51. The following diagram is from The Genetics Learning Center at

http://www.geneinfo.net/index.php?option=displaypage&Itemid=78&op=page&SubMenu=

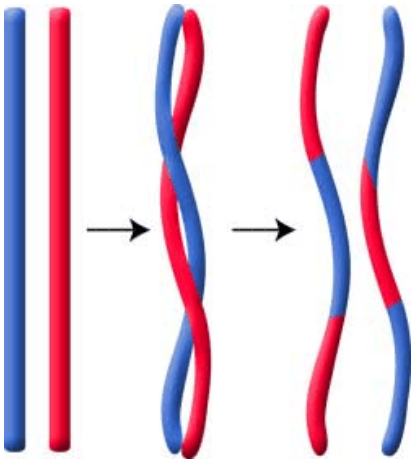
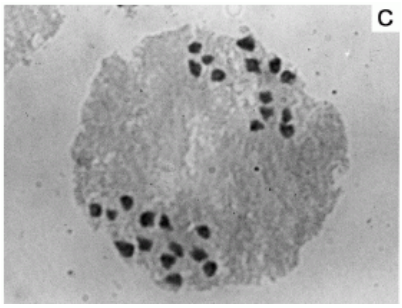


Image of crossing over occuring [sic] in chromosomes

This site is sponsored by the Genetics & Biotech Information Network

Explain the two greatest errors in their diagram. Limit your answer to two sentences or short paragraphs

52. The following photos of *C. lanceolatum* are from:



Tong N and PW Bosland. 2003. Observations on interspecific compatibility [...] of *Capsicum buforum* and *C. lanceolatum*. Gen. Resources and Crop Evol 50:193-199.

Based on the photo c:

A) What is the stage & type of division of this cell?

B) What are the key features used to make your determination?

C) During the last interphase stage of this cell:

_____n = ___x = ___c = _____

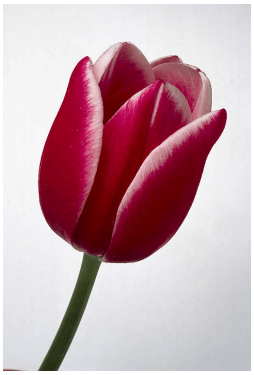
D) Immediately before this cell entered the metaphase stage:

_____n = ___x = ___c = _____

E) For one of the daughter cells, once this division is totally over:

_____n = ___x = ___c = _____

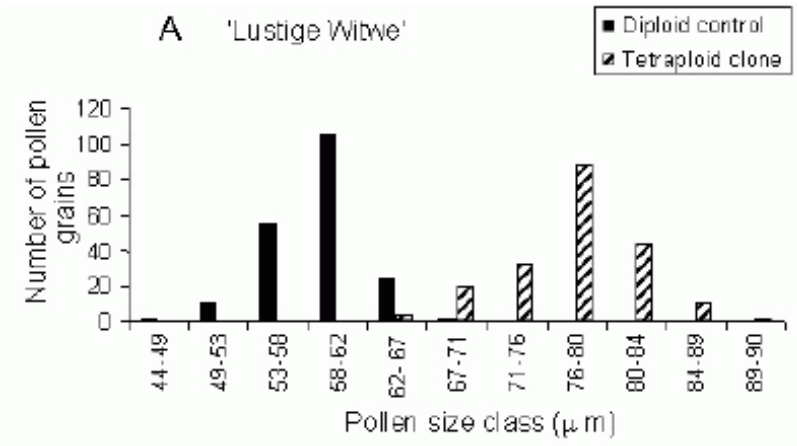
53. The following is from:



Chauvin JE, A Label, MP Kermarrec. 2005. In vitro chromosome doubling in tulip (*Tulipa gesneriana* L.). J. Hort. Sci. Biotechnol. 80:693-698.

Ornamental tulips are diploid, except for the Darwin Hybrids, which are triploid. Wild tulips are tetraploid. In order to facilitate crosses between the 2x and 4x tulip germplasm pools, the authors doubled the chromosome number of cv 'Lustige Witwe' (photo at right) using oryzalin in cell culture. They next measured the diameter of the pollen grains produced by the resulting plants.

Photo credit:
http://www.dkimages.com/discover/previews/823/20053758.JPG



The average pollen diameter from the 2x tulip was 58 µm, while that from the 4x was somewhere between 70 - 76 µm.

A) Why would 2x pollen have a greater diameter than x pollen?

B) How do the observed 2x sizes compare with the predicted size?

54. The following is from:

Francis KE, SY Lam, BD Harrison, AL Bey, LE Berchowitz, and GP Copenhaver. 2007. Pollen tetrad-based visual assay fro meiotic recombination in *Arabidopsis*. PNAS 104:3913-3918.

In this paper, the authors engineered arabidopsis with genes for cyan (blue), yellow, and red fluorescent proteins. Thus, the color of the fluorescence allowed them to detect recombination. The diagram below represents the order of the transgenes. They looked at 4988 pollen grains.

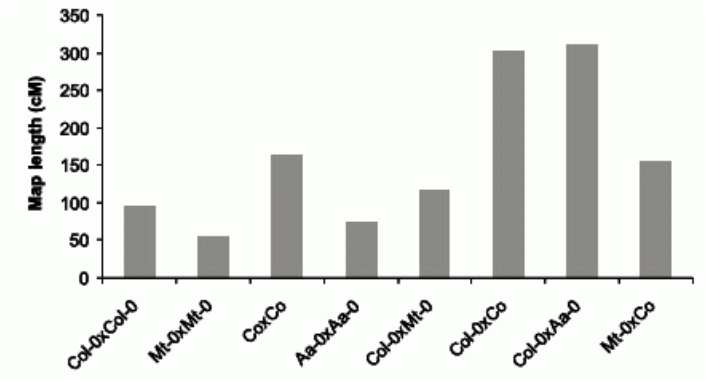
The numbers represent the number of recombinants between each marker. They observed 60 double crossovers between cyan and red . [*Note: the numbers in the diagram below are the numbers of observed recombinations in the regions, not the genetic distance*]

Based on these numbers, what is the amount of interference? Show your work (which need not exceed the space below).

55. **The following is from:**

Barth S, AE Melchinger, B Devezi-Savula and T Lübberstedt. 2001. Influence of [....] on recombination in *Arabidopsis thaliana*. Genome 44:971-978.

In this paper, the authors looked at recombination frequency between 5 pairs of kanamycin resistance and hygromycin resistance transgenes introduced into different genotypes of arabidopsis by backcrossing, thus ensuring they were looking at the same loci. The genotypes were Col-0 (Columbia), Mt-0 (Martuba), Co (Coimbra), and Aa-0 (Aua).



Then they either crossed the genotypes with each other, or between each other, and looked at recombination frequency between them. The data are in the bar graph.

Based on these data, what is the *single* greatest factor that appears to determine recombination in these arabidopsis genotypes?

56. **The following is from:**

Vorsa, N and LJ Rowland. 1997. Estimation of 2n megagametophyte heterozygosity in diploid blueberry (*Vaccinium darrowi* Camp) clone using RAPDs. J Hered 88:423-426.

In this case, most of the 2n eggs had an average heterozygosity of 72.7%. However, 17% of the 2n eggs had an average heterozygosity of less than 50%.

What inferences can you draw about the modes and mechanisms of 2n egg production in this blueberry clone?

Your answer should not exceed 2-3 sentences.

V. darrowi,
http://species.wikimedia.org/wiki/Image:Vaccinium_darrowii.jpg

57. The following is from:

Plants and roots of cassava.
Photos from Corbis.

http://www.geneconserve.pro.br/Goias_Brazil.htm

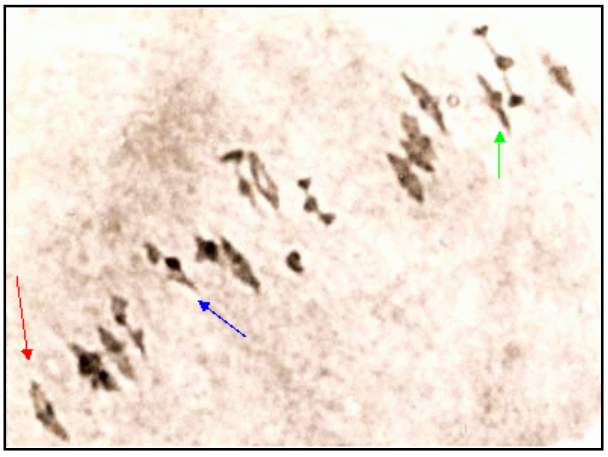
Cassava is a diploid root crop that is one of the most important sources of calories for the tropics.

A) Name the stage of meiosis in the photo below

B) Based on the photo, provide the coefficients for x, c and give the total chromosome number

2n = _____ x = _____ c = _____

C) Extra Credit. Three of the bivalents have been labeled with arrows. For each of these, provide an interpretive drawing. These should show the centromeres and the crossovers. Specify if the chromosomes are meta, acro or telocentric.



58 The following is from:

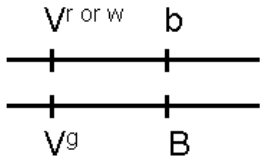
Deng Z and BK Harbaugh. 2009. Leaf blotching in caladium (Araceae) is under simple genetic control and tightly linked to vein color. HortSci 44:40-43.

The top photo is cv 'Carolyn Whorton' and has 2 ornamental traits, namely red vein and blotching. The bottom photo is 'Frieda Hemple,' and has the red vein but lacks the blotching.

Both blotching and vein color are important traits for caladium breeders. Blotching was found to be conditioned by a single, dominant gene, *B*. Vein color was previously known to be conditioned by one of 3 possible alleles at the *V* locus. The V^r (red vein) is dominant over V^w (white vein) which is dominant over V^g (green vein).

In a series of crosses between ornamental genotypes, no recombination between *B* and *V* was obtained in 357 progeny, indicating that the two loci are tightly liked. Furthermore, they determined that the ornamentally undesirable *b* (no blotch) allele was linked to the desirable V^r or V^w alleles, while the ornamentally desirable *B* allele was linked to the undesirable V^g allele, as illustrated at right.

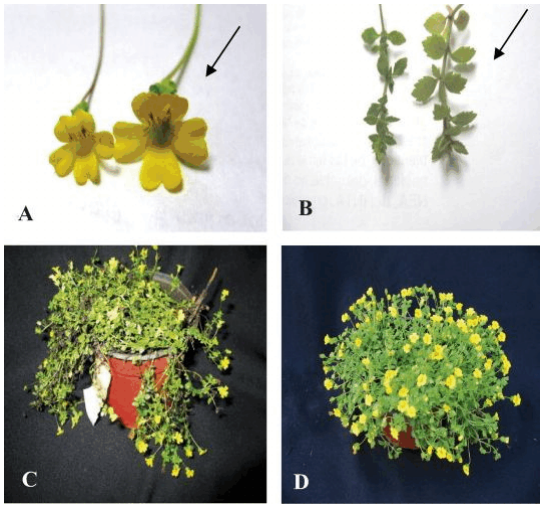
Describe 2 strategies you would suggest to the authors that might increase their chances of breaking the linkage between the *V* and *B* loci. Make sure your examples are relevant to this particular case.



59 The following is from:

Escandón AS, LM Alderete, and JC Hagiwara. 2007. *In vitro* polyploidization of *Mecardonia tenella*, a native plant from South America. Scientia Horticulturae 115:56-61.

The photo at right shows the 2x and 4x versions of the plant, as well as close-ups of 2x and 4x flowers and leaves.



The table below shows the average diameter of the 2x and 4x flowers and stems.

Relative sizes and SD between a tetraploid plant and its control

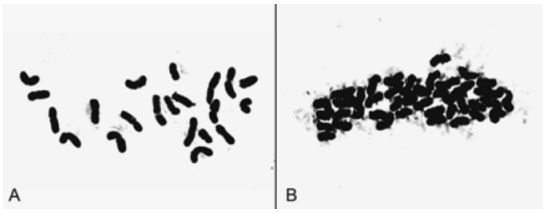
Individuals	Flower diameter (mm)	Stem diameter (mm)
Control	6.66 ± 0.66 a	0.67 ± 0.15 a
Tetraploid	9.66 ± 0.65 b	0.81 ± 0.16 b

Assuming that cell number remained constant in flowers and stems, how do the measured diameters of the 4x compare to the expected diameters? Calculate the expected sizes in order to give your answer.

60 The following is from:

Jauhar PP. 2007. Meiotic restitution in wheat polyhaploids (amphihaploids): a potent evolutionary force. J Hered 98:188-193.

In this paper, the author crossed wheat x maize. In these hybrids, the maize chromosomes are lost, so the resulting plant is a wheat haploid (photo of metaphase I at right). As the plant is a haploid, there are only univalents present.



A) What is the expected frequency with which these haploids would be expected to form a 2n gamete? *Hint*: In this case, a 2n gamete would have to have all 21 chromosomes. The behavior of the univalents in a haploid is identical to that of a synaptic mutant.

B) When the haploid plants were allowed to self, the observed seed set was 1.45 for variety Chinese Spring, and 2.26 for variety Fuko. The resulting plants had 42 chromosomes. Based on the frequency of seed set, is the frequency of 2n gamete formation solely due to random assortment of the chromosomes during meiosis I, or is some other factor involved that is leading to preferential recovery of 2n gametes?

61 The following is from:

Li Y, M Cai, ZY Wang, W Guo, X Liu, X Wang, and Y Ning. 2008. Microsatellite-centromere mapping in large yellow croaker (*Pseudosciaena crocea*) using gynogenic diploid families. Marine Biotechnol. 10:83-90.

The yellow croaker is a popular fish in China, but over-fishing has depleted the ocean stocks. Therefore, attempts are underway to raise yellow croakers in aquiculture and to initiate breeding programs

When egg mother cells are undergoing division, they can be exposed to irradiated sperm, which prevents the second meiotic division from happening. The resulting 2n eggs can be used for gene-centromere mapping, exactly as they can in plants.

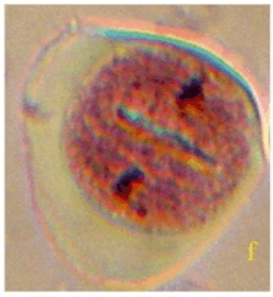
Yellow croakers at market.
http://en.wdhaian.com/cp/html/?16.html

A) For each SSR marker in the table below, calculate its locus-centromere distance

B) Which marker remains unlinked?

SSR locus	Genotype of 2n eggs			N	SSR-Centromere Distance in cM
	a/a	a/b	b/b		
LYC0002	2	86	1	89	
LYC0008	33	24	36	93	
LYC0021	47	2	39	88	
KPC49	0	94	0	94	

62. The following is from:

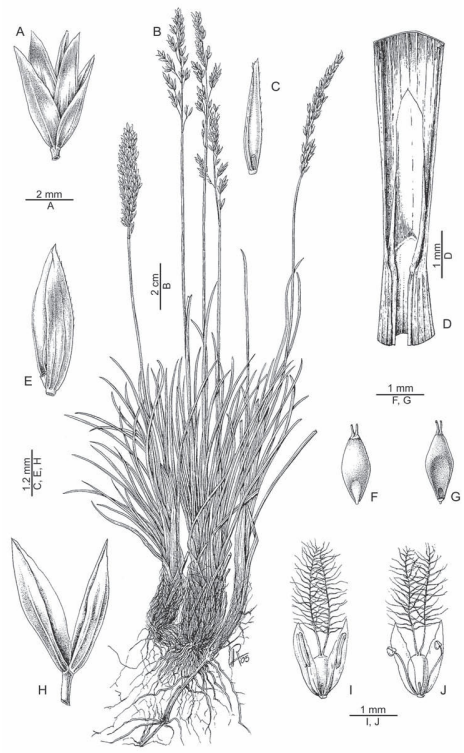


Zhang J-F, Z-Z Wei, D Li and B Li. 2009. Using SSR markers to study the mechanism of 2n pollen formation in *Populus* x *euramericana* (Dode) Guinier and *P.* x *popularis*. Ann Forest Sci 66:1-10.

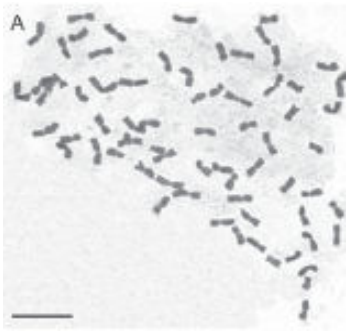
Poplars are eudicots. In the photo, the Met II spindles are parallel, BUT premature cytokinesis is taking place between the spindles. Will the resulting gametes be FDR or SDR? Explain your answer in a sentence or two.

63 The following is from:

Negrito MA, AA Romanutti, MC Acosta, EA Moscone, AE Cocucci, and AM Anton. 2008. Morphology, reproduction and karyology in the rare Andean *Poa gymnatha*. Taxon 57:171-178.

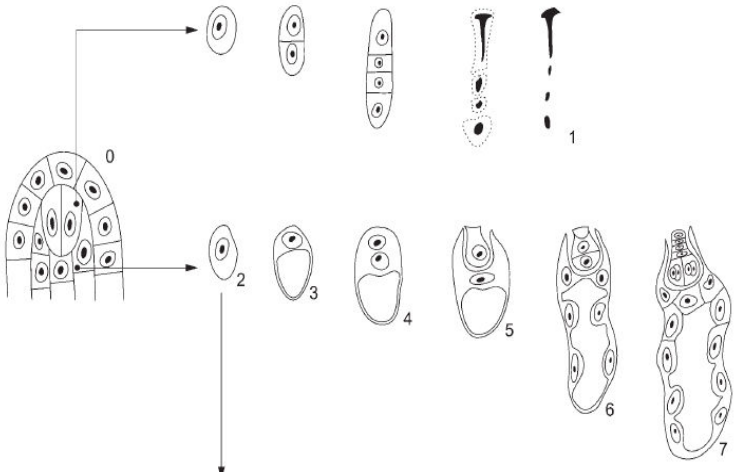


Poa gymnatha (2n = 10x = 70, figure at right) is found in the Andes mountains. All flowers are female, with no males known. Cytology revealed the following:



The top row shows the egg undergoing meiosis, with all megaspores aborting. In the mean time, a cell of the integument becomes an embryo sac, and the embryo develops parthenogenically.

A) What type of apomixis is taking place? What is the diagnostic feature? What will be the genotype of the embryo?



B) Why or why not is it surprising to find apomixis in a species like this one?

64 The following is from:

Peckert T and J Chrtek. 2006. Mating interactions between coexisting diploid, triploid and tetraploid cytotypes of *Hieracium echioides* (Asteraceae). Folia Geobotanica 41:323-334.

Hieracium echioides (x=18) is native to central and eastern Europe. 2x, 3x and 4x types (ie, cytotypes) are known. The authors were exploring the ability of the various cytotypes to cross with each other. Among the crosses they performed were 2x - 3x crosses, and they got 2x seed at the rate of 0.32 seeds per pollinated flower.

How does this compare to the expected rate at which 2x-3x crosses should give 2x progeny? Show your calculations.

http://commons.wikimedia.org/wiki/Image:Hieracium_echioides_Sturm58.jpg

65. The following is from:
Mneimneh S. 2012. Crossing over … Markov meets Mendel. PLOS Computational Biology. 8: e1002462.
The following diagram is from the field of computer science, and illustrates the attempt of a computer scientist to explain crossing over.

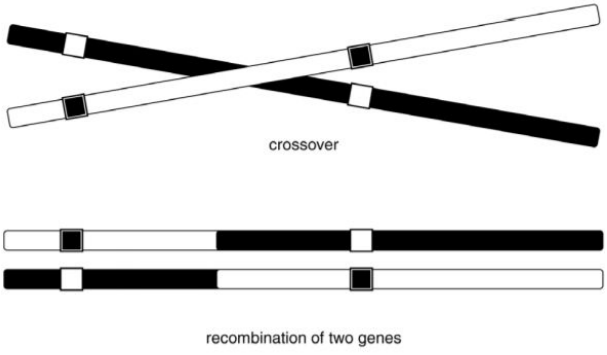


Figure 2. One chromosomal crossover and a genetic recombination.

A. Pretend that you are going back one century in time. You do not know anything about how chromosomes cross over, but you have lots of hypotheses and F_2 segregation data on hand. Would your F_2 genotype categories to be explainable by the crossing over model in the diagram? Explain why or why not in your answer.

B. The premise of the author is that current mapping algorithms have quirks in them that lead to wrong distances. With the current models:

"the probability of recombination depends on the chromosome length and, therefore, two chromosomes that are locally similar but have different lengths exhibit different local recombination behavior. *This is not biologically justifiable*." In other words, linkage should not depend on the chromosome length.

Evaluate the premise that linkage should not depend on chromosome length. Give specific reason or examples of crossing over biology to justify your answer.

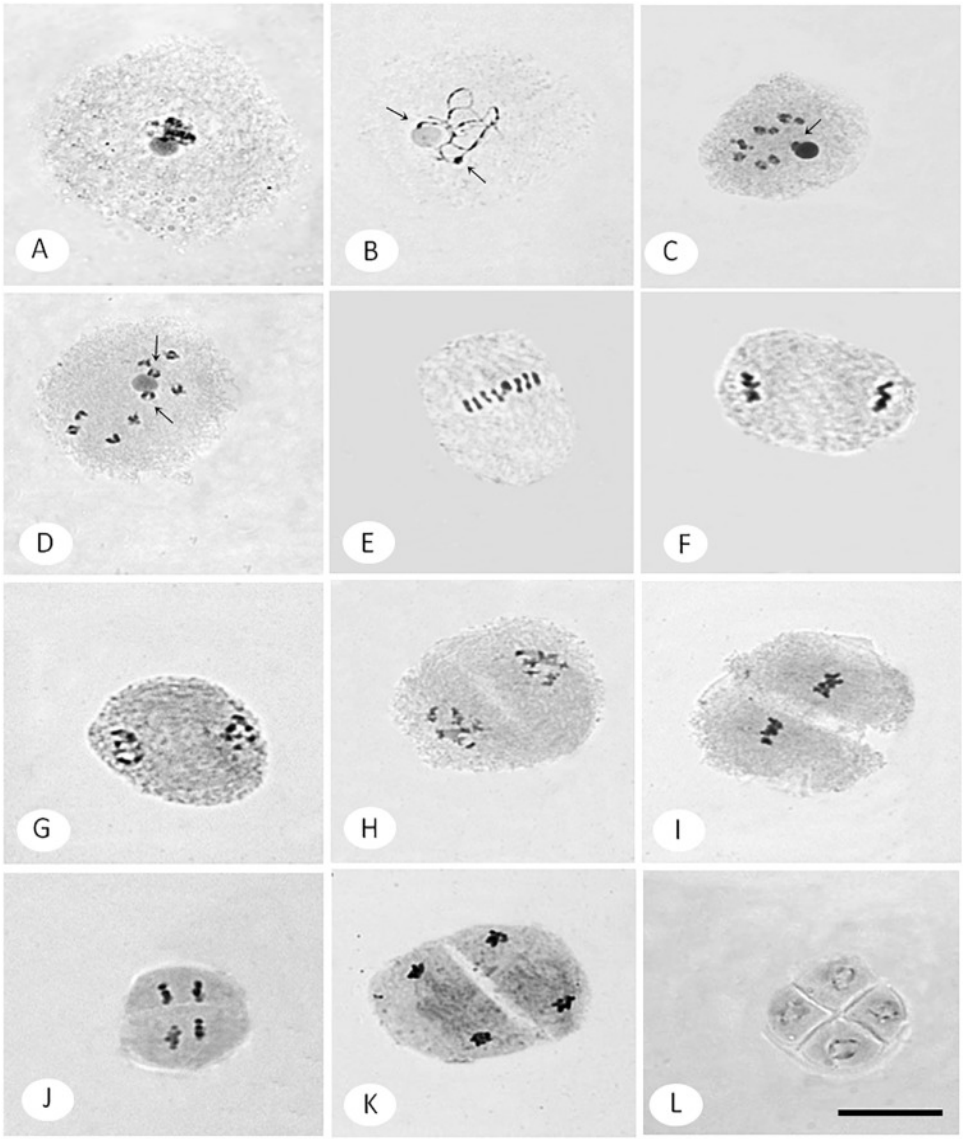
C. "Independent assortment: This is impossible due to linkage where distance [ie length of chromosome] is a determining factor in the recombination." In other words, independent assortment would not be possible if chromosome length is truly what determines recombination.

Evaluate the premise that linkage & chromosome length affect independent assortment. Give specific reasons or example of meiosis biology to justify your answer.

D "Independent assortment: This is impossible due to linkage where distance [ie length of chromosome] is a determining factor in the recombination." In other words, independent assortment would not be possible if chromosome length is truly what determines recombination.

66. **The following is from:**
Morais LC, F Souza Sobrinho and VH Techio. 2018. Comparative microsporogenesis between diploid and ….. South African Journal of Botany. 119:258-264.

Answer the following questions based on the figure.



A. What process is shown by this set of photos? Do not use 'meiosis' as an answer.

B. Name each of the stages show in A-L. Do not use 'prophase' as an answer.

A:	E:	I:
B:	F:	J:
C:	G:	K:
D:	H:	L:

C. For this plant, _____n = _____ x = _____

Which figure(s) can contribute to this answer? _____

D. What is the C value in photos B through E? _____

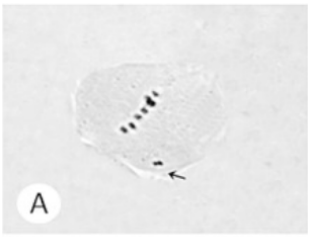
E. Without knowing anything else about this plant, is it most likely a monocot or dicot?

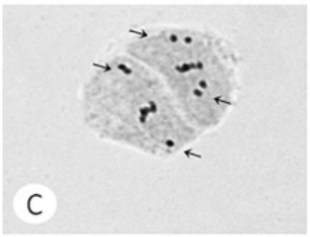
Which figure(s) allow you to make that conclusion? _____

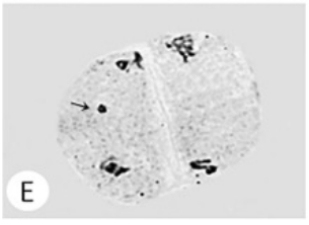
The diagnostic feature is:

_____

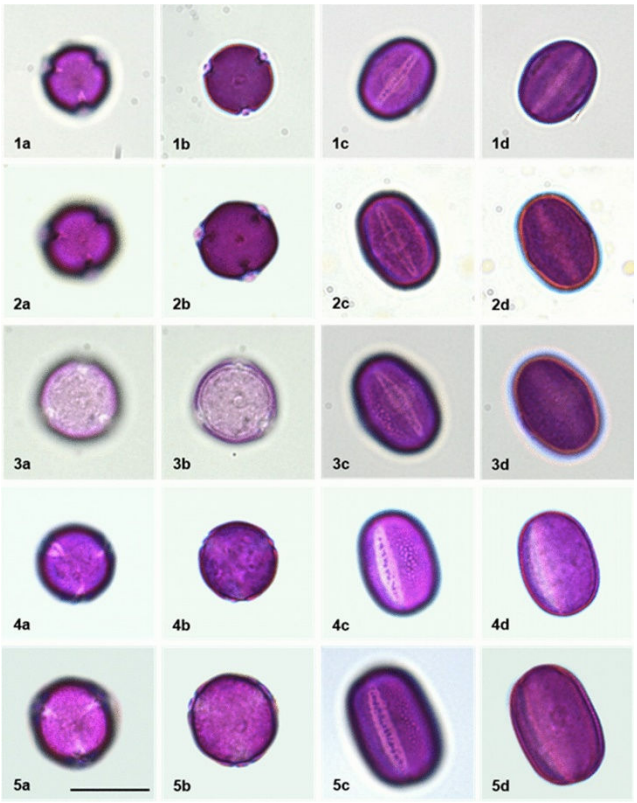
F. What phenomenon is shown in figures A, C & E, and what will the resulting sporad look like?







67. The following is from:
Benhizia H, Y Benhizia, R Djeghar, F Pustahija, S Siljak-Yakolev & N Khalfallah. 2020. Cytogenetic characterization, nuclear genome size, and pollen morphology of some *Hedysarum* L. taxa (Fabaceae) from Algeria, with emphasis on the origin of *H. perrauderianum* Coss. & Durieu. *Genetic Resources and Crop Evolution* **68**: 679–691.



In this paper, the authors looked at 4 diploid species of hedysarum (a fodder crop), and at a related 4x species .

A) Based on the pollen samples at right, which row is the 4x species?

B) What is the basis for your assertion?

68. The following is from Zhou Q, J Wu, Y Sang, Z Zhao, P Zhang and M Liu. 2020. Effects of colchicine on *Populus canescens* ectexine structure and 2n pollen production. Frontiers in Plant Science 11: 295

Sometimes, papers get published that challenge credibility, or at least, challenge conventions. In this paper, the authors were trying to obtain 2n pollen in poplars by injecting colchicine into anthers at various stages. The authors sampled male flowers to determine the stage of meiosis, and then proceeded to inject them with 10 μM colchicine a different number of times at 2-hour intervals.

The frequency of success is in the table at right. Eleven injections at pachytene gave the best results. Based on SSR analysis, the 2n pollen contained sister chromatids.

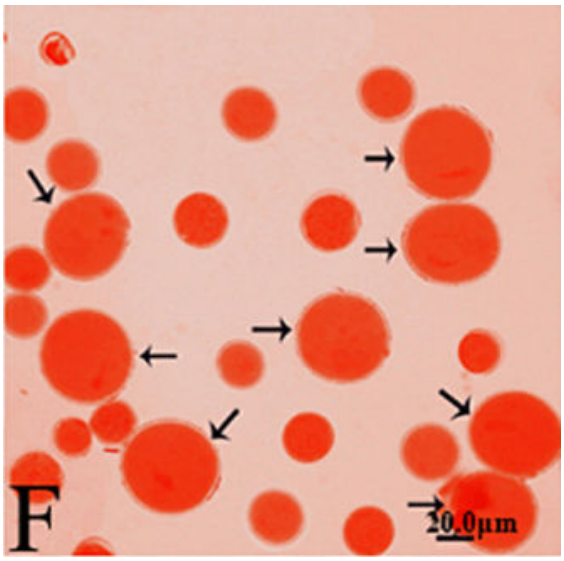
Dominant meiotic stage of PMCs	No. of colchicine injections times	Frequency of colchicine-induced 2n pollen (%)
Leptotene	3	4.79 ± 1.46
	5	6.42 ± 2.13
	7	9.40 ± 1.32
	9	8.19 ± 0.99
	11	10.44 ± 4.41
Pachytene	3	5.46 ± 0.90
	5	6.22 ± 0.89
	7	9.04 ± 2.62
	9	16.70 ± 3.95
	11	30.27 ± 8.69
Diplotene	3	4.18 ± 1.52
	5	5.79 ± 0.60
	7	8.76 ± 0.45
	9	9.48 ± 1.31
	11	9.68 ± 1.76
Diakinesis	3	6.99 ± 1.31
	5	7.81 ± 0.74
	7	8.17 ± 0.56
	9	10.53 ± 0.82
	11	20.36 ± 1.49
Metaphase I	3	2.75 ± 0.43
	5	3.91 ± 1.53
	7	4.34 ± 1.08
	9	11.03 ± 1.23
	11	15.11 ± 4.99
Control		2.08 ± 0.40

A. Recap the mode of action of colchicine.

B. What are the chromosomes doing at pachytene?

C. When the mode of action of colchicine is considered in light of the cellular events taking place when the colchicine is applied, are the results as you would expect? Explain your answer as to why or why not. Try to give an alternative explanation as to how their system may work.

D. The following figure shows the resulting 2n pollen grains (shown by the arrows).



Fully discuss whether the size of these 2n pollen grains fits with the usual expectations.

E. To determine if their 2n pollen was functional, they crossed to a 2x female. They got 6741 seeds, of which 4955 germinated, and 5 were 3x. The frequency of 3x was far lower than expected from their frequency of 2n pollen. Their explanation is that 2n pollen tubes grow more slowly did n pollen grains.

Why should they have or have not expected a low frequency of 3x plants? Is there another explanation for the low frequency of 3x progeny? Would a different female parent have been better? Explain your answer.

Extra credit

If the smaller grains are haploid, calculate the volume of the 2n pollen in the photo.

69. **The following is from:**
Xia Q-M, L-K Miao, K-D Xie, Z-P Yin, X-M Wu, C-L Chen, JW Grosser & W-W Guo. 2020. Localization and characterization of *Citrus* centromeres by combining half-tetrad analysis and CenH3-associated sequence profiling. Plant Cell Reports, 39:

There is a variety of tangerine that produces 2n eggs. In this work, the authors were trying to more precisely map the position of the centromere. They began by finding SNPs that are heterozygous in it. It was then pollinated by 4x males, and the progeny was genotyped for the maternal SNPs. Some of the data for chromosome 8 are below:

univela-morocco.com/products/citrus/nadorcott-tangerine/

Table S2 Genotypes of 2n megagametophytes and rates of heterozygosity restitution (HR) for each locus

No.	Maternal	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	32	33	34	35	36
168	GC	GC	GC	CC	GG	GC	GG	CC	GG	GC	GC	CC	CC	GG	CC	GG	GG	GC	GC	CC	GC	CC	CC	GC	GG	GG	GG	GC	GG	GG	CC	GG	CC	GG	GG	GG	GG
169	TA	TA	TA	AA	TT	TA	TT	AA	TT	AA	TA	AA	AA	TT	AA	TT	TT	TA	AA	AA	TA	AA	AA	TA	TT	TT	TT	TT	TT	TT	AA	TT	AA	TT	TT	TT	TT
170	AG	AG	AG	GG	AA	AA	AA	N	AA	GG	AA	GG	GG	AA	GG	AA	AA	AG	GG	GG	AG	GG	GG	AG	AA	AA	AA	AA	AA	AA	GG	AA	GG	AA	AA	AA	AA
171	TA	TA	TT	AA	TT	TT	TT	AA	TT	TA	TT	AA	AA	TT	AA	TT	TT	TT	AA	AA	TT	AA	AA	TA	TT	TT	TT	TT	TT	TT	AA	TT	AA	TT	TT	TT	TT
172	GT	GG	GG	GG	TT	TT	TT	GG	TT	GG	GG	GG	GG	GG	TT	GG	GG	GG	GG	GG	TT	GG	GG	TT	TT	TT	TT	TT	TT	TT	GG	TT	GG	TT	TT	TT	GG
173	TA	TT	AA	TT	AA	AA	AA	TT	AA	TT	AA	TT	TA	AA	AA	AA	AA	AA	TT	TT	AA	TT	TT	AA	AA	AA	AA	AA	AA	AA	TT	AA	TT	AA	AA	AA	AA
174	TG	GG	TT	GG	TT	TT	TT	GG	TT	GG	TT	GG	GG	TT	TT	GG	TT	TT	GG	GG	N	TT	GG	GG	TT	TT	TT	TT	TT	TT	GG	TT	GG	TT	TT	TT	TT
175	CT	TT	CC	TT	CC	CC	CC	TT	CC	CT	CC	TT	CT	CC	TT	CC	CC	CC	TT	TT	CC	TT	TT	CC	CC	CC	CC	CC	CC	CC	TT	CC	TT	CC	CC	CC	CC
176	GA	AA	GG	AA	GG	GG	GG	GA	GG	AA	GG	AA	AA	GG	AA	GG	GG	GG	AA	AA	GG	AA	AA	GG	GG	GG	GG	GG	GG	GG	AA	GG	AA	GG	GG	GG	GG
177	CT	TT	CC	TT	CC	CC	CC	TT	CC	TT	CC	TT	TT	CC	CC	TT	CC	CC	TT	TT	TT	CC	TT	TT	CC	CC	CC	CC	CC	CC	TT	CC	TT	CC	CC	CC	CC
178	GA	GG	AA	GG	AA	AA	GG	GG	AA	GG	AA	GG	GG	GA	AA	AA	AA	GG	GG	GG	AA	AA	GG	GG	AA	GG	GG	GG	GG	GG	AA	GG	GG	GG	AA	AA	GG
179	CT	TT	CC	TT	CC	CC	CC	TT	CC	TT	CC	TT	TT	CC	CC	TT	CC	CC	TT	TT	CC	TT	TT	CC	CC	CC	CC	CC	CC	CC	TT	CC	TT	CC	CC	CC	CC
180	TA	AA	TT	AA	TT	TT	TT	AA	TT	AA	TT	TA	AA	TT	TT	AA	TT	TT	AA	AA	TT	AA	AA	TT	TT	TT	TT	TT	TT	TT	AA	TT	N	TT	TT	TT	TT
181	AT	TT	TT	AT	AT	AT	AT	AT	AT	AA	AT	AT	AT	AA	TT	AA	AT	AT	AA	AT	AT	AT	AT	AA	TT	TT	TT	TT	TT	TT	TT	TT	TT	AA	AA	AT	AT
182	GC	CC	GG	CC	GG	GG	GG	CC	GG	CC	GG	CC	CC	GG	GG	CC	GG	GG	CC	CC	GG	CC	CC	GG	GG	GG	GG	GG	GG	GG	CC	GG	CC	GG	GG	GG	GG
183	GT	GT	GG	GT	GG	GG	GG	GT	GG	GT	GG	GT	GT	GG	GT	GG	GG	GG	GT	GT	GG	GT	GT	GG	GG	GG	GG	GG	GG	GG	GT	GG	GT	GG	GG	GG	GG
184	CT	CC	TT	CC	TT	TT	TT	CC	TT	CC	TT	CC	CT	CT	TT	TT	TT	TT	CC	CC	TT	CT	CC	TT	TT	TT	TT	TT	TT	TT	CC	TT	CC	TT	TT	CT	TT
185	CT	TT	CC	TT	CC	CC	CC	TT	CC	TT	CC	TT	TT	CC	TT	CC	CC	CC	TT	TT	CC	TT	TT	CC	CC	CC	CC	CC	CC	CC	TT	CC	TT	CC	CC	CC	CC
186	CG	GG	CG	GG	CC	CC	CC	CG	CC	GG	CC	GG	GG	CC	GG	CC	CC	CC	GG	GG	CC	GG	GG	CG	CC	CC	CC	CC	CG	CC	GG	CG	GG	CC	CG	CC	CC
187	CT	CT	CC	TT	TT	CC	CT	TT	TT	TT	CC	CC	CT	CC	CT	CT	TT	TT	CT	CT	CC	CC	CT	TT	CC	TT	CC	TT	CT	CT	TT	CT	CC	CT	CT	CC	CT

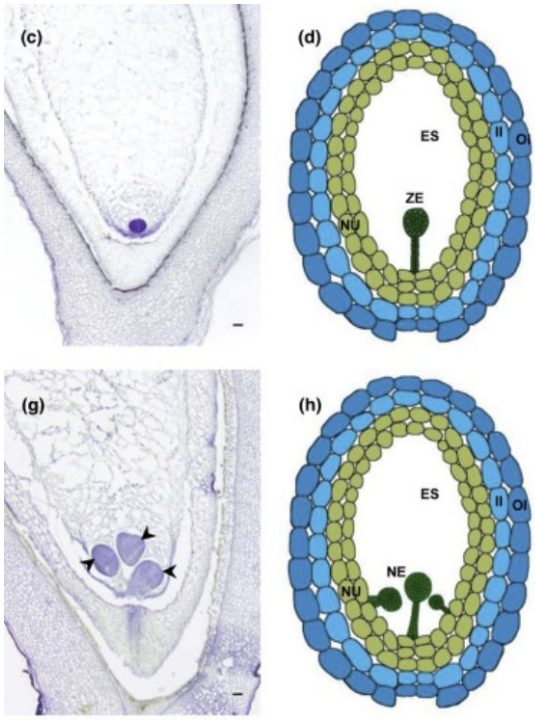
A. Which SNP markers are right on the centromere?

B. Which marker is the most distant? _____

C. Provide the marker-centromere distance for the 1st 4 markers.

168	
169	
170	
171	

70. **The following is from**: (title revealed after exam)
Xu Y, H J, X Wu, AMG Koltunow, X Deng, Q Xu. 2020. Regulation of nucellar embryony, a mode of sporophytic apomixis in *Citrus* resembling somatic embryogenesis. Current Opinion in Plant Biology 5959: 101984



The photos show 2 embryo sacs and interpretive drawings.

A. What phenomenon is shown in g & h?

B. How will the genotype of the resulting seedlings compare with that of the female parent?

C. Is there a chance the embryos could be coming from a cell other than the nucellus? Explain.

D. If so, what would be the genotype of the resulting plant?

71. **The following is from:**
FIAN International Secretariat. 2018. A Human Rights Analysis of Gene Drives. Self published. 9 pp.

3. *Gene drives threaten biodiversity and ecosystems*

Ongoing research on gene drives explicitly aims to remove or eradicate species. Gene drives have the potential to forever change the genetic makeup of species, or even drive certain species to extinction. Indeed, they are designed to set off a chain reaction, which is potentially uncontrollable and unstoppable. "Removing a pest may seem attractive from the point of view of efficient monoculture food production, but even pests have their place in the food chain and may in other contexts (particularly outside of farmland) turn out to be essential or keystone species for maintaining biodiversity."[16] This means that the intended extinction of one species could lead to the unintended extinction of others because of the disruption of food chains and ecosystems. Another risk of gene drive technology is that it could produce new invasive species or organisms, the spread of which would be impossible to control.

At right is an excerpt from their arguments on why gene drives should never be deployed.
An international development agency is considering a project to eradicate insect pests via gene drives, but is having second thoughts after reading the FIAN report.
They have called you in as a science consultant to evaluate the 3rd reason, given here. What explanation and conclusions would you give them?