the Darwin Tree of Life Barcoding collective
- Members of the Wellcome Sanger Institute Tree of Life Management, Samples and Laboratory team
- Members of Wellcome Sanger Institute Scientific Operations – Sequencing Operations
- Members of the Wellcome Sanger Institute Tree of Life Core Informatics team
- Members of the Tree of Life Core Informatics collective
- Members of the Darwin Tree of Life Consortium

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The materials that have contributed to this genome note have been supplied by a Darwin Tree of Life Partner. The submission of materials by a Darwin Tree of Life Partner is subject to the **'Darwin Tree of Life Project Sampling Code of Practice'**, which can be found in full on the Darwin Tree of Life website. By agreeing with and signing up to the Sampling Code of Practice, the Darwin Tree of Life Partner agrees they will meet the legal and ethical requirements and standards set out within this document in respect of all samples acquired for, and supplied to, the Darwin Tree of Life Project. Further, the Wellcome Sanger Institute employs a process whereby due diligence is carried out proportionate to the nature of the materials themselves, and the circumstances under which they have been/are to be collected and provided for use. The purpose of this is to address and mitigate any potential legal and/or ethical implications of receipt and use of the materials as part of the research project, and to ensure that in doing so we align with best practice wherever possible. The overarching areas of consideration are:

- Ethical review of provenance and sourcing of the material

- Legality of collection, transfer and use (national and international)

Each transfer of samples is further undertaken according to a Research Collaboration Agreement or Material Transfer Agreement entered into by the Darwin Tree of Life Partner, Genome Research Limited (operating as the Wellcome Sanger Institute), and in some circumstances, other Darwin Tree of Life collaborators.

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Open Peer Review

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✔ **Automated Benchmarking**

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As this article is a Genome Note, Automated Benchmarking has been used to determine whether the reported assembly passes four defined checks established by the Earth BioGenome Project: the raw and assembled data are publicly available, the Earth BioGenome Project three-part metric is met, the k-mer completeness exceeds 90%, and the BUSCO score passes the stated threshold.

For Carex riparia (lpCarRipa1), all four checks passed.

Data available: pass. ENA study PRJEB81075, raw-read accessions ERR13800622 and ERR13802754, and assembly accessions GCA_964374305.2 and GCA_964374325.2 are public.

Earth BioGenome Project three-part metric: pass. Haplotype 1 is reported as 6.C.Q66, meeting the 6.C.Q40 reference standard.

k-mer completeness: pass. The combined haplotype assemblies have 99.17% k-mer completeness, exceeding the Earth BioGenome Project target of 90%.

BUSCO: pass. Haplotype 1, which is proposed as the reference assembly for this species, has 97.7% complete BUSCOs (93.4% single-copy and 4.3% duplicated). BUSCO software version: 6.1.0; lineage dataset: poales_odb12. It meets the plant-specific target of greater than 90% complete BUSCOs.

This decision uses values reported in the Genome Note and public accession records.

Competing Interests: This Automated Benchmarking peer-review report was generated automatically and relies on analyses performed by the Tree of Life programme, which also produced the Genome Note under review.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.