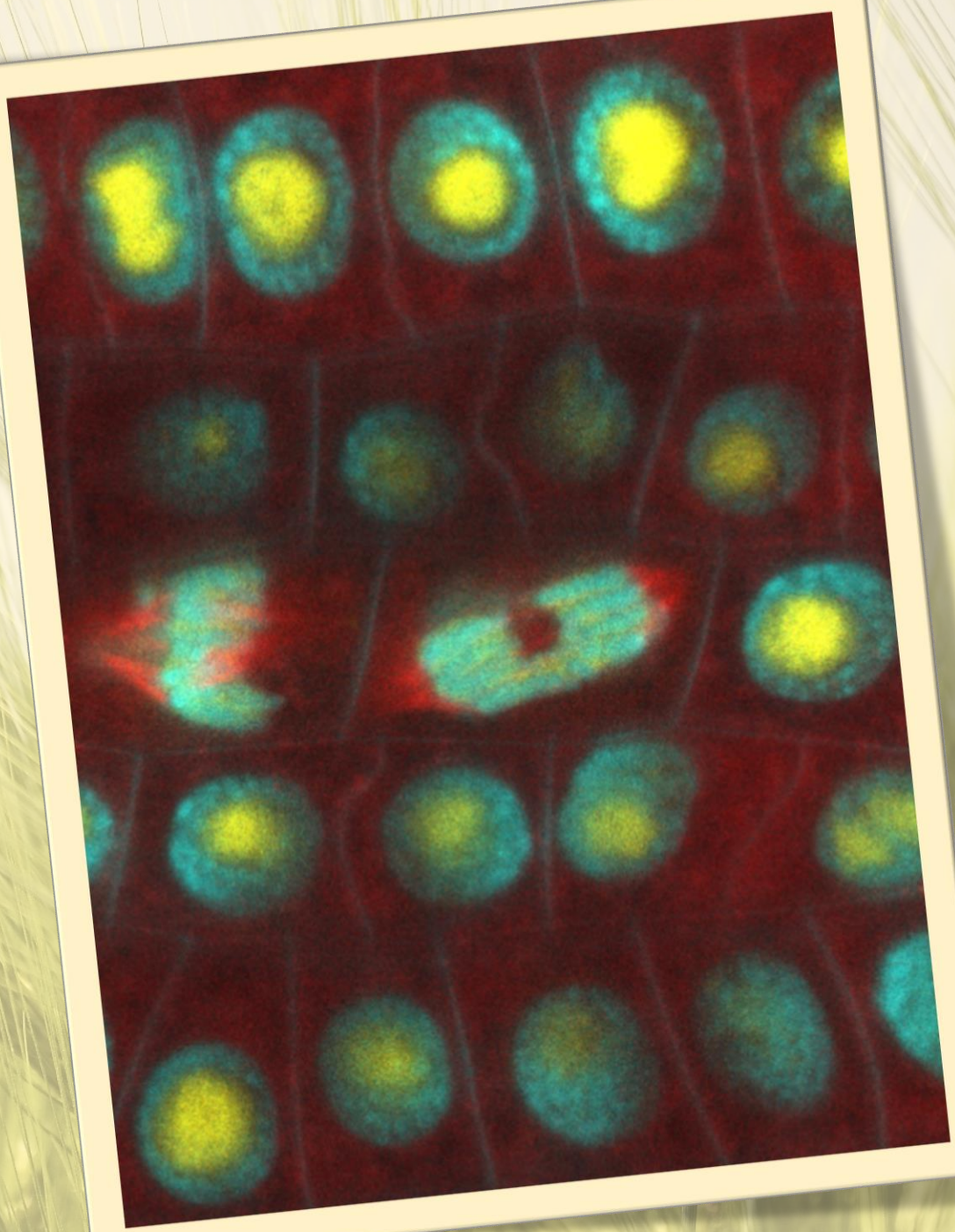
Chromosome Biology 2024



7th Edition

Leibniz Association

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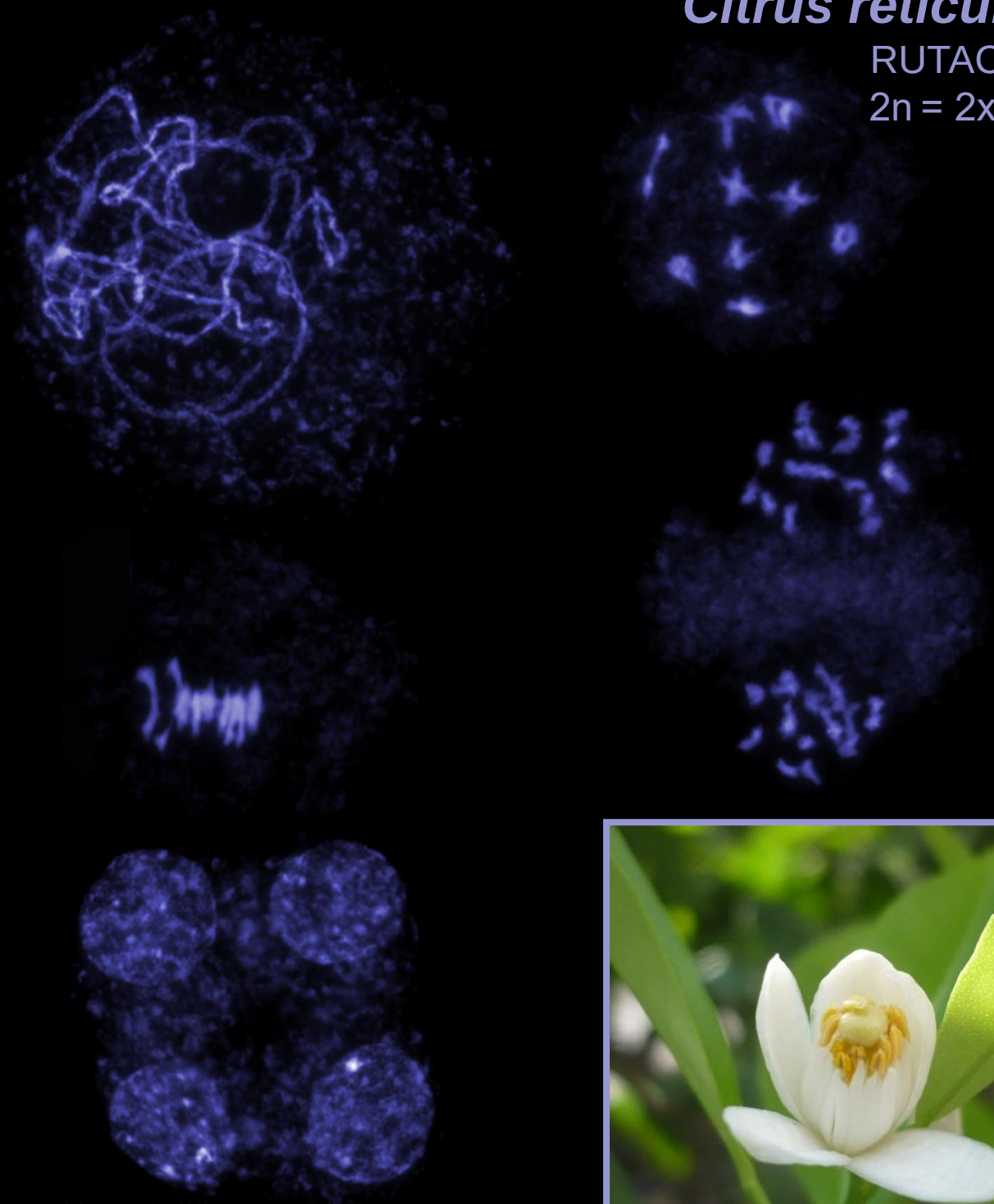
JANUARY

Citrus reticulata

RUTACEAE

2n = 2x = 18



Composition of different meiotic stages from diploid *Citrus reticulata* by spreading technique with DAPI staining. The production of triploid citrus hybrids is relevant to get new seed-less varieties.

Nadia Fernández-Jiménez and Mónica Pradillo (Universidad Complutense de Madrid, Spain)
Andrés García-Lor and Pablo Aleza (Instituto Valenciano de Investigaciones Agrarias, Valencia, Spain)

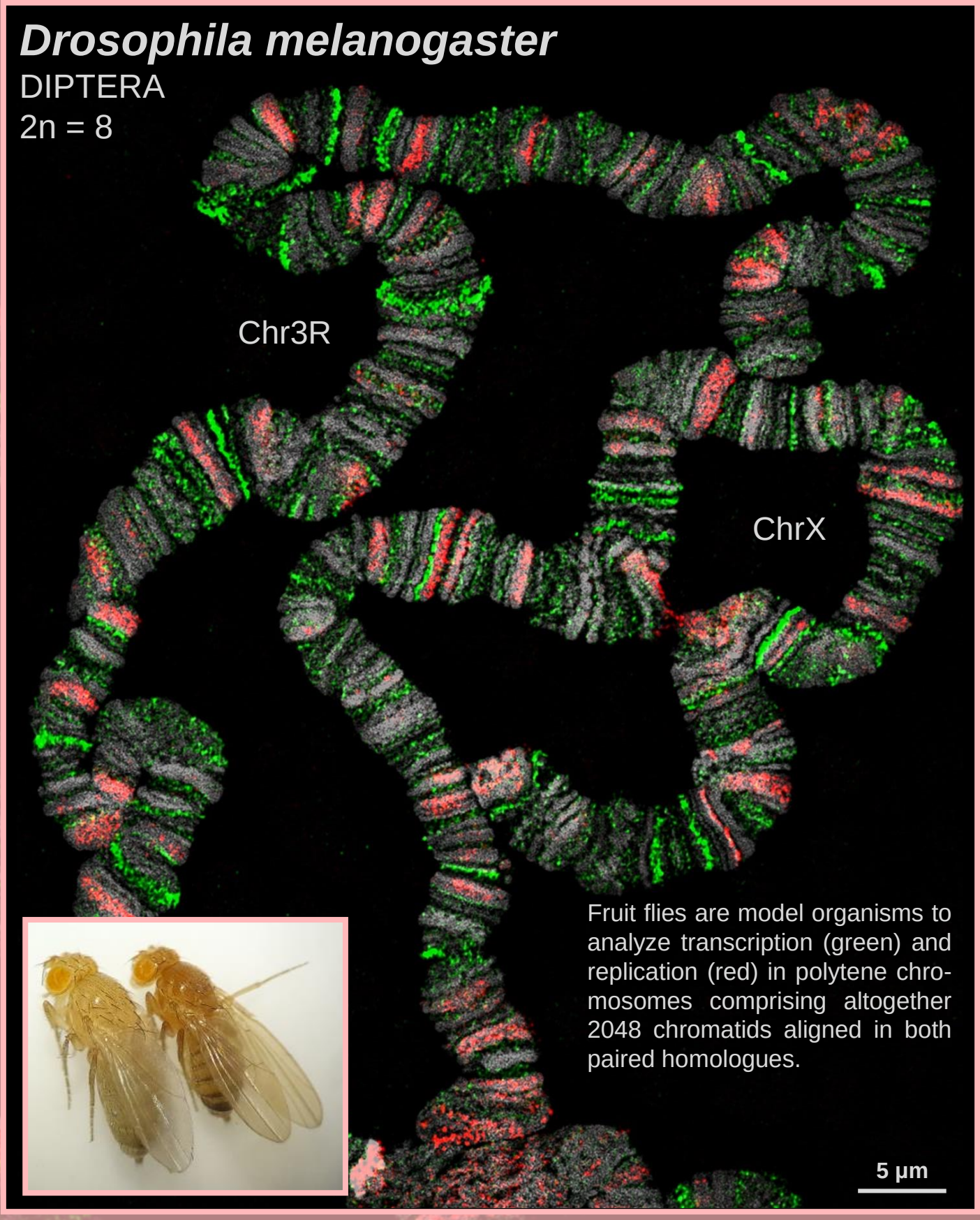
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

FEBRUARY

Drosophila melanogaster

DIPTERA

2n = 8



Fruit flies are model organisms to analyze transcription (green) and replication (red) in polytene chromosomes comprising altogether 2048 chromatids aligned in both paired homologues.

Tatyana Kolesnikova, Viktoria Dovgan and Veit Schubert (Institute of Molecular and Cellular Biology, Novosibirsk, Russia; IPK Gatersleben, Germany)

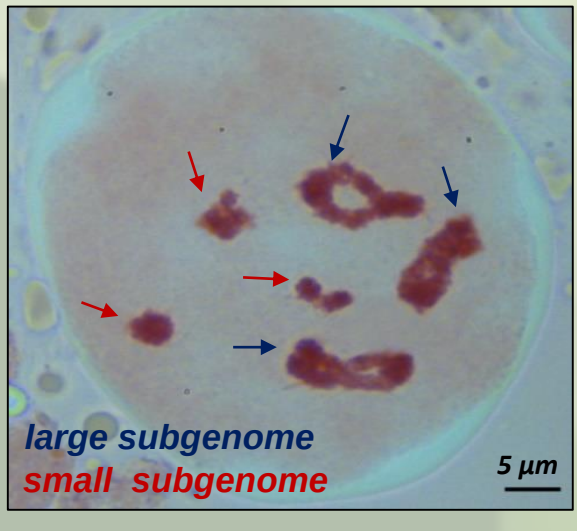
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29

MARCH

Dipcadi goaense

ASPARAGACEAE

2n = 2x = 12



Top: Mitotic metaphase of *D. goaense* showing 2*n* = 12 chromosomes and a bimodal karyotype.

Bottom: Pollen mother cell at diakinesis showing *n* = 6 bivalents

Priya E. Shelke, Shrirang R. Yadav and Manoj M. Lekhak (Shivaji University, Kolhapur, India)

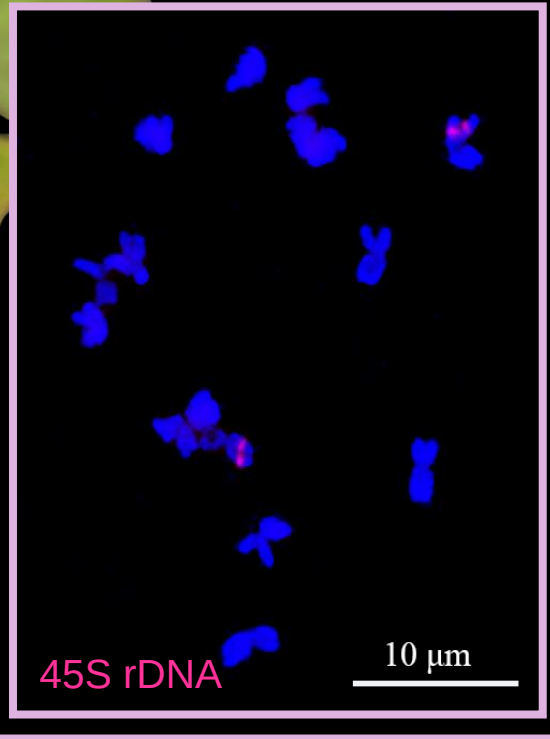
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

APRIL

Fagopyrum esculentum

POLYGONACEAE

2n = 2x = 16



F. esculentum is known as the "food medicine dual-use" food treasure, due to its enrichment in flavonoids, the well-balanced amino acid composition and other nutrients.

Wen Zheng and Dandan Wu (Sichuan Agricultural University, China)

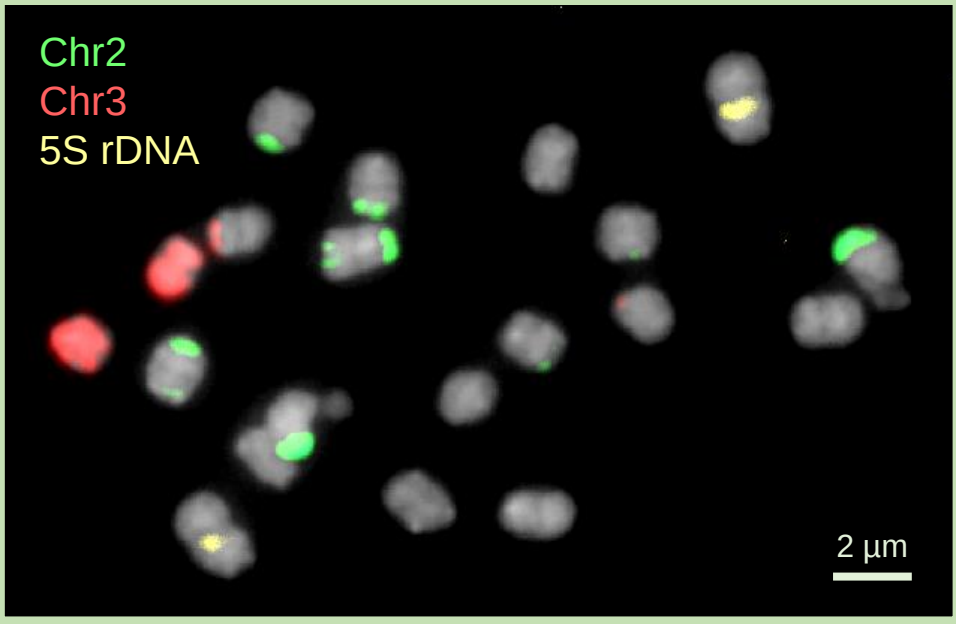
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

MAY

Phaseolus angustissimus

FABACEAE

2n = 2x = 20



Oligo painting probes designed from the common bean genome for the orthologous Chr2 (in green) and Chr3 (in red) show translocations for both chromosomes in the genome of *P. angustissimus*.

Thiago Nascimento, André Marques and Andrea Pedrosa-Harand (Federal University of Pernambuco, Brazil and Max-Planck Institute for Plant Breading Research, Cologne, 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

JUNE

Arabidopsis thaliana

BRASSICACEAE

2n = 10

Meiosis occurs inside the female gametophyte embedded within multiple cell layers, making its investigation a challenge. Here, female meiotic cells are visualized by expression of the meiotic axis protein ASY1 fused to mRuby2 (red). This line also expresses CENH3 fused to mTurquoise2 (blue).

50 µm

Maria Cuacos and Stefan Heckmann (IPK Gatersleben, Germany)

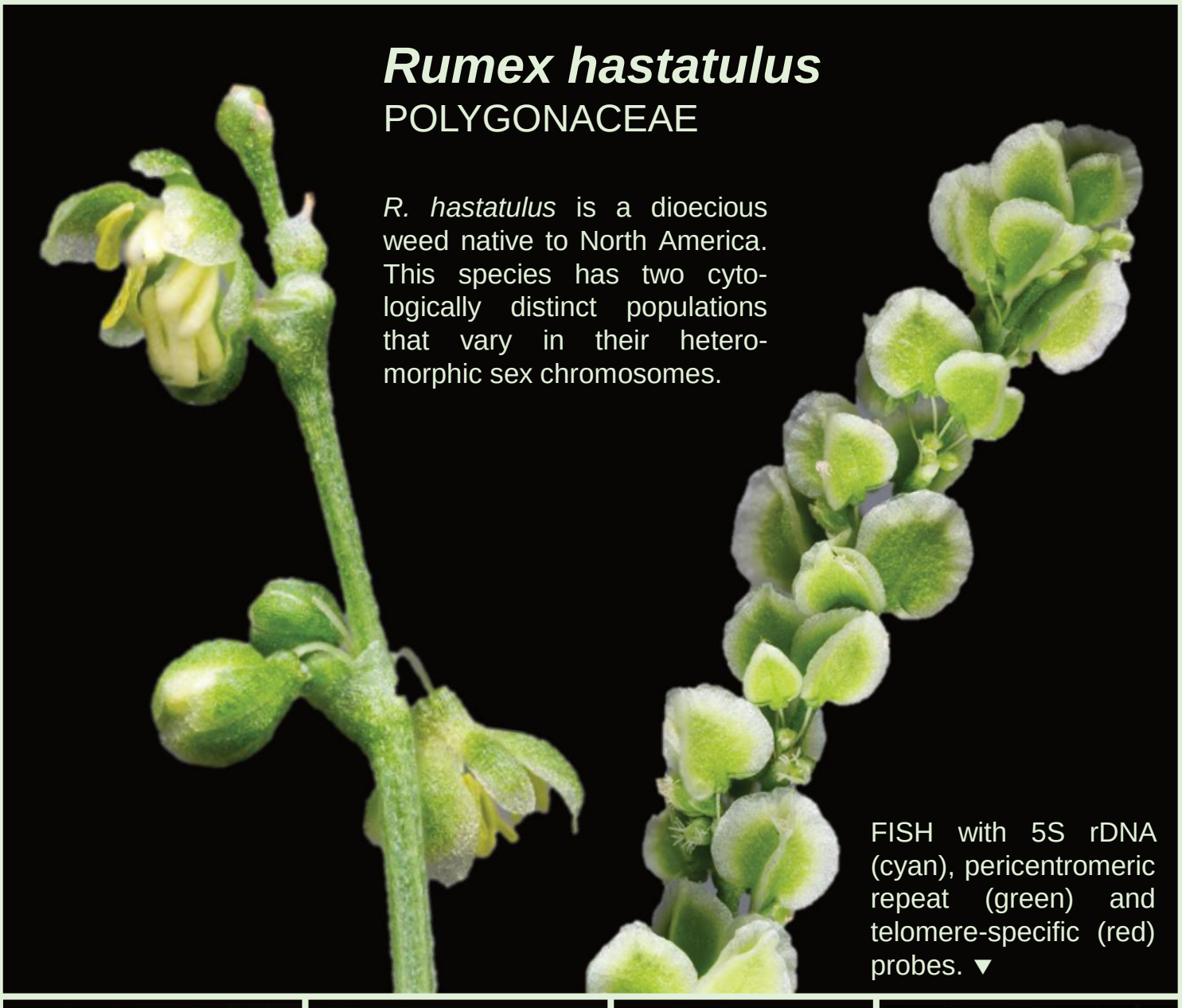
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

JULY

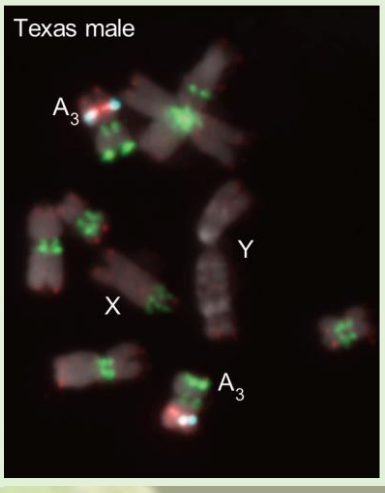
Rumex hastatulus

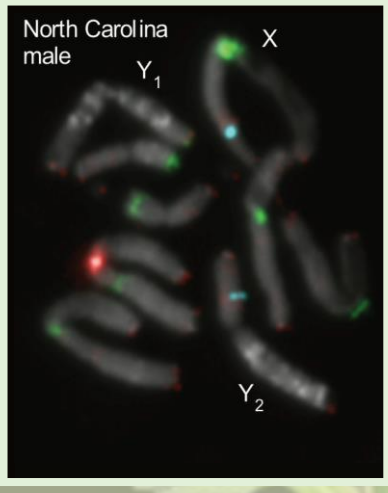
POLYGONACEAE

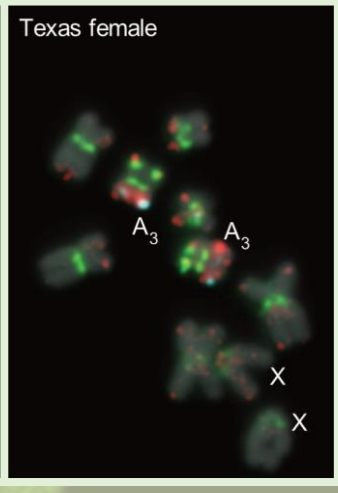
R. hastatulus is a dioecious weed native to North America. This species has two cytologically distinct populations that vary in their heteromorphic sex chromosomes.

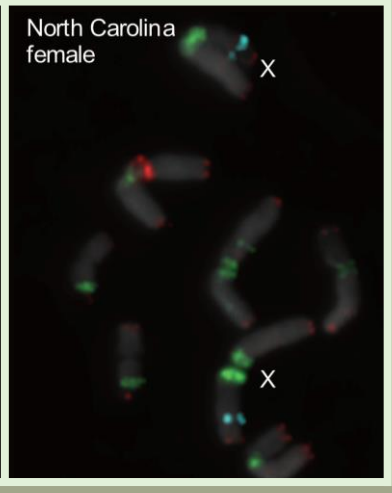


FISH with 5S rDNA (cyan), pericentromeric repeat (green) and telomere-specific (red) probes. ▼









Jana Kružlicová, Roman Hobza (Institute of Biophysics CAS, Brno, Czech Republic) and Stephen Wright (University of Toronto, Canada)

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

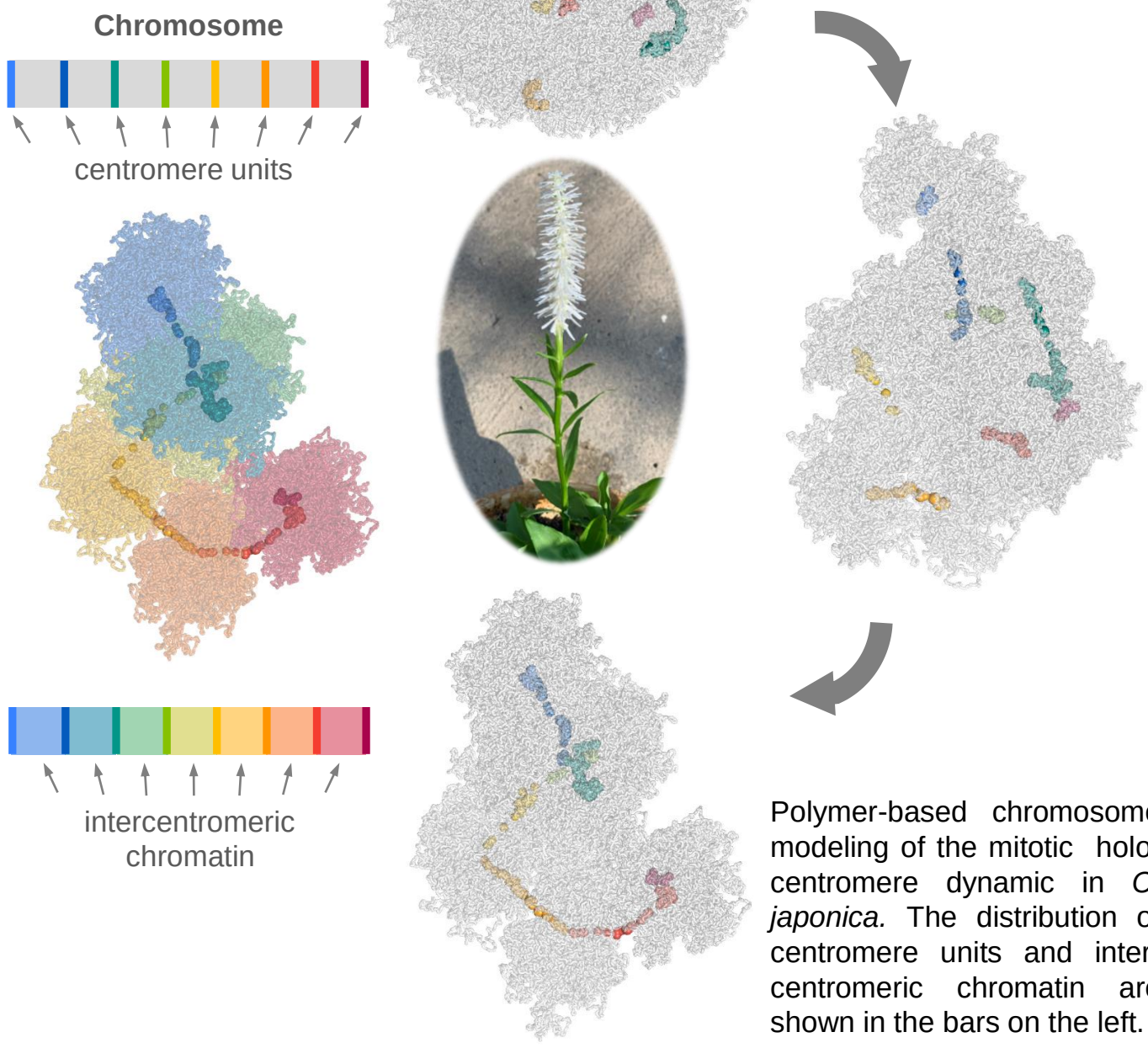
AUGUST

Chionographis japonica

MELANTHIACEA

2n = 2x = 24

C. japonica, distributed in north Asia, is the only genus with holokinetic chromosomes in this family.



Polymer-based chromosome modeling of the mitotic holocentromere dynamic in *C. japonica.* The distribution of centromere units and intercentromeric chromatin are shown in the bars on the left.

Amanda Câmara, Yi-Tzu Kuo and Andreas Houben (IPK Gatersleben, Germany)

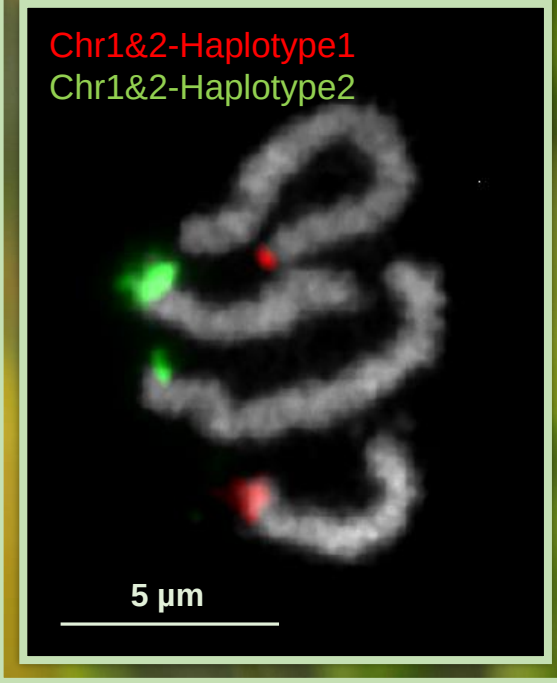
SEPTEMBER

Rhynchospora tenuis

CYPERACEAE

2n = 2x = 4

R. tenuis is a holocentric beaksedge showing achiasmatic meiosis. It presents the lowest chromosome number reported for flowering plants (*2n* = 4), which makes it a model candidate in the study of meiotic adaptations and karyotype evolution in holocentric species.



◀ Haplotype-specific oligo probes showing a complex translocation between the non-homologous chromosomes of *R. tenuis*. Probes in red are specific for the haplotype 1 and probes in green specific to haplotype 2.

Thiago Nascimento and André Marques (Max-Planck Institute for Plant Breeding Research, Cologne, 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

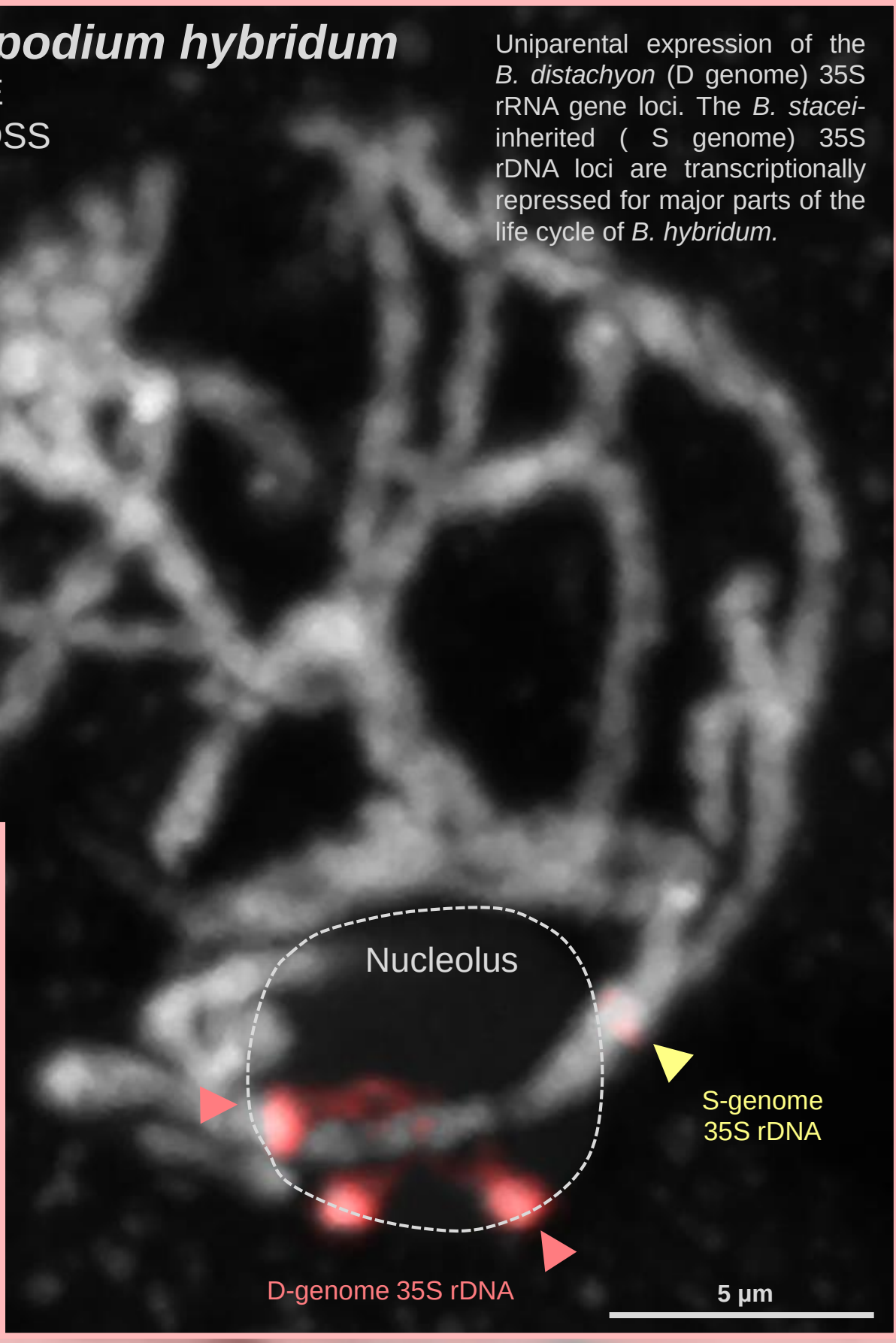
OCTOBER

Brachypodium hybridum

POACEAE

2n=30, DDSS

Uniparental expression of the *B. distachyon* (D genome) 35S rRNA gene loci. The *B. stacei*-inherited (S genome) 35S rDNA loci are transcriptionally repressed for major parts of the life cycle of *B. hybridum.*



Natalia Borowska-Żuchowska, Ewa Robaszkiewicz and Robert Hasterok (University of Silesia in Katowice, 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 29 30 31

NOVEMBER

Crocus vernus

IRIDACEAE

2n = 2x = 8

The spring crocus (*C. vernus*) is growing in alpine meadows of the northern Pyrenees, the Alps and the Dinaric Alps. An interesting cytogenetic feature of *C. vernus* is its high heterozygous karyotypes.

5S rDNA
45S rDNA
Cl60
Cl154
Cl188 (centromeric repeat)

Nomar Espinosa Waminal, Frank R. Blattner and Dörte Harpke (IPK, Gatersleben, Germany)

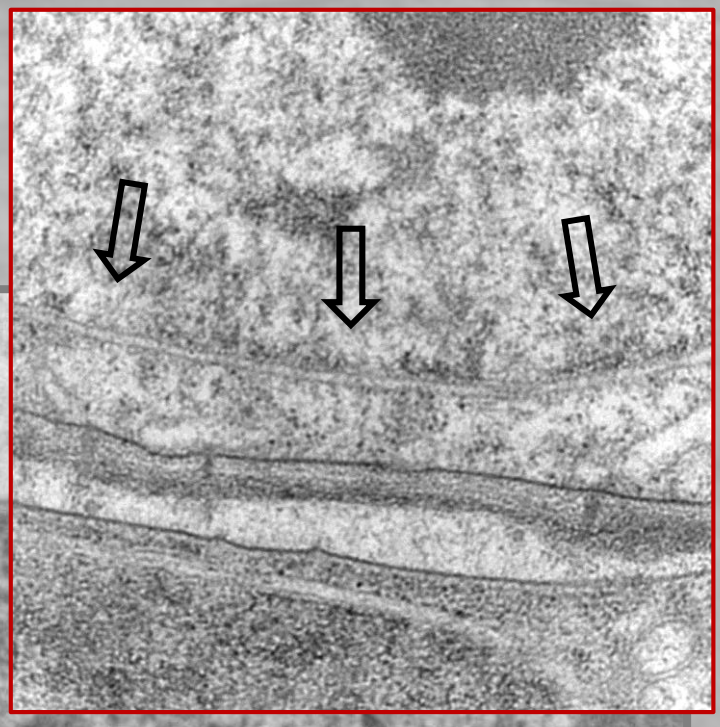
DECEMBER

Myristica fragrans

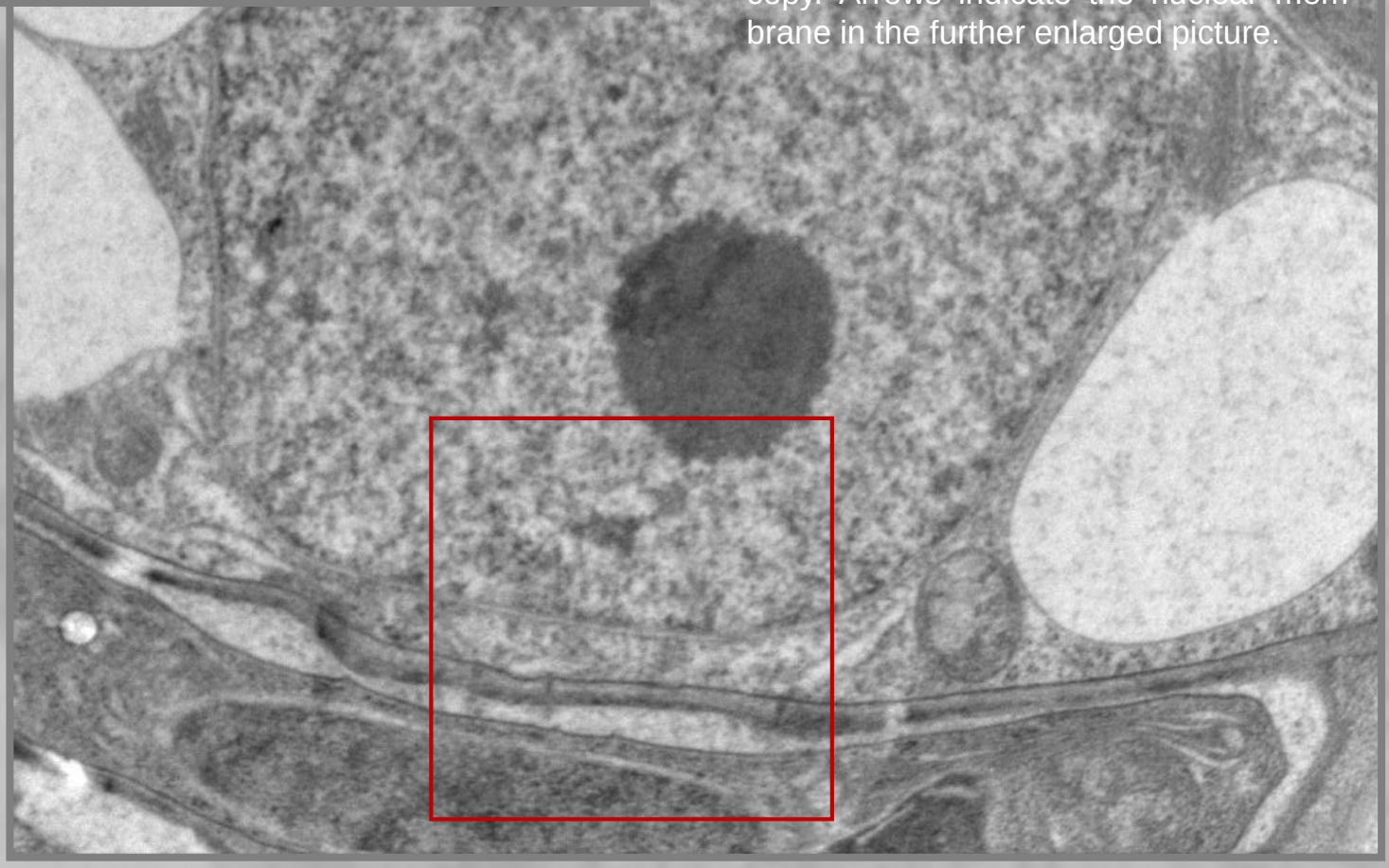
MYRISTICACEAE

2n = 2x = 44

Nutmeg seed and red aril within fruit.

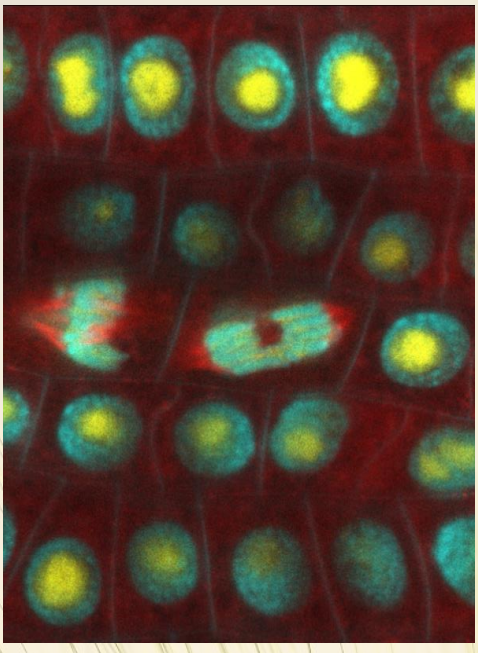


Interphase nucleus of *M. fragrans* analysed by transmission electron microscopy. Arrows indicate the nuclear membrane in the further enlarged picture.



Michael Melzer, Yi-Tzu Kuo, Jacob G. Kurian and Andreas Houben (IISER Thiruvananthapuram, India; 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



Cover picture

Mitosis in living barley plant visualized with a multi-marker fluorescent line for chromatin (CFP-H2B), nucleolus (EYFP-FIB1) and microtubules (mCHERRY-TUA3).

Kateřina Kaduchová and Aleš Pečinka (IEB, Olomouc, Czech Republic)

Acknowledgement

The print was supported by the IPK Gatersleben and the Gemeinschaft zur Förderung der Kulturpflanzenforschung Gatersleben e. V..

Most of all, we would like to thank all colleagues who provided the beautiful contributions.

Jörg Fuchs and Andreas Houben (IPK, Gatersleben, Germany)

Gemeinschaft zur Förderung der Kulturpflanzenforschung Gatersleben e.V.

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