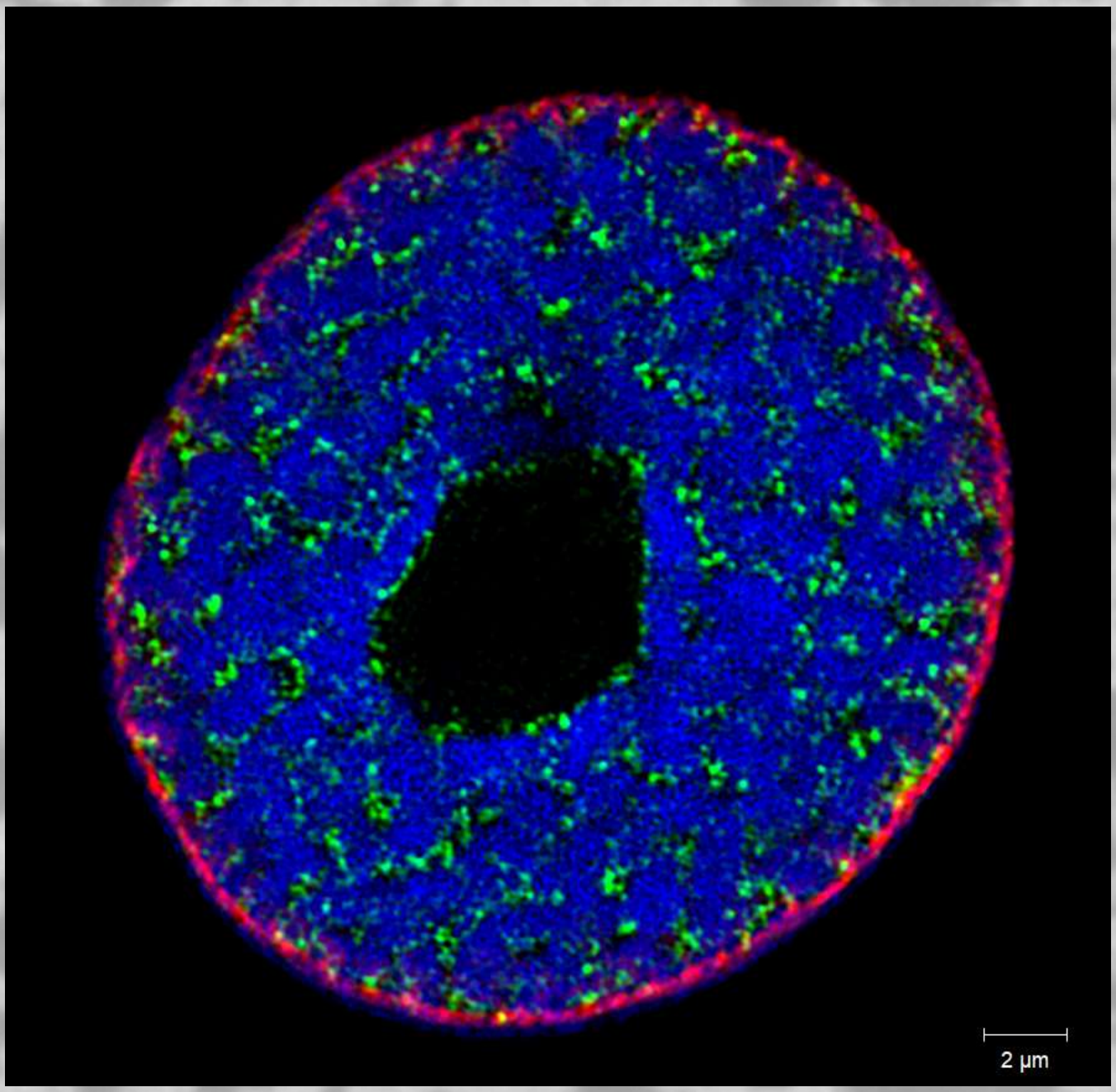
Chromosome Biology 2025



8th Edition

Leibniz Association

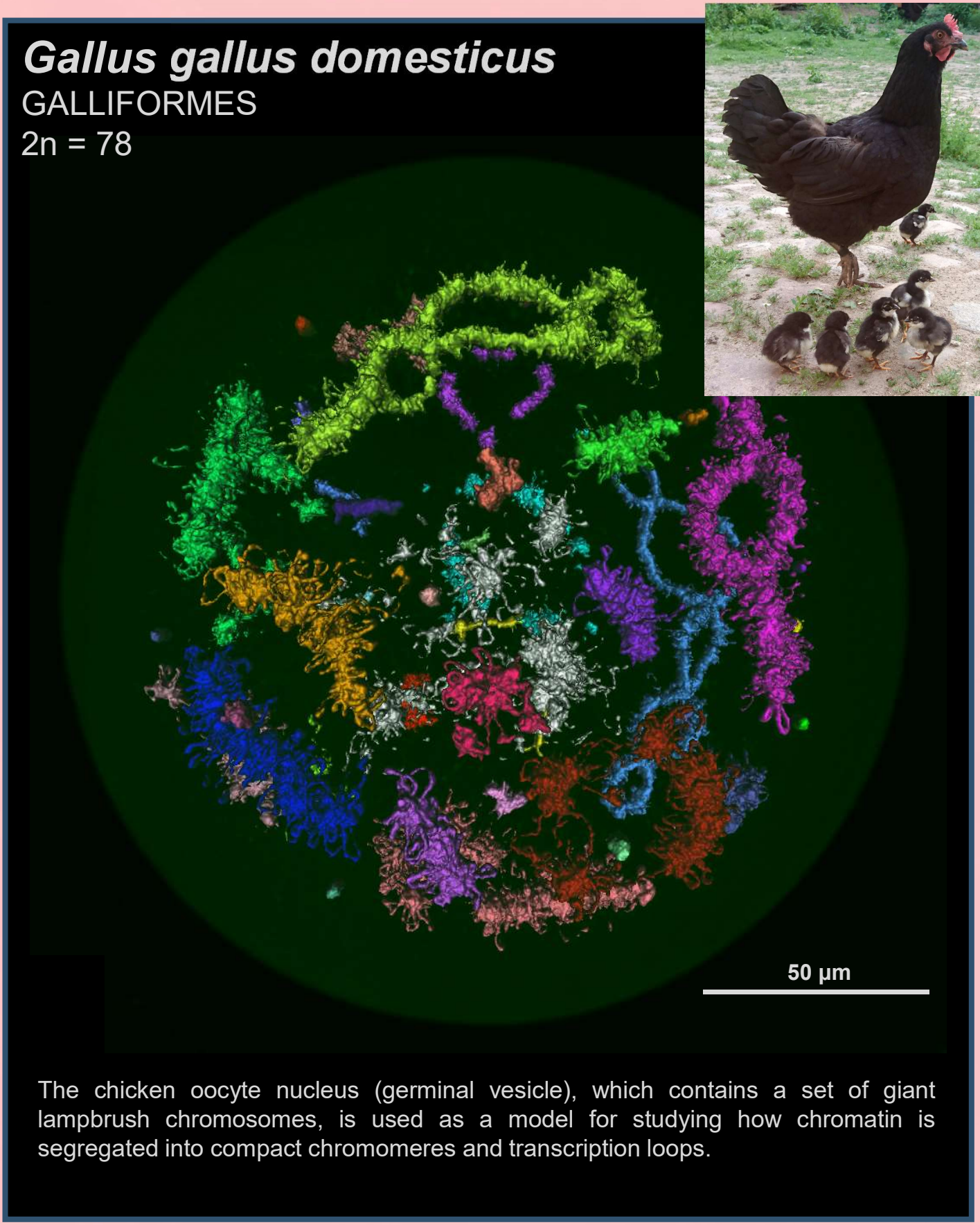
IPK LEIBNIZ INSTITUTE

JANUARY

Gallus gallus domesticus

GALLIFORMES

2n = 78



The chicken oocyte nucleus (germinal vesicle), which contains a set of giant lampbrush chromosomes, is used as a model for studying how chromatin is segregated into compact chromomeres and transcription loops.

Alla Krasikova and Antonina Maslova (Saint-Petersburg State University, Saint-Petersburg, Russia)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

FEBRUARY

***Allium cepa*.**
AMARYLLIDACEAE
2n =2x= 16

Onion is the most widely cultivated species of the genus *Allium* and a favorable cytological object.

Mitotic cycle of onion in one microscope view

Hieronim Golczyk; John Paul II Catholic University of Lublin, Poland

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

MARCH

Arabidopsis thaliana
BRASSICACEAE
2n = 10

A hallmark during meiosis is the formation of synaptonemal complex (SC), a tripartite structure composed of two lateral elements (LEs) and one central region (CR). Here, the SC is depicted by immunostaining of REC8 (LEs, light blue) and ZYP1 (CR, red) together with super-resolution structured illumination microscopy.

2 µm

Chao Feng, Veit Schubert and Stefan Heckmann (IPK Gatersleben, Germany)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

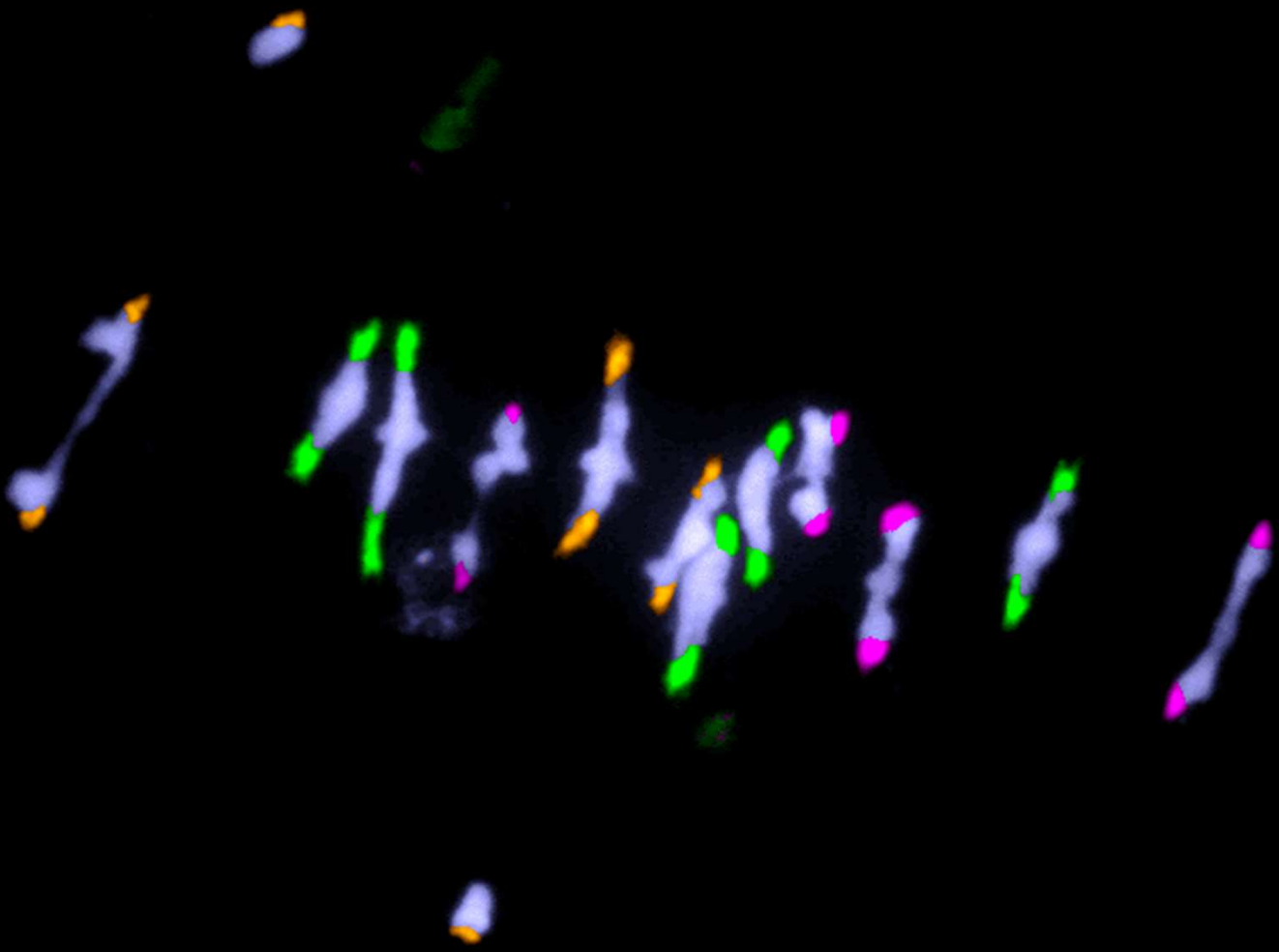
April

Chromosome Waltz

Arabidosis thaliana

At x Al

Arabidosis lyrata



Chromosome pairing in synthetic allotetraploid *A. thaliana* × *A. lyrata* during metaphase I. (Peri)centromeres of individual parental genomes are labelled with specific probes (green: *A. thaliana*, orange and pink: *A. lyrata*). Note two unpaired *A. lyrata* chromosomes (orange).

Alžběta Doležalová, Jana Szecówka, David Kopecký (Institute of Experimental Botany CAS, Olomouc, CZ)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

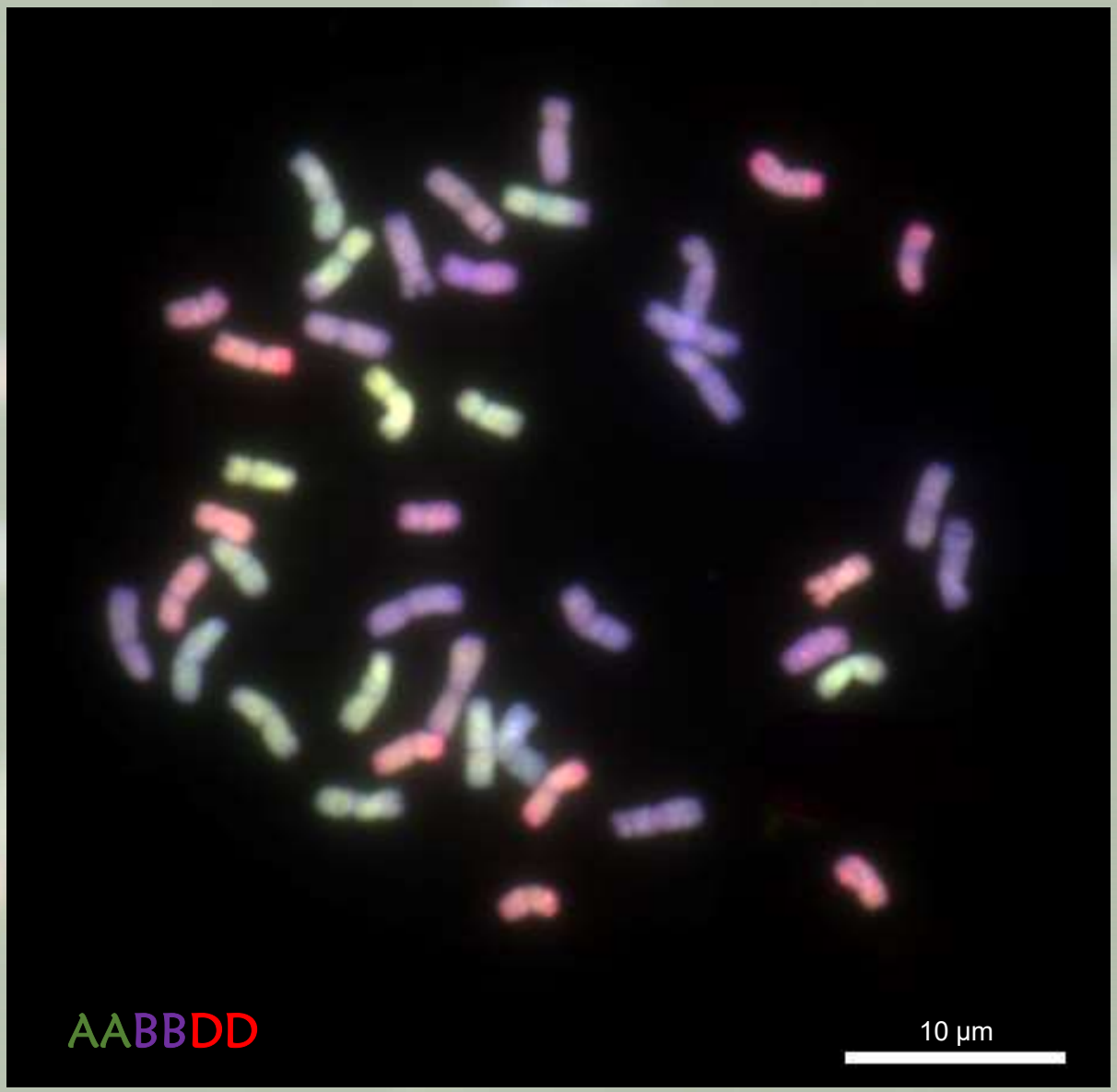
MAY

Triticum aestivum

POACEAE

(2*n*=6x=42, AABBDD)

Zang1817, a Tibetan semi-wild wheat accession, demonstrates genomic adaptations to high-altitude environments by accumulating stress-resilient haplotypes, enabling it to thrive under harsh conditions.



Huangyu Hong and Handong Su (Huazhong Agricultural University, China)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

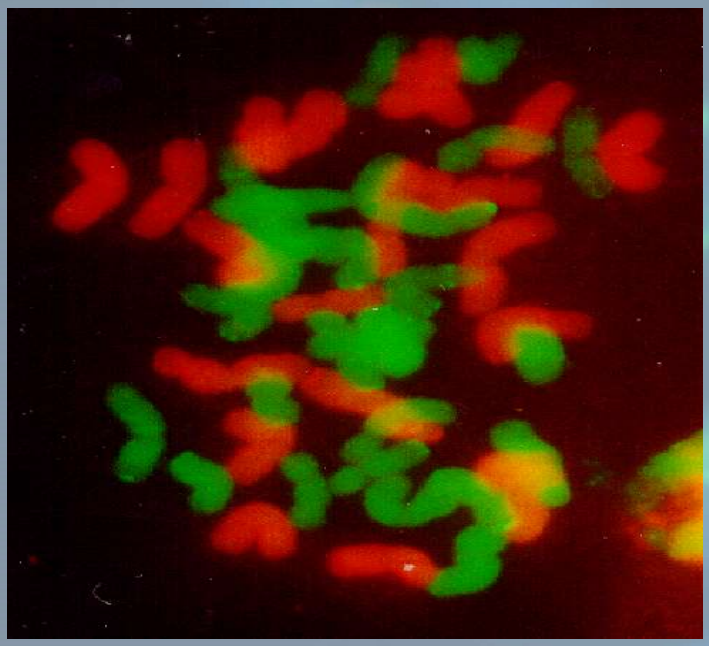
JUNE

Leymus triticoides

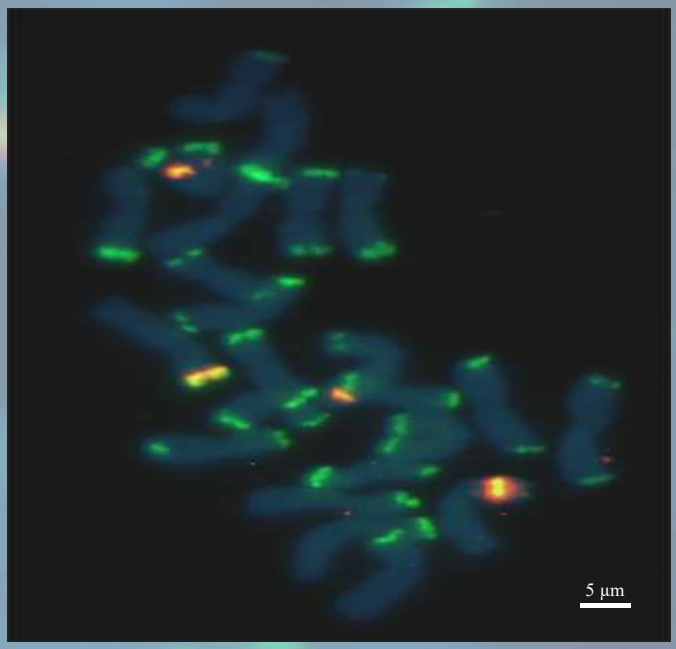
POACEAE

2n=28

Seltjarnarnes (Iceland), at midnight of the June solstice



Triticoleymus (2n=42)
GISH: Red *Triticum,* Green *Leymus*



Leymus triticoides (2n=28)
FISH: Red 45S rDNA, Green Sat. Ltr-1

Kesara Anamthawat-Jónsson, University of Iceland, Reykjavík, Iceland

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

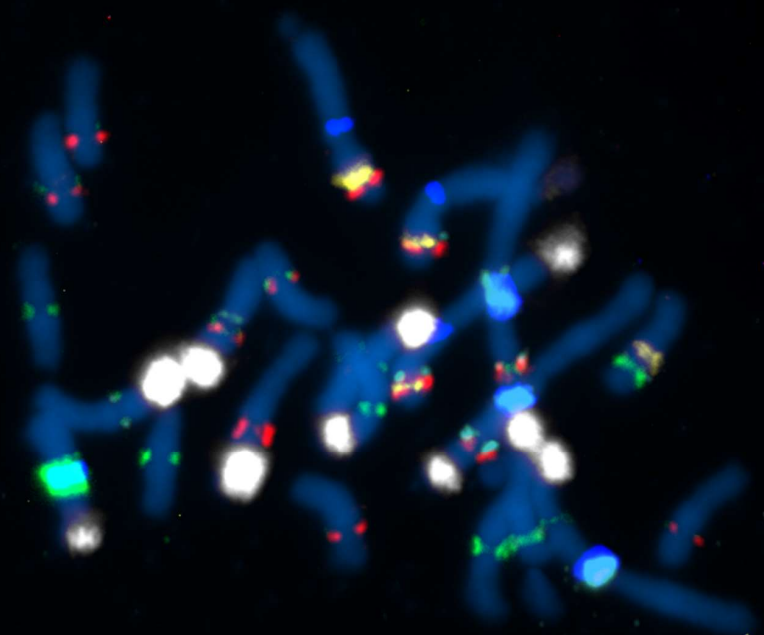
JULY

Crocus sativus

IRIDACEAE

2n = 3x = 24

The autumn-flowering saffron crocus is a triploid, clonally propagated crop grown for the production of the spice saffron. It has a rather large genome size of 1C = 3.45 Gbp.



CroSat1
CroSat2
CroSat3
CroSat4
5S rRNA genes
18S-5.8S-25S rRNA genes

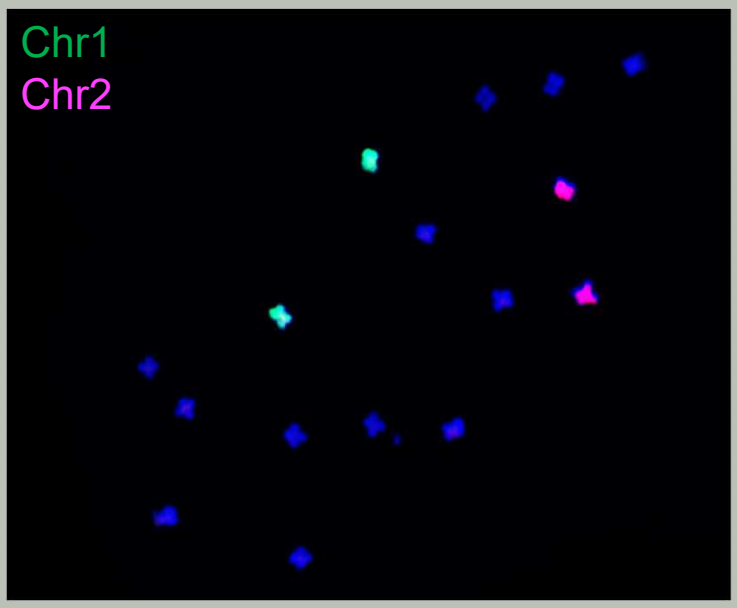
10 µm

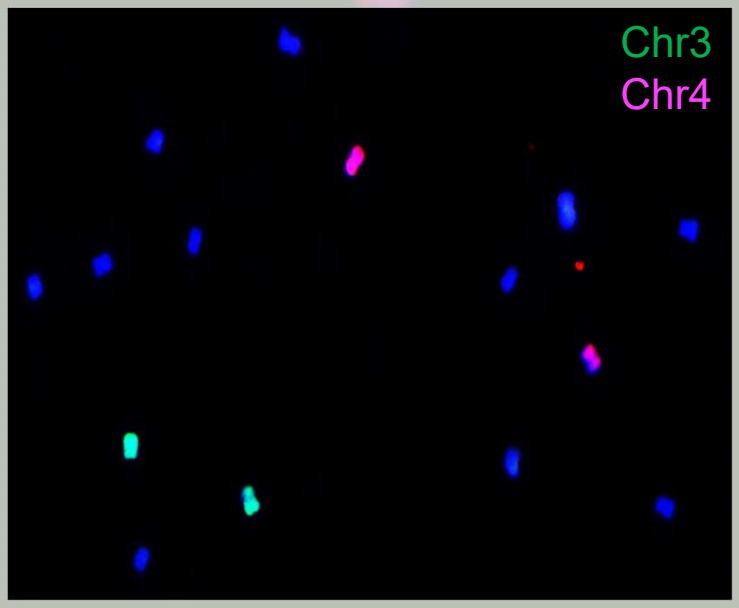
Abdullah El-nagish, Susan Liedtke, Ludwig Mann and Tony Heitkam (Faculty of Biology, TU Dresden, Germany & Institute of Biology, RWTH Aachen University)

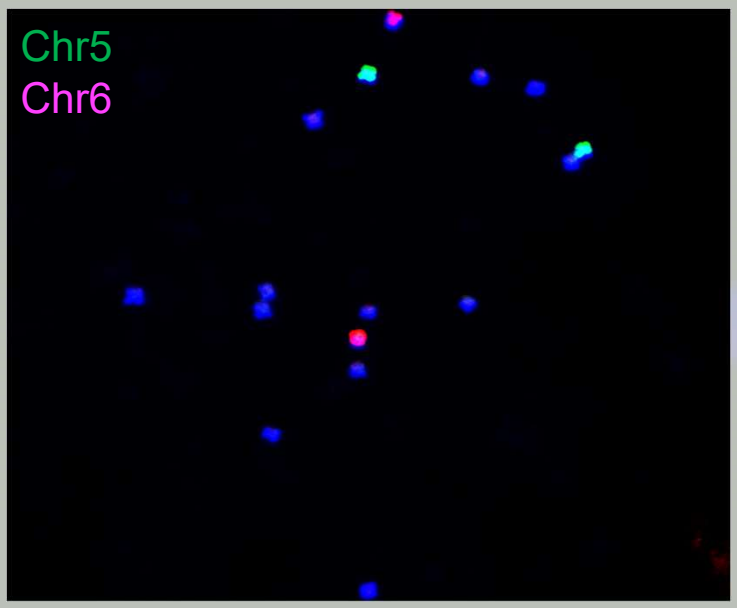
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

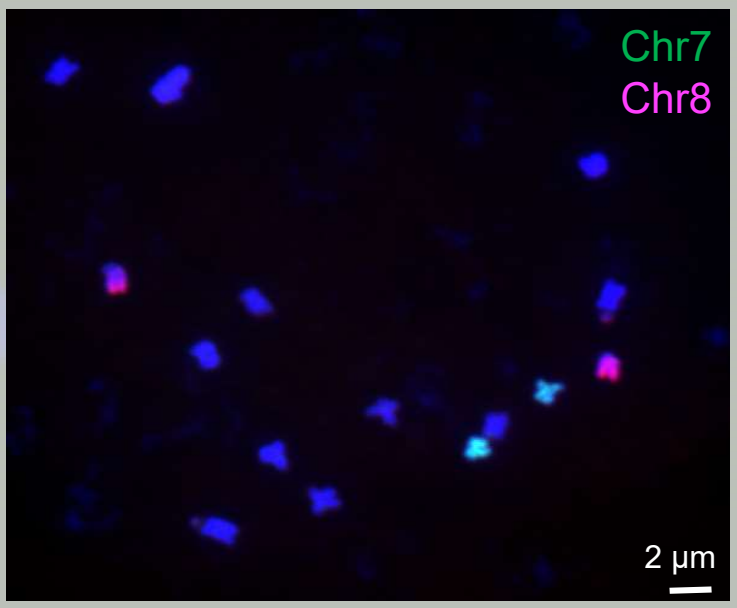
August

Fagopyrum tataricum
POLYGONACEAE
2n= 2x=16









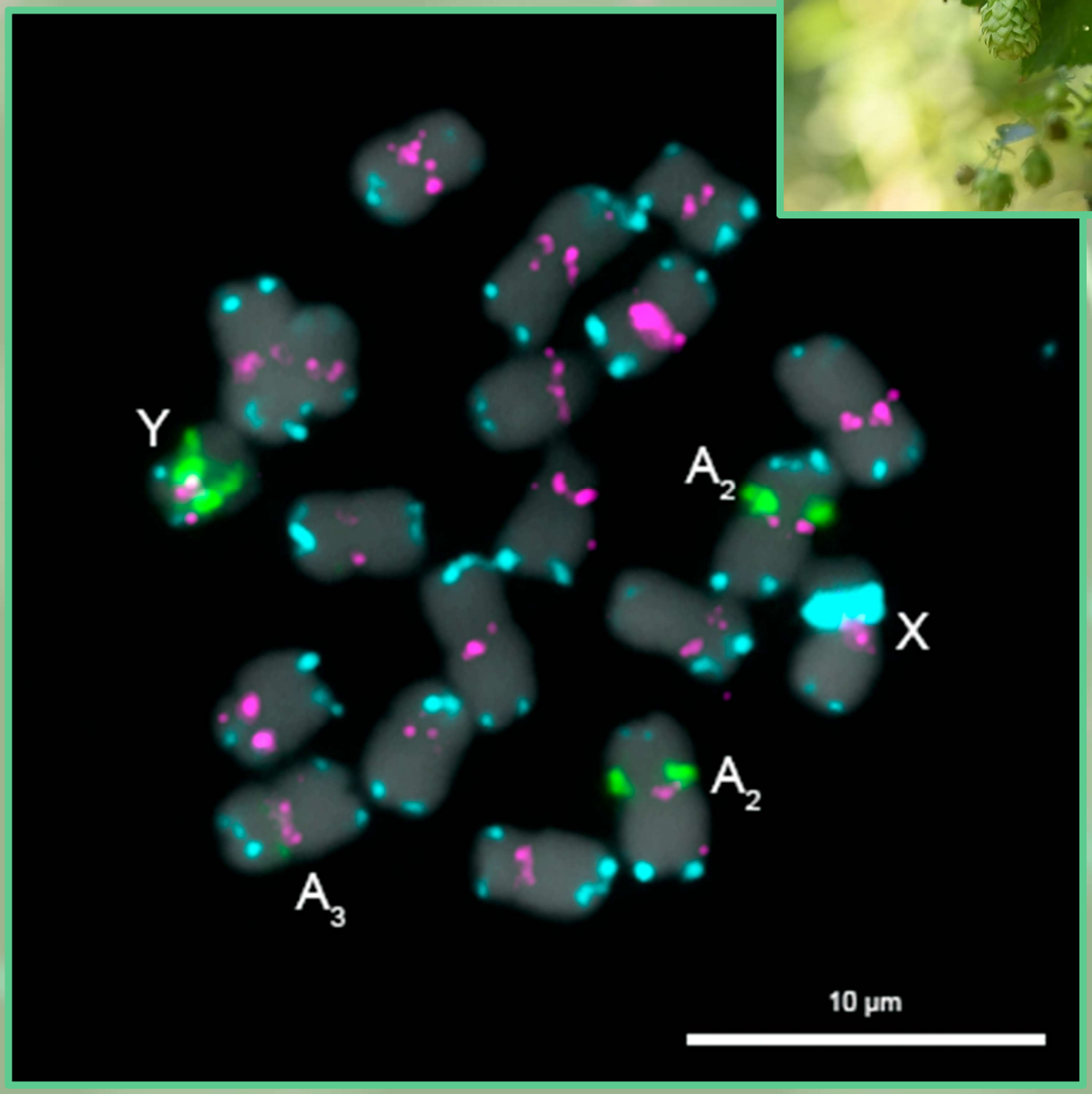
Tartary buckwheat is a pseudocereal crop with high nutritional value. Oligo-painting FISH probes were generated to identify the homolog chromosome pairs.

Qiong Wang, Houyang Kang, Yonghong Zhou and Dandan Wu (Sichuan Agricultural University, Chengdu, China)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

SEPTEMBER

Humulus lupulus
CANNABACEAE
2n = 2x = 20



FISH with centromeric-specific retrotransposon SaazCRM1 (magenta), HuluTR120 satellite (green), and subtelomeric HSR1 satellite (cyan).

Lucie Horáková and Václav Bačovský (Institute of Biophysics CAS, Brno, CZ)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

October

Bombyx mori
LEPIDOPTERA
(2n=56)

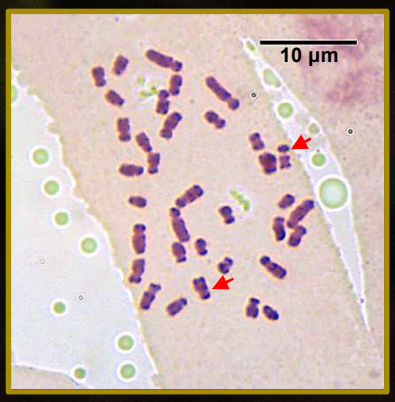
Whole chromosome oligopaints labelling three *B. mori* holocentric chromosomes (green, blue pink) during male meiotic prophase. *B. mori,* the silkmoth, is one of the oldest domesticated species that is used for silk production for more than 7000 years.

Picture credit: Leah Rosin, National Institute of Health; Heloise Muller, Institut Curie; Assembly: Ines Drinnenberg

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

NOVEMBER

Curculigo trichocarpa (Wight) Bennet & Raizada
Hypoxidaceae
(2*n*=4*x*=36)



Mitotic metaphase shows 2*n* = 36 chromosomes. Note, arrows indicate satellites.

Pollen mother cell at metaphase I showing *n* = 18 bivalents. Note, two bivalents (arrowheads) are associated with nucleolus.

R.N. Chougule, S.R. Yadav, M.M. Lekhak; Shivaji University, Kolhapur, India

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

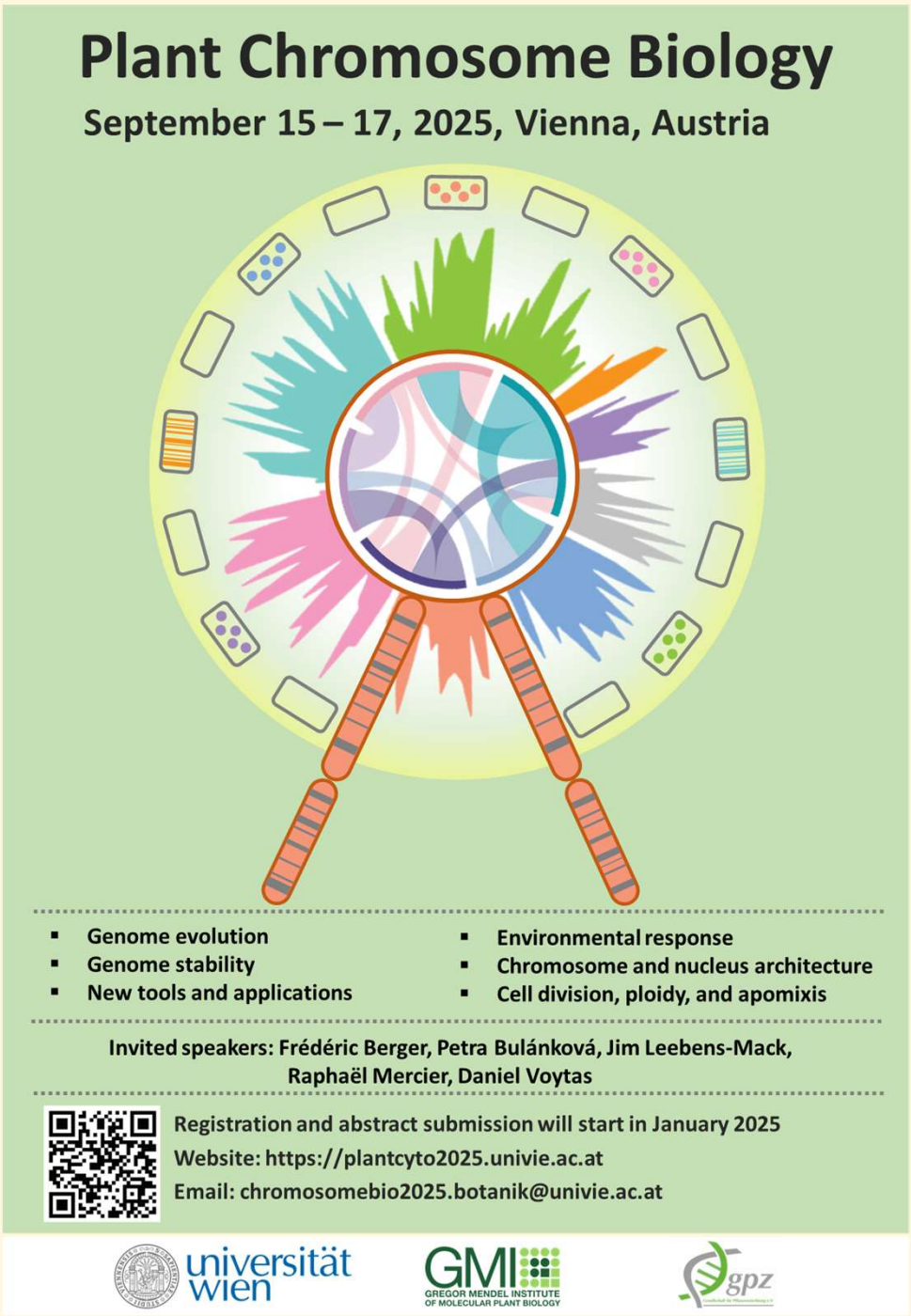
DECEMBER

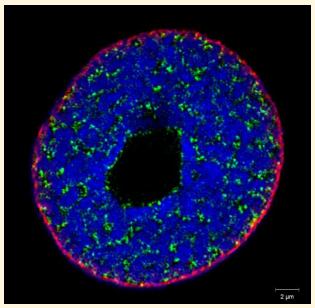
Viscum album
SANTALACEAE
2n =2x= 20

TEM of the large genome *V. album* nucleus.

Michael Melzer, Nomar Espinosa Waminal, IPK, Gatersleben, Germany; Hans Nützmann, George Jervis, University Exeter, UK

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31





Cover picture

Mistletoe cell nucleus.
Highly compacted chromatin (blue) is surrounded by decondensed DNA (green).
Veit Schubert, Katrin Kumke IPK, Gatersleben, Germany;
Hans Nützmann, George Jervis, University Exeter, UK

Acknowledgement

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Jörg Fuchs, Y-Tzu Kuo and Andreas Houben (IPK, Gatersleben, Germany)

https://www.ipk-gatersleben.de/en/research/breeding-research/chromosome-structure-and-function

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