

Mejora Clásica

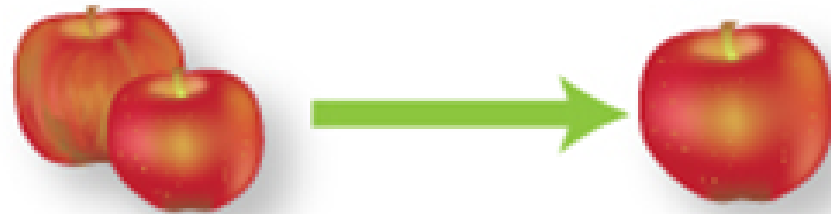
Genética, genómica y mejora vegetal

Enero de 2019

Máster en Genética y Evolución
(Especialidad Agroalimentaria)

Cruce

Combinación de dos especies sexualmente compatibles para crear una variedad con rasgos deseados de los padres.



Las manzanas Honeycrisp obtuvieron su famosa textura y sabor mezclando los rasgos de sus padres.



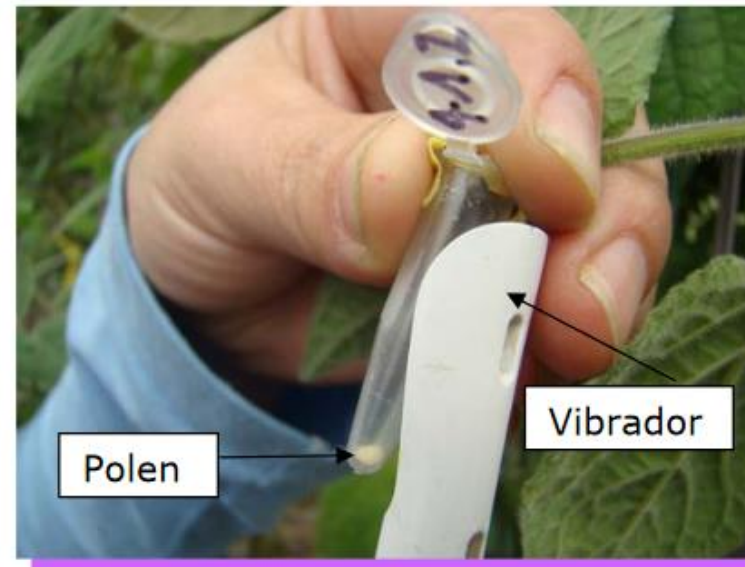
GREGOR MENDEL



Honeygold x Macoun

Entre las cinco patentes que más royalties produjeron en los Estados Unidos durante su vigencia

Polinización cruzada en *Physalis peruviana* L.



Polinización cruzada en *Physalis peruviana* L.



Emasculación

Polinización cruzada en *Physalis peruviana* L.



Polinización cruzada en *Physalis peruviana* L.



Ilustración 18 Extracción de semillas y remoción del exceso de agua de la semilla con un paño absorbente



Ilustración 19. Conservación adecuada de las semillas

Doomsday Vault



Punto de vista conservacionista:



Contiene unos 1600 taxones de los 4000 que componen la flora andaluza (>60% flora total de la Península Ibérica y Baleares)



Red Española de Bancos de Semillas

www.redbag.es/





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Germplasm Resources Information Network

Welcome!

In 1990, the U.S. Congress authorized establishment of a National Genetic Resources Program (NGRP). It is the NGRP's responsibility to: acquire, characterize, preserve, document, and distribute to scientists, germplasm of all lifeforms important for food and agricultural production.

The Germplasm Resources Information Network ([GRIN](#)) web server provides germplasm information about plants, animals, microbes and invertebrates. This program is within the U.S. Department of Agriculture's Agricultural Research Service.

The National Genetic Resources Advisory Council ([NGRAC](#)) advises and makes recommendations to the Secretary and Director of the NGRP. The NGRAC responds to the important issues of the nation in respect to conserving and utilizing genetic resources for food and agriculture.

Click [here](#) for a summary of the GRIN-Global project that is developing and deploying a new version of the GRIN system for plants.

Updated 28-Nov-2015

Punto de vista productivo:

Mejora de plantas autógamas
[Selección de **caracteres de interés**]

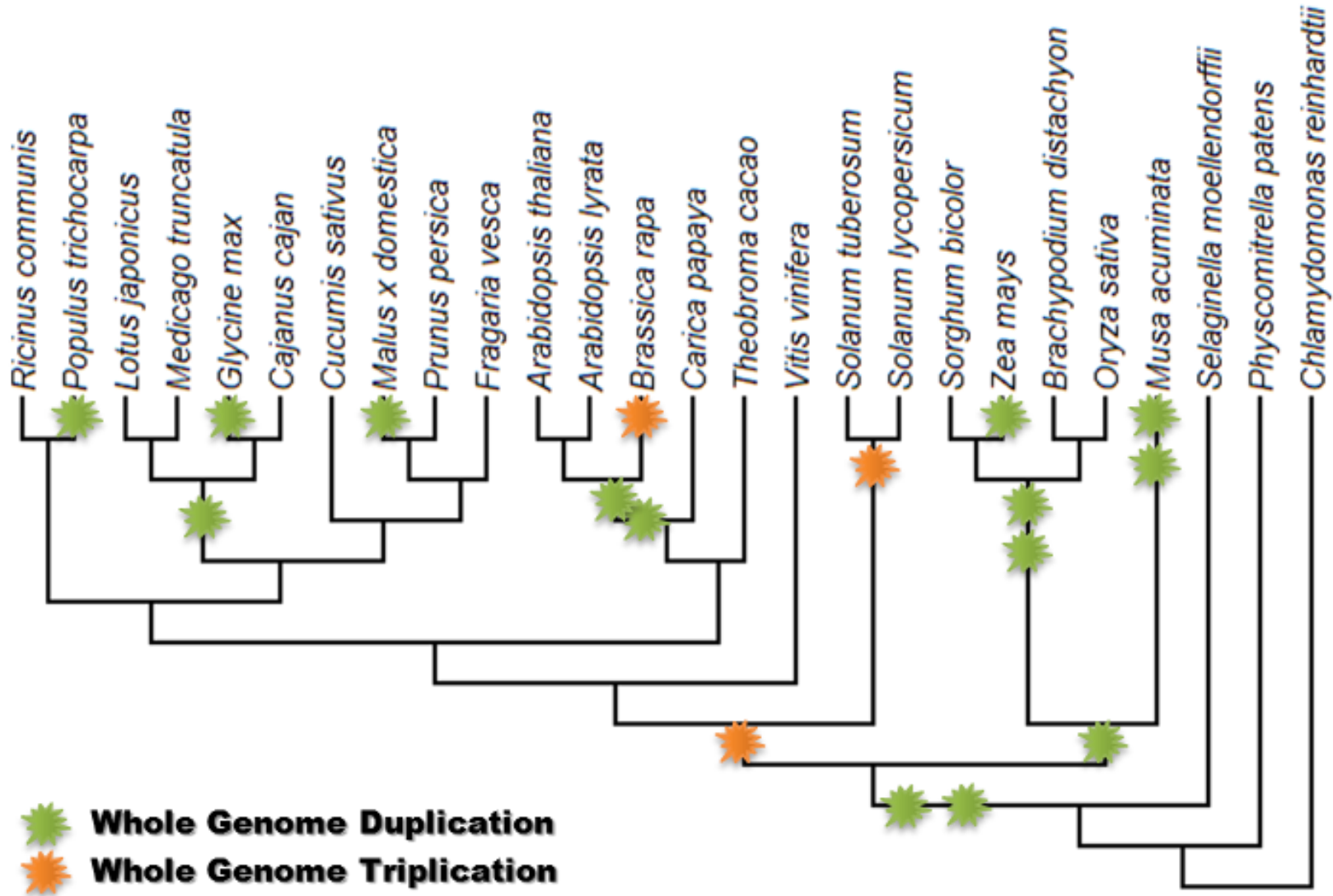
Mejora de plantas alógamas
[Obtención de **híbridos**]

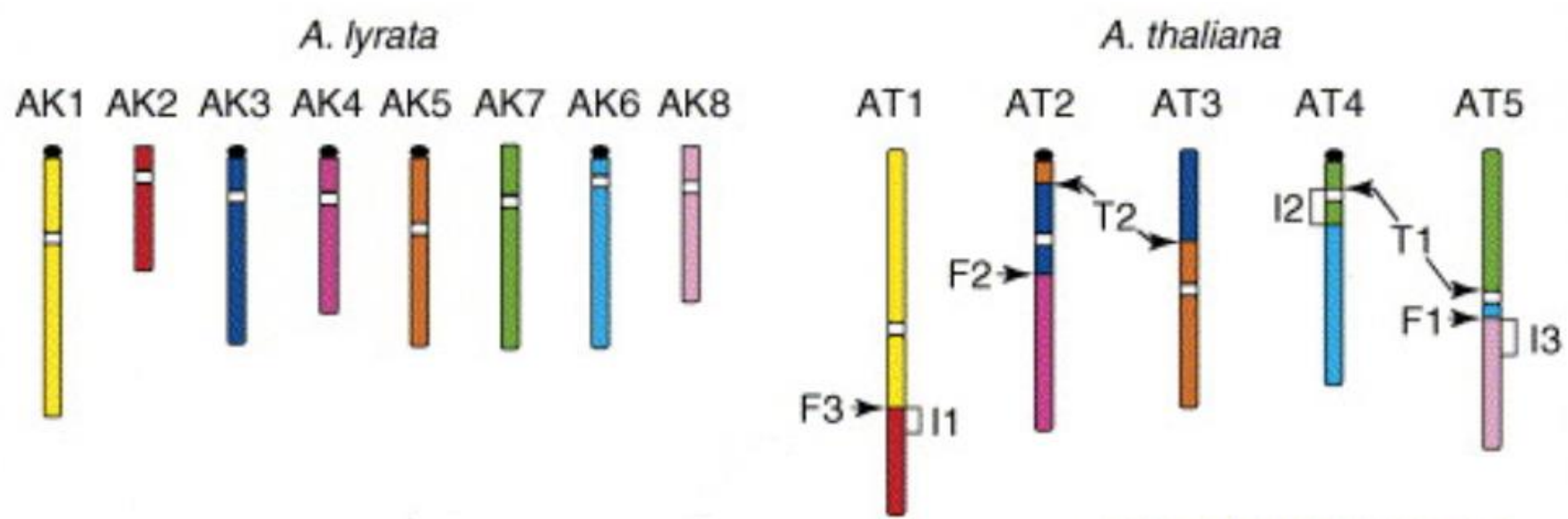
Poliploidía Inducida

Multiplicación del número de cromosomas de un cultivo para impactar su fertilidad.



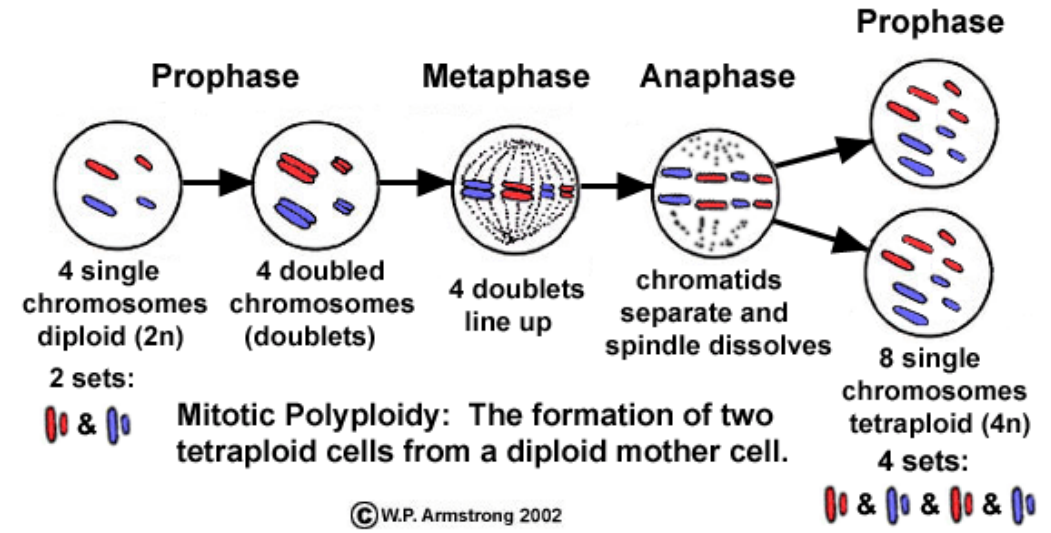
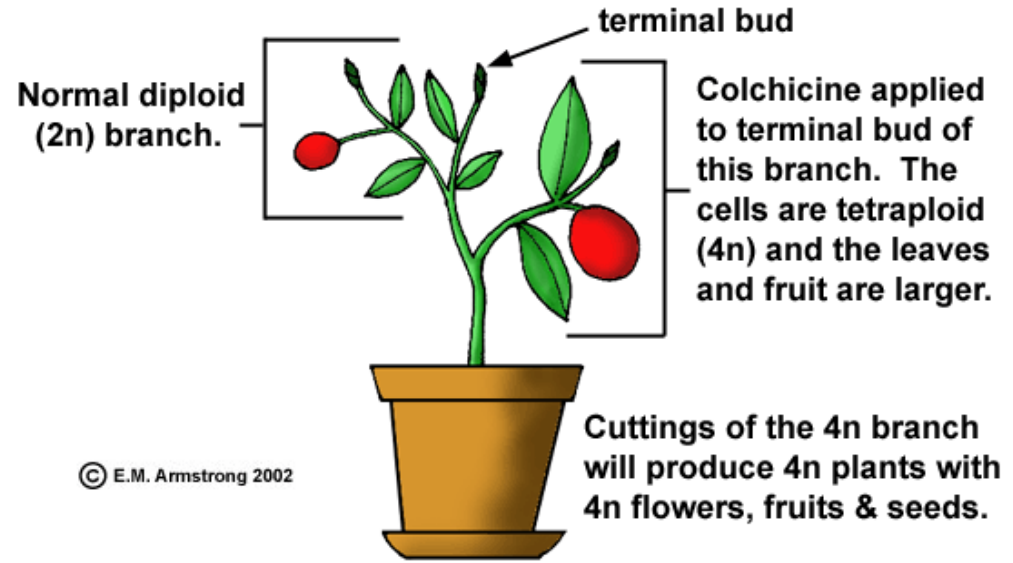
Las sandías sin semillas son creadas cruzando una planta con dos juegos de cromosomas con otra de 4 juegos. La fruta sin semillas tiene 3 juegos.





<https://phytozome.jgi.doe.gov/>

Genes in Family		Functional Annotation		MSA	Family History		Domains	Syteny	Exons
<input type="checkbox"/>	M	Views	Org	ID	Alias/Symbol	Define			
<input type="checkbox"/>	F		Bdi	Bradi4g08800.1	Bradi4g08800.v2	ribulose-bisphosphate carboxylase activity ...			
<input type="checkbox"/>	F		Bdi	Bradi4g08800.1.p	none	Bradi4g08800.1.p is a member of Family 72394443: none			
<input type="checkbox"/>	F		Bdi	Bradi5g04080.1	Bradi5g04080.v2	ribulose-bisphosphate carboxylase activity ...			
<input type="checkbox"/>	F		Bdi	Bradi3g26391.1	Bradi3g26391.v2	(M=11) 4.1.1.39 - Ribulose-bisphosphate ca...			
<input type="checkbox"/>	F		Bsta	Brast10G096300.1		(M=5) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Bsta	Brast10G107800.1		(M=5) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Bsta	Brast09G038200.1		(M=5) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Bsta	Brast03G114700.1		(M=5) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Osa	LOC_Os02g05830.1		ribulose bisphosphate carboxylase small c...			
<input type="checkbox"/>	F		Osa	LOC_Os12g17600.1		ribulose bisphosphate carboxylase small c...			
<input type="checkbox"/>	F		Osa	LOC_Os12g19381.1		ribulose bisphosphate carboxylase small c...			
<input type="checkbox"/>	F		Osa	LOC_Os12g19470.2		ribulose bisphosphate carboxylase small c...			
<input type="checkbox"/>	F		Pha	Pahal.C03268.1		(M=6) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Pha	Pahal.C03582.1		(M=6) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Pha	Pahal.C03271.1		(M=6) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Pha	Pahal.C03575.1		(M=6) 4.1.1.39 - Ribulose-bisphosphate car...			
<input type="checkbox"/>	F		Pha	Pahal.A00305.1		(M=6) 4.1.1.39 - Ribulose-bisphosphate car...			



$2n=18$

Yemas
terminales

Inflorescencias

Yemas
laterales

Tallos y
flores

Tallo

Hojas

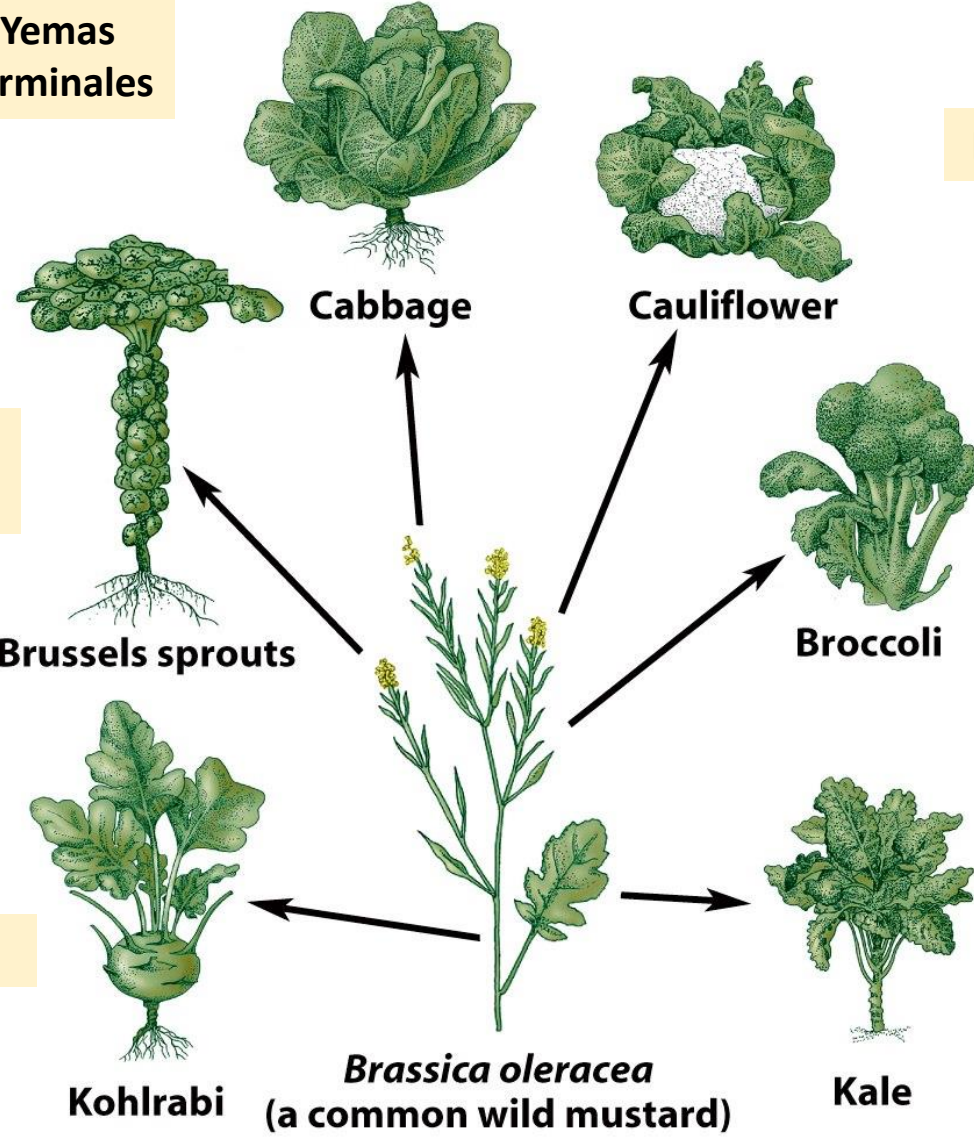
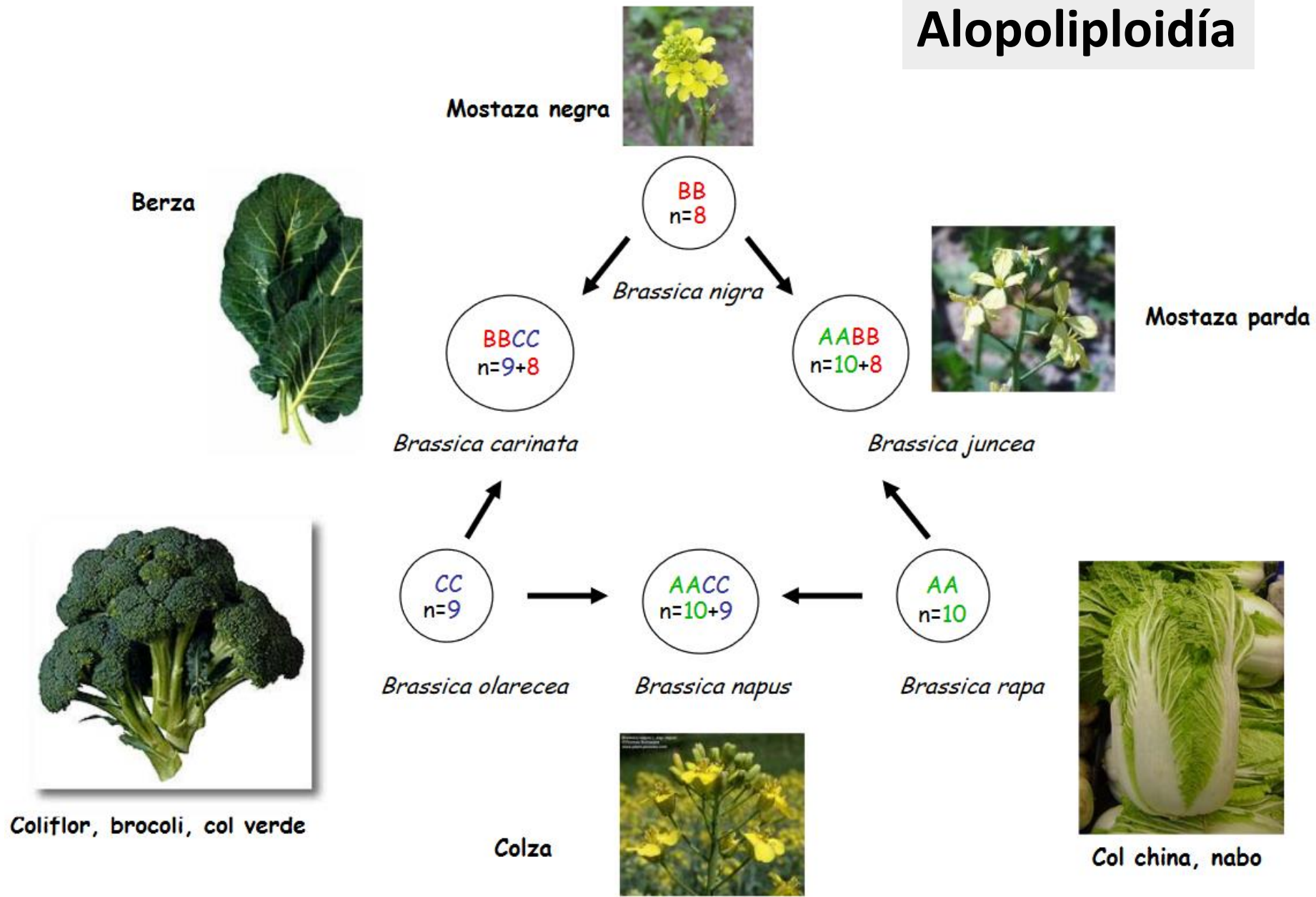
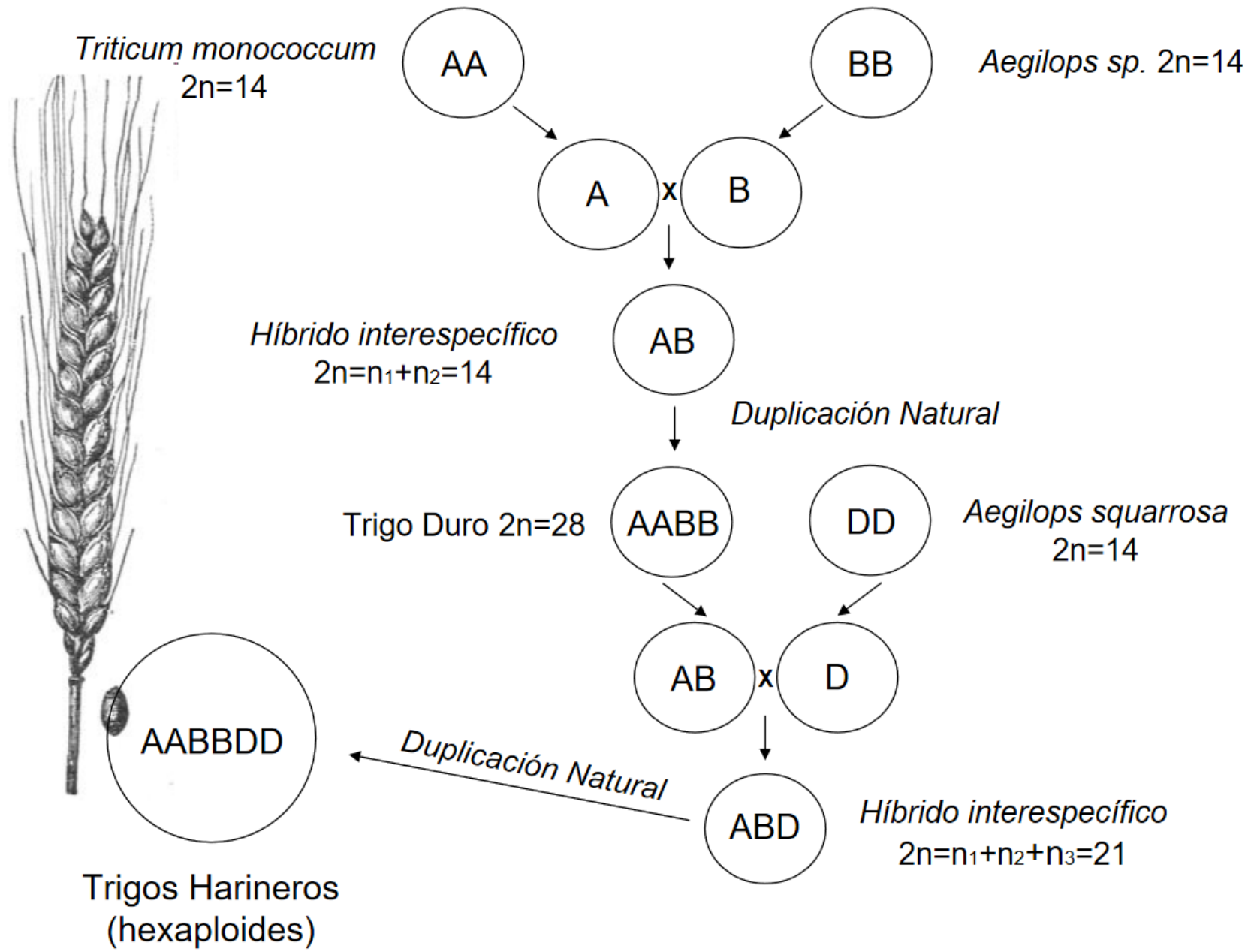


Figure 16-9 Discover Biology 3/e
© 2006 W. W. Norton & Company, Inc.

Alopoliploidía







© W.P. Armstrong 2002

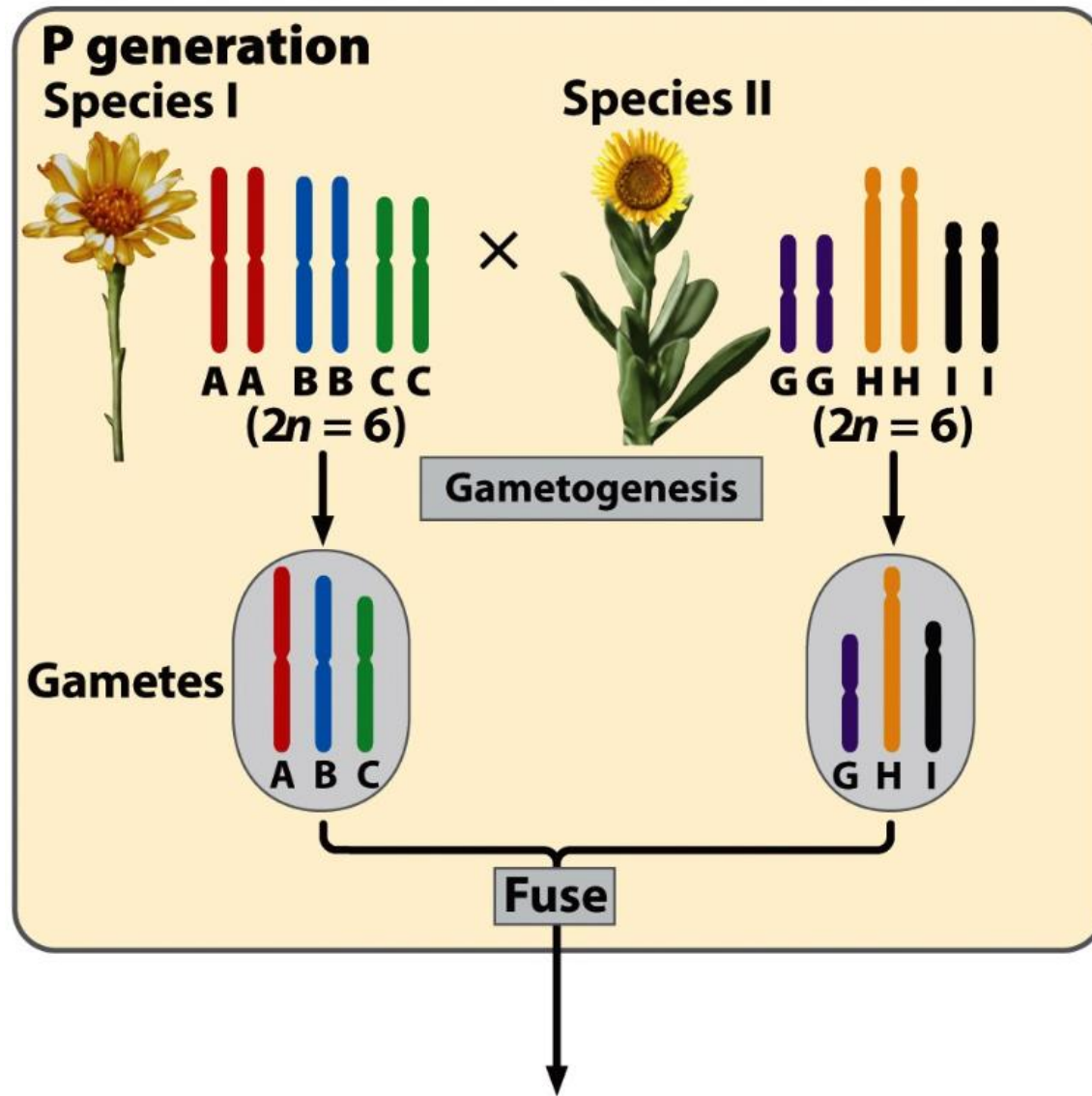


Figure 9-28 part 1
Genetics: A Conceptual Approach, Third Edition
© 2009 W. H. Freeman and Company

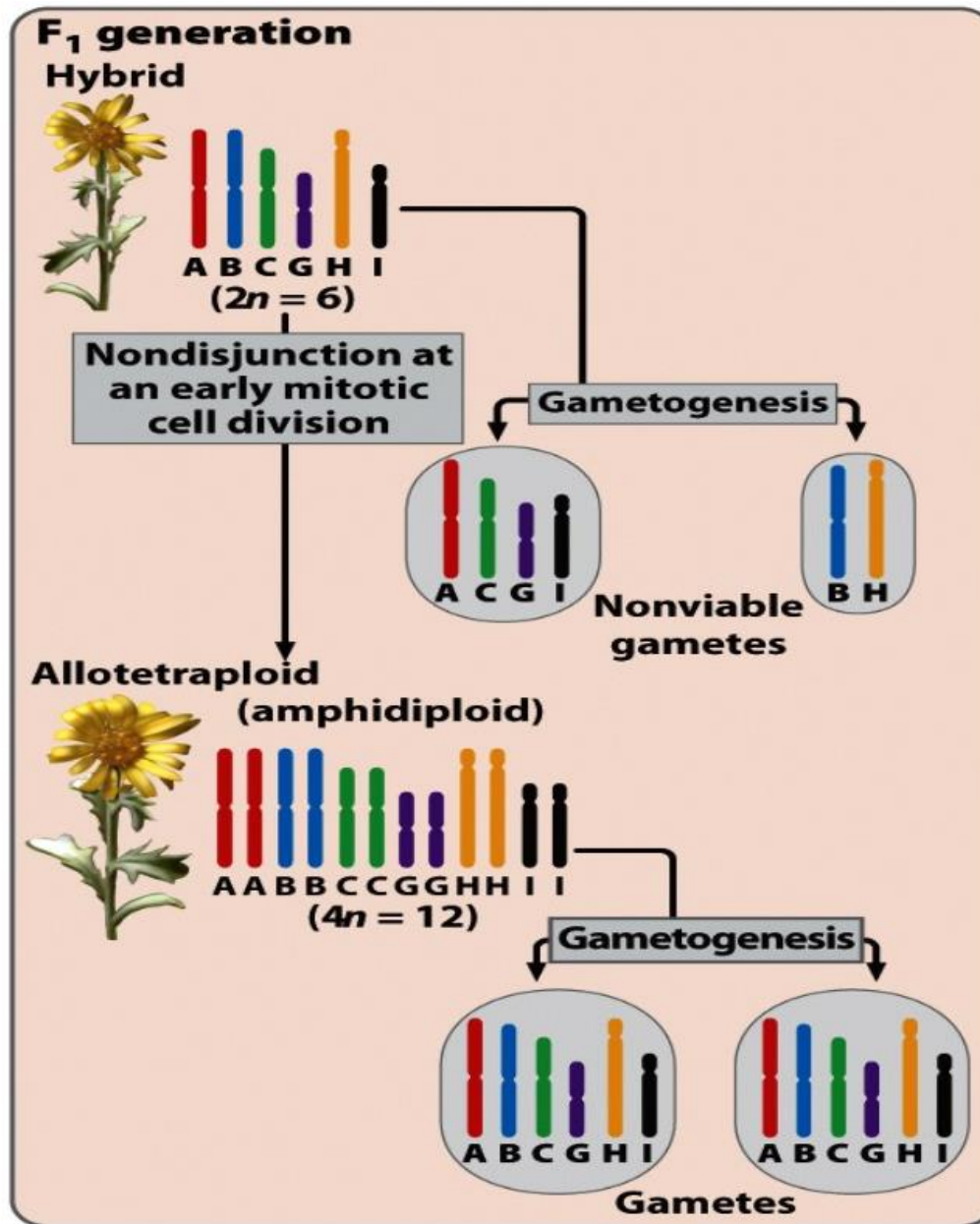
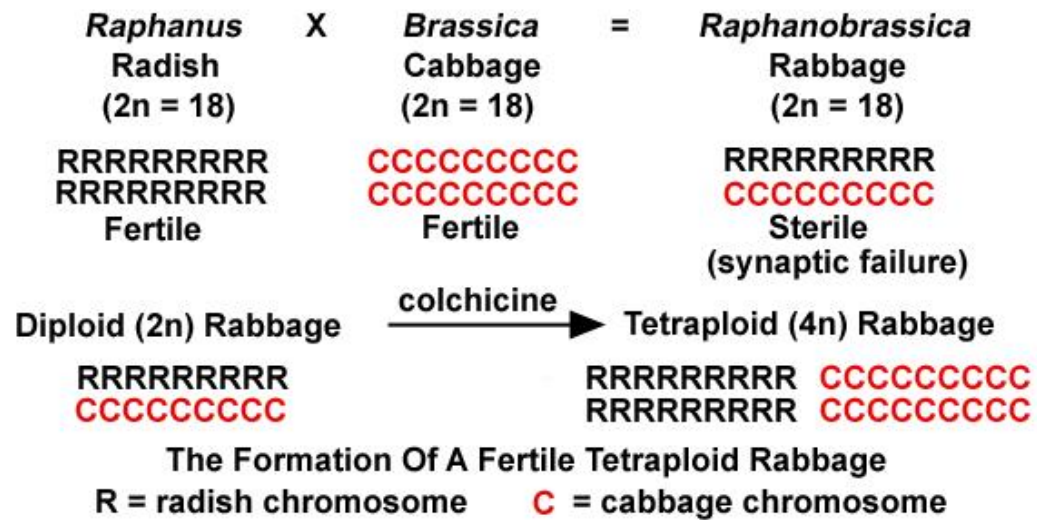
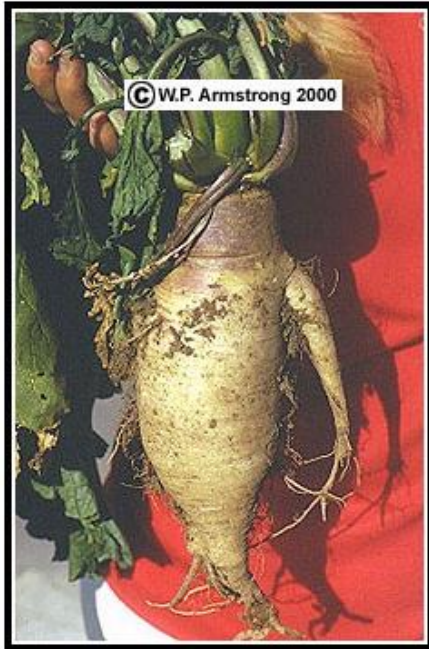


Figure 9-28 part 2
Genetics: A Conceptual Approach, Third Edition
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(Rábano x Col) + Poliploidización



Raphanus sativus

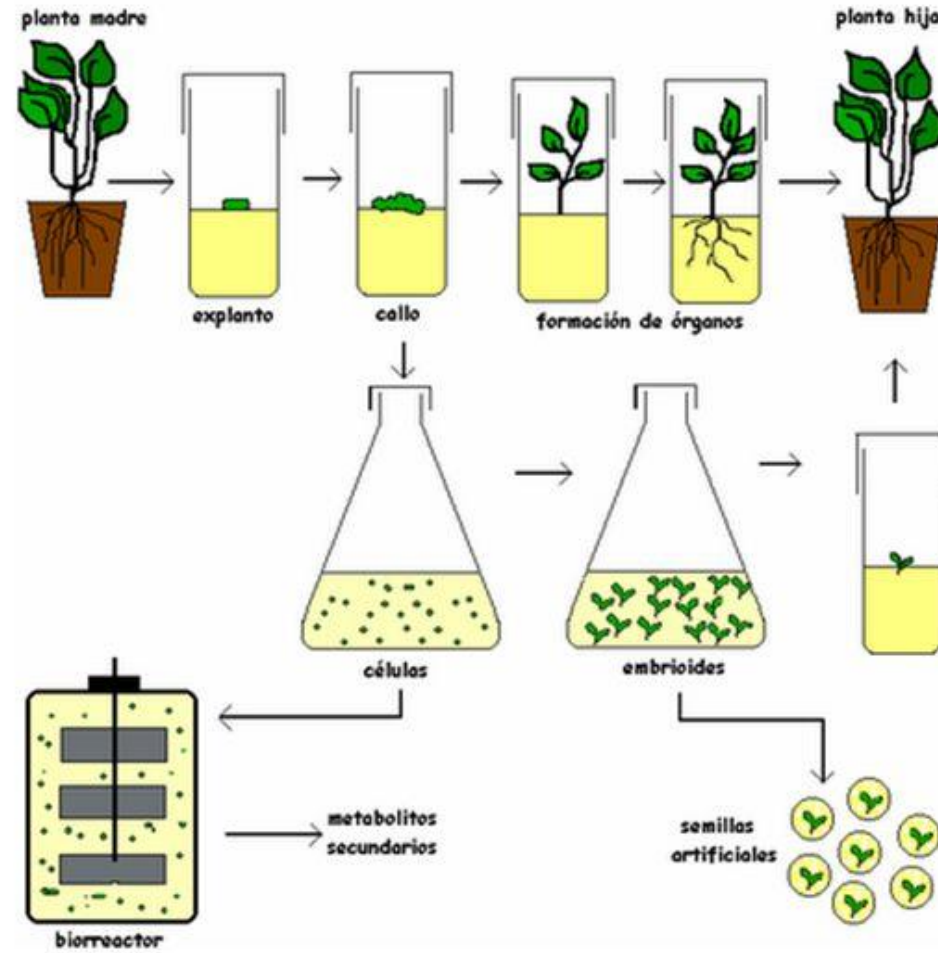
Ni siquiera es necesario ser sexualmente compatible...

Reproducción Asexual:

- **Multiplicación vegetativa:**
 - Cultivo *in vitro*



Etapas del cultivo *in vitro*



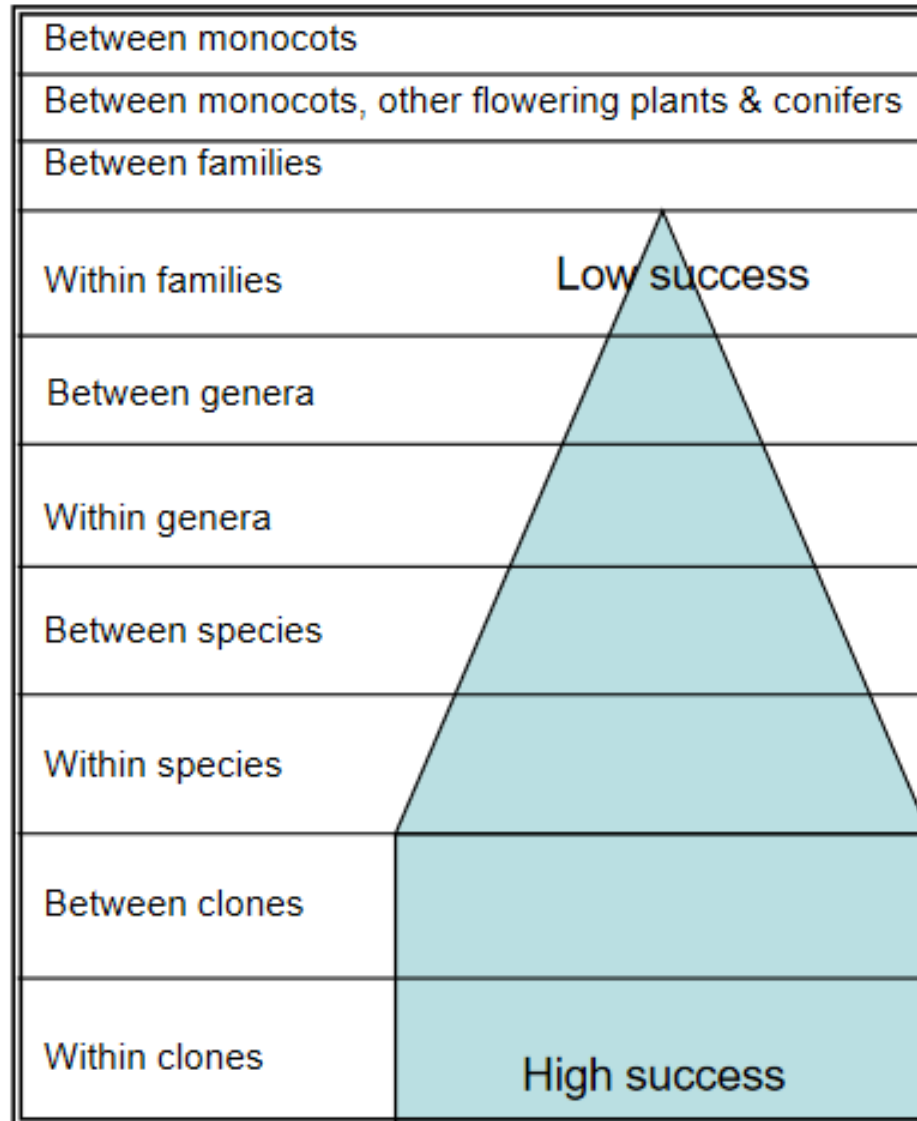
Ni siquiera es necesario ser sexualmente compatible...

Reproducción Asexual:

- **Multiplicación vegetativa:**
 - Injerto



Frecuente en plantas
leñosas del mismo género



<http://extension.oregonstate.edu/deschutes/sites/default/files/propagation.pdf>

Common Name	Botanical Name	Budding			Grafting				Rootstock(s)*
		T	Chip	Patch	Whip	Side	Bark	Cleft	
Almond	<i>Prunus dulcis</i>	F							almond, peach, Marianna plum
Apple	<i>Malus domestica</i>	S,F			W		S,Su	S,Su	
Apricot	<i>Prunus armeniaca</i>	S,Su,F							apricot, peach, myrobalan plum
Arborvitae	<i>Thuja spp.</i>					W			
Avocado	<i>Persea americana</i>	S,Su,F							
Azalea	<i>Rhododendron sp.</i>					F			
Beech	<i>Fagus sp.</i>				F				
Birch	<i>Betula spp.</i>	F	F			W			<i>B. pubescence</i> , <i>B. pendula</i> , <i>B. platyphylla</i>
Butternut	<i>Juglans cinerea</i>						S		black walnut
Camellia	<i>Camelia spp.</i>				W	W			
Carob	<i>Ceratonia siliqua</i>		Su						
Cedar	<i>Calocedrus decurrens</i>					W			cedar, Thuja
Cherry	<i>Prunus avium</i>	S,F	S,F						
Chestnut	<i>Castanea spp.</i>	S	W		W				
Citrus	<i>Citrus spp.</i>	S,F							citrus, <i>Poncirus</i> (Trifoliata orange)
Dogwood	<i>Cornus spp.</i>	F			W				
Filbert	<i>Corylus spp.</i>				W				
Fir	<i>Abies spp.</i>					W			
Fringe tree	<i>Chionanthus spp.</i>	F				W			
Ginkgo	<i>Ginkgo biloba</i>	S	S		W				
Grape	<i>Vitis spp.</i>	S,W			W				
Hackberry	<i>Celtis spp.</i>		S			S			
Hawthorn	<i>Crataegus</i>	F							
Hazelnut	<i>Corylus avellana</i>				W				
Hibiscus	<i>Hibiscus rosa-sinensis</i>					S,Su			
Hickory	<i>Carya spp.</i>			F			S		
Honeylocust	<i>Gleditsia triacanthos</i>	F			W				
Horsechestnut (buckeye)	<i>Aesculus spp.</i>	F			S			S	
Juniper	<i>Juniperus spp.</i>					W			
Kiwi	<i>Actinidia deliciosa</i>	F			W				
Magnolia	<i>Magnolia spp.</i>					W			
Maple	<i>Acer spp.</i>	Su,F	Su,F			Su			
Mountain ash	<i>Sorbus spp.</i>		F		F				
Nectarine	<i>Prunus persica</i>	Su,F	Su,F						peach, apricot, some plums
Oak	<i>Quercus spp.</i>				W	W			

Oak	<i>Quercus spp.</i>				W	W		
Olive	<i>Olea europea</i>	F		F	W			
Pawpaw	<i>Asimina triloba</i>		S					
Peach	<i>Prunus persica</i>	Su,F						peach, apricot, some plums
Pear	<i>Pyrus spp.</i>	F			W			pear, quince
Pecan	<i>Carya Illinoensis</i>			Su				
Persimmon, Japanese	<i>Diospyros kaki</i>				S			<i>D. lotus, D. kaki, D. virginiana</i>
Pine	<i>Pinus spp.</i>					W		
Pistachio	<i>Pistacia vera</i>	Su,F						
Plum, Prune	<i>Prunus domestica</i>	F						plum, peach, apricot, almond
Quince	<i>Cydonia oblonga</i>	F						
Redbud	<i>Cercis spp.</i>	Su						
Rhododendron	<i>Rhododendron spp.</i>					W		
Rose	<i>Rosa spp.</i>	S,Su,F						<i>R. multiflora, R. canina, R. chinensis, R. odorata, R. rugosa</i>
Shagbark hickory	<i>Carya ovata</i>			Su				
Spruce	<i>Picea spp.</i>					W		
Viburnum	<i>Viburnum spp.</i>					W		
Walnut	<i>Jugulans regia</i>	S,Su		S,Su	W			black walnut, Persian walnut, paradox walnut
Yew	<i>Taxus spp.</i>					W		

Note: S, Spring; Su, Summer; F, Fall; W, Winter

*Scions are grafted or budded onto their seedlings where specific rootstocks are not indicated.

<http://extension.oregonstate.edu/deschutes/sites/default/files/propagation.pdf>



The tree of forty fruits | Sam Van Aken



CPVO

Community Plant Variety Office

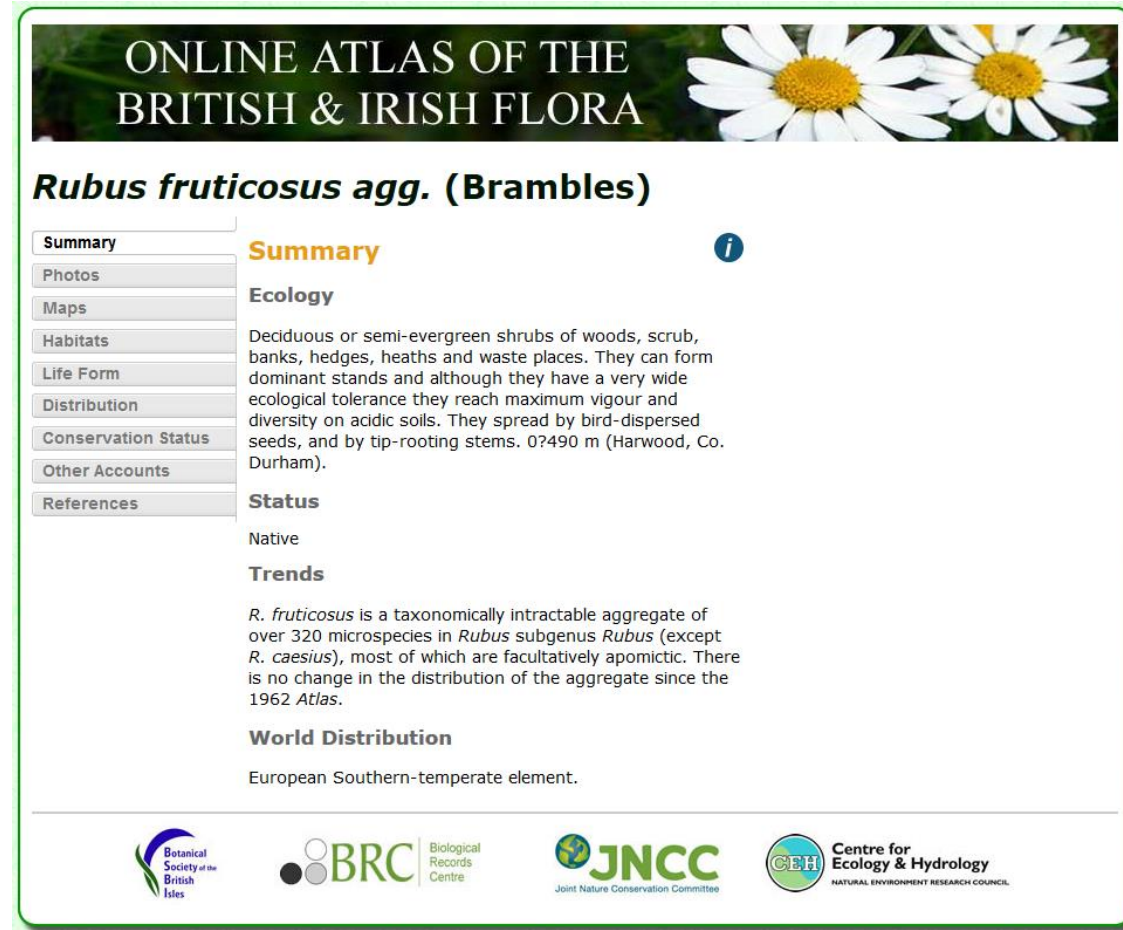
<http://cpvo.europa.eu/>

Ni siquiera es necesario ser sexualmente compatible...

Reproducción Asexual:

- Apomixis

- Producción de semillas **sin fecundación**.
- Obtención de individuos **idénticos**.
 - Mantenimiento de genotipos deseados **a lo largo del tiempo**.



ONLINE ATLAS OF THE BRITISH & IRISH FLORA

Rubus fruticosus agg. (Brambles)

- Summary
- Photos
- Maps
- Habitats
- Life Form
- Distribution
- Conservation Status
- Other Accounts
- References

Summary

Ecology

Deciduous or semi-evergreen shrubs of woods, scrub, banks, hedges, heaths and waste places. They can form dominant stands and although they have a very wide ecological tolerance they reach maximum vigour and diversity on acidic soils. They spread by bird-dispersed seeds, and by tip-rooting stems. 0?490 m (Harwood, Co. Durham).

Status

Native

Trends

R. fruticosus is a taxonomically intractable aggregate of over 320 microspecies in *Rubus* subgenus *Rubus* (except *R. caesius*), most of which are facultatively apomictic. There is no change in the distribution of the aggregate since the 1962 *Atlas*.

World Distribution

European Southern-temperate element.

Botanical Society of the British Isles | BRC Biological Records Centre | JNCC Joint Nature Conservation Committee | CEH Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL

Ni siquiera es necesario ser sexualmente compatible...

Reproducción Asexual:

- Multiplicación vegetativa:

- Propagación:



Esquejes



Tubérculos



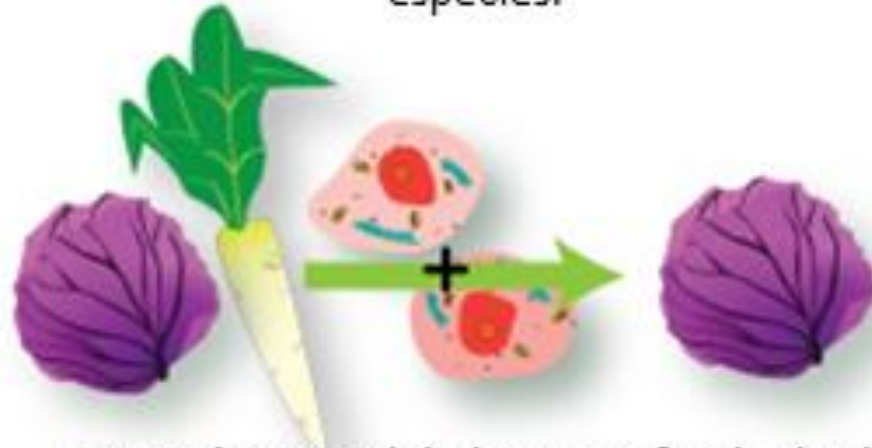
Rizomas



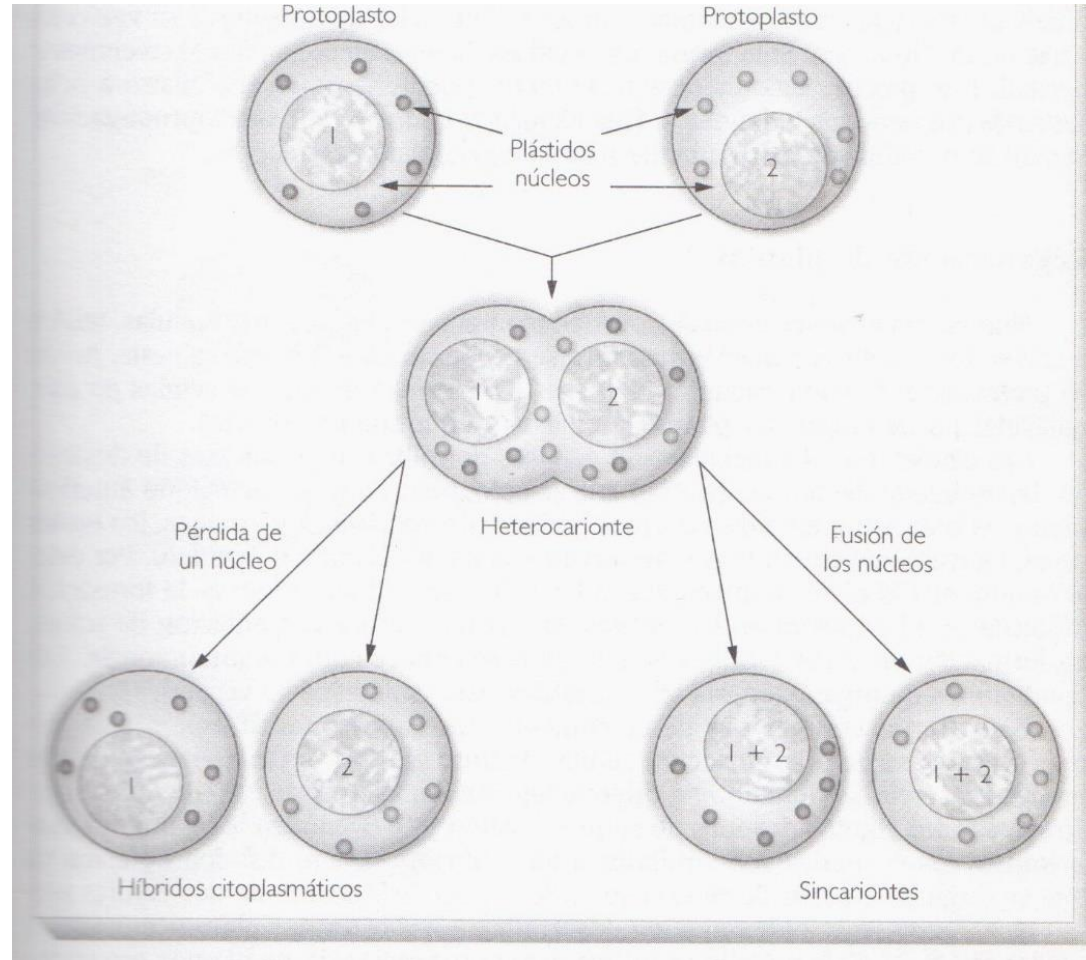
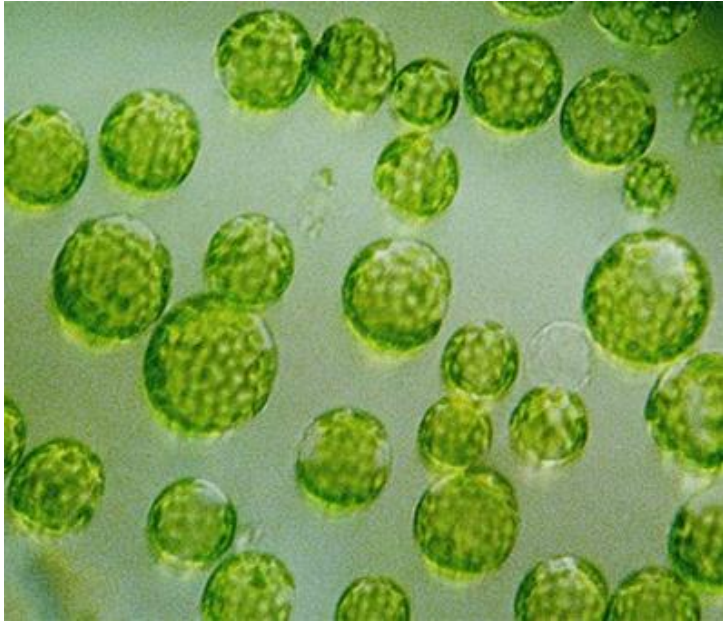
Estolones

Fusión de Protoplastos

Fusión de células o componentes celulares para transferir rasgos entre especies.

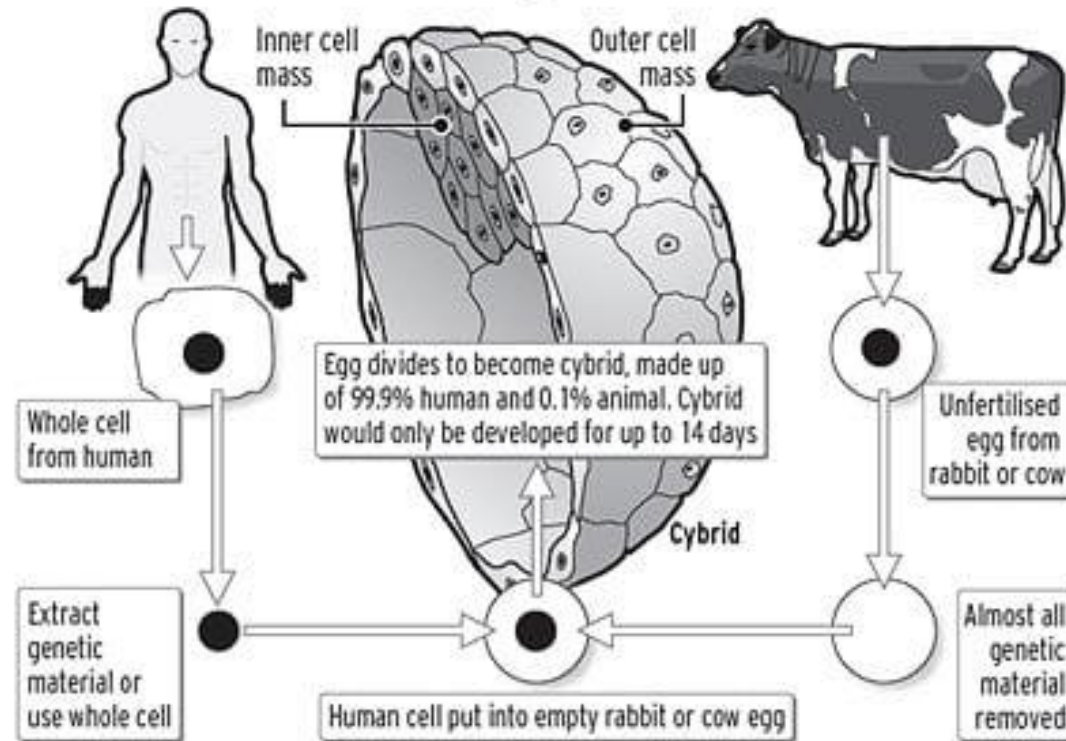


La macho esterilidad es transferida desde rábanos a las coles rojas fusionando sus células. La macho esterilidad ayuda a los fitomejoradores a hacer cultivos híbridos.



“Cybrids” (Cytoplasmatic hybrids)



How to make a human cybrid



Híbridos simétricos

Híbridos asimétricos

TABLE 44.3 A selected list of interspecific hybrids produced through protoplast fusion along with the chromosome numbers in the hybrids

<i>Plant species with their chromosome number</i>	<i>Chromosome number(s) in the hybrid(s)</i>
<i>Petunia parodii</i> (2n = 48) + <i>P. hybrida</i> (2n = 14)	44–48 
<i>Datura innoxia</i> (2n = 24) + <i>D. stramonium</i> (2n = 24)	46, 48, 72
<i>Nicotiana tabacum</i> (2n = 48) + <i>N. nesophila</i> (2n = 48)	96 
<i>Nicotiana tabacum</i> (2n = 48) + <i>N. glutinosa</i> (2n = 24)	50–58
<i>Lycopersicon esculentum</i> (2n = 24) + <i>L. peruvianum</i> (2n = 24)	72
<i>Solanum tuberosum</i> (2n = 24, 48) + <i>S. chacoense</i> (2n = 14)	60
<i>Brassica oleracea</i> (2n = 18) + <i>B. campestris</i> (2n = 18)	Highly variable
<i>Brassica napus</i> (2n = 38) + <i>B. juncea</i> (2n = 36)	Highly variable