CIICAM
RESEARCH CENTER

¿Qué es el material genético, cómo obtenerlo y para qué?

Nataly Ruiz Quiñones

nruizq@gmail.com

Breve historia de la molécula de DNA

1869- Friedrich Miescher.

- Primera extracción de DNA.
- Nucleina (Miescher et al, 1971)

https://www.advancedsciencenews.com/wp-content/uploads/2019/04/Capture-2-233x300.png

1879, 1890- Albrecht Kossel
(premio Nobel 1910)

- Identificó las bases nitrogenadas
- Presencia de azúcar.

https://iiif.wellcomecollection.org/image/V0026654.jpg/full/800%2C/0/default.jpg

1889- Richard Attmann

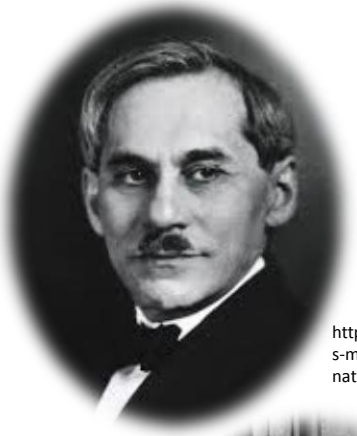
- Ácido nucléico

https://s3.amazonaws.com/s3.timetoast.com/public/uploads/photos/5356276/richard-altmann-1852-1900.jpg

Breve historia de la molécula de DNA

1929- Phoebus Levene.

- Ribosa, desoxirribosa y fosfato.
- Nucleotidos



https://images.fineartamerica.com/images-medium-large-5/phoebus-levene-national-library-of-medicine.jpg

1950- Erwin Chargaff

- Nucleotidos inter e intraespecífico.
- A=T , G=C

https://media.sciencephoto.com/image/c0373020/800wm

1952- Alfred Hershey y Martha Chase

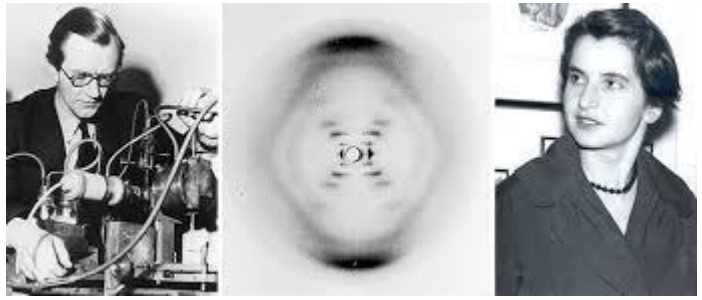
- Carácter hereditario del DNA

https://content.dnalc.org/content/c16/16406/16406_hershey_chase.jpg

Breve historia de la molécula de DNA

1953- Rosalind Franklin y Maurice Wilkins

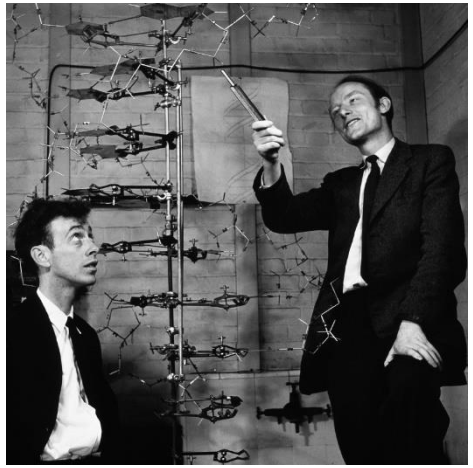
- Identifican la doble hélice del DNA



https://www.kcl.ac.uk/ImportedImages/0Prospectus/kings-in-time/dna-pic-2.jpg

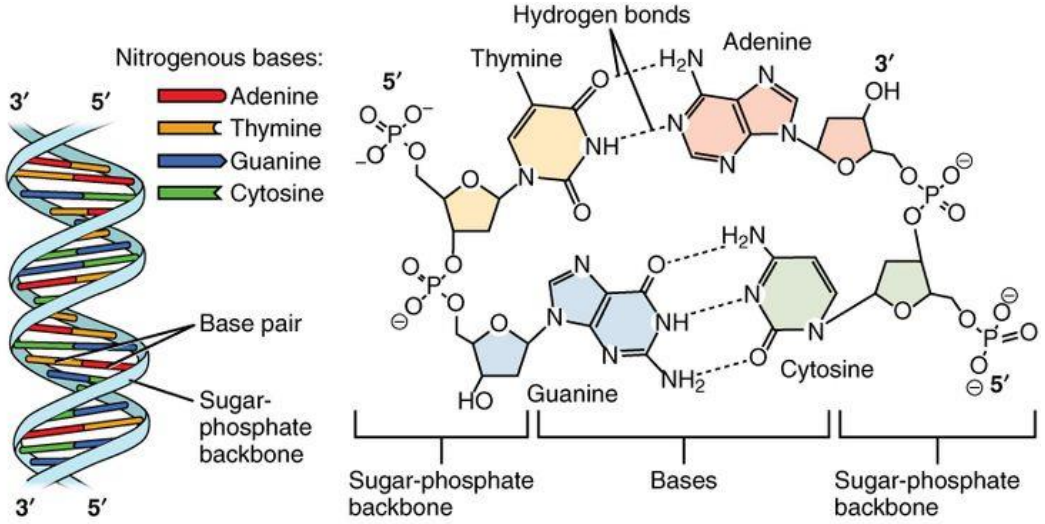
1953- James Watson y Francis Crick

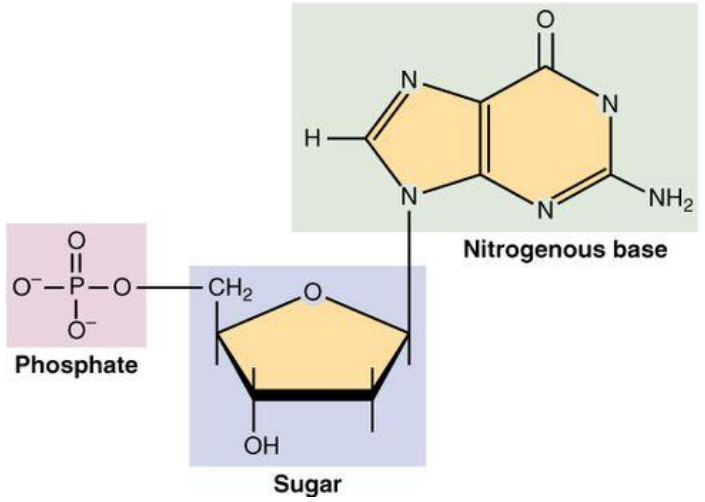
- Dilucidan la estructura del DNA



https://www.sciencehistory.org/sites/default/files/styles/rte_full_width/public/watson-crick-dna-model.jpg?itok=Qa7645Jc

Conformación del DNA





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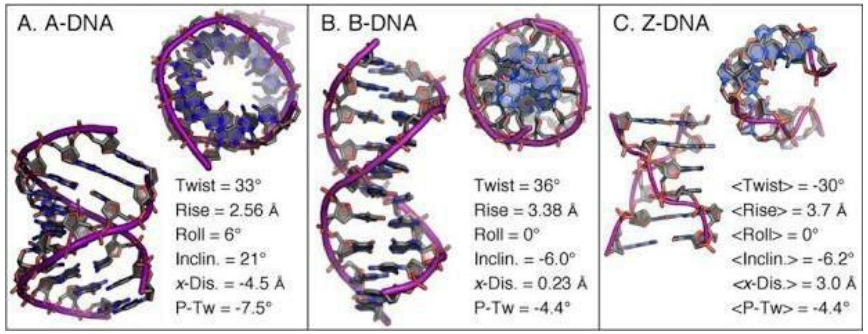

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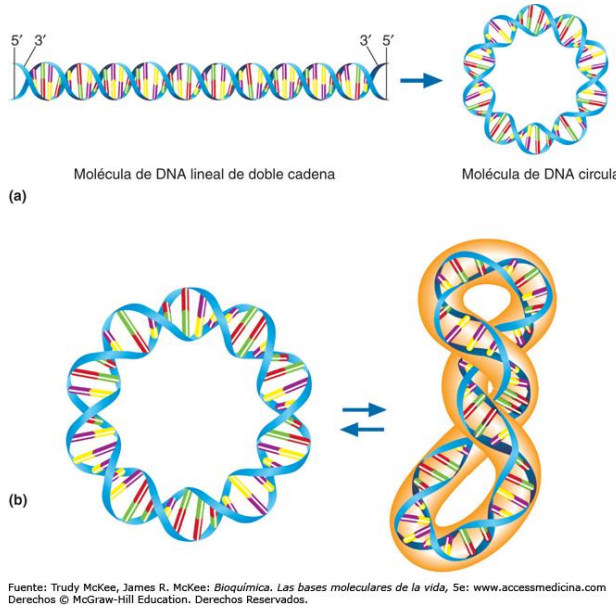

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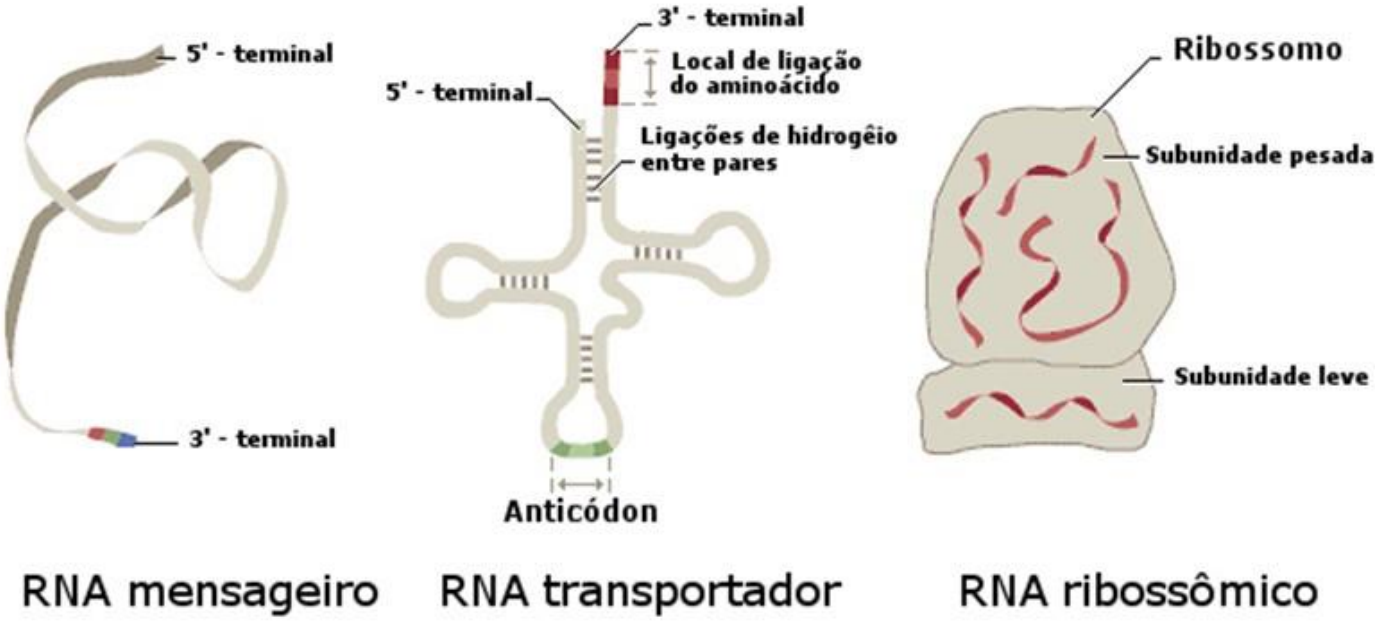
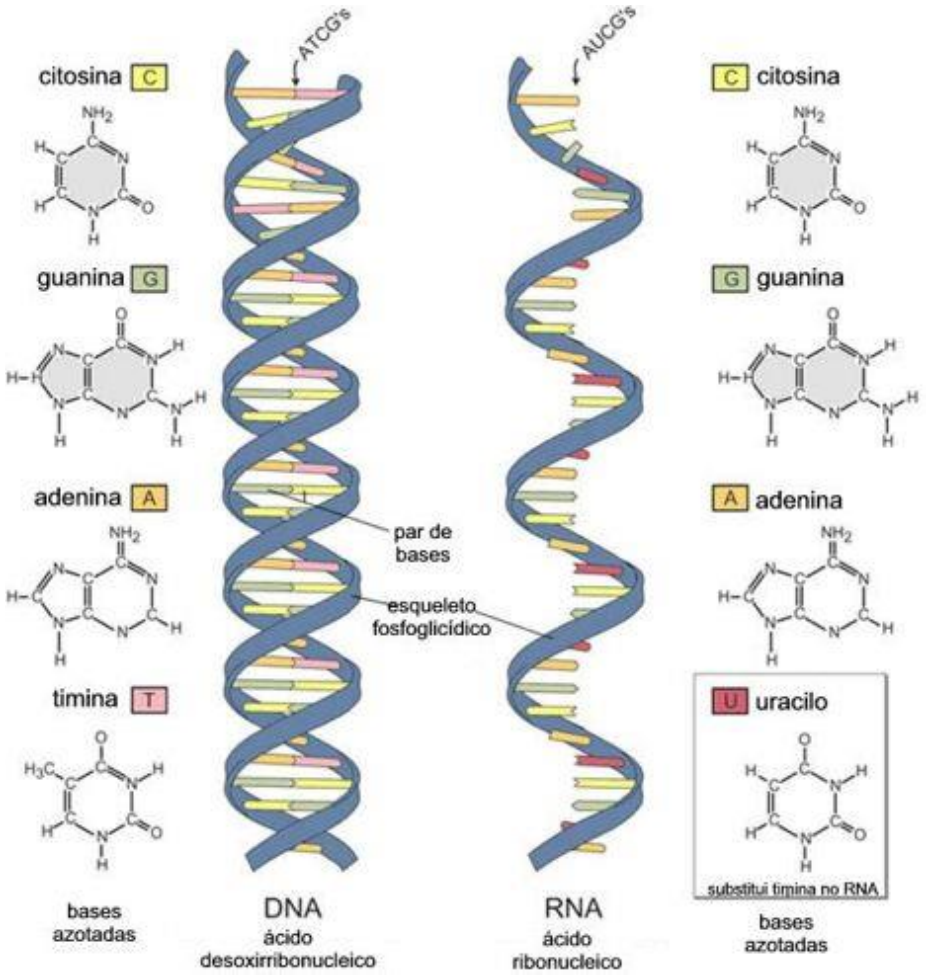
Conformación del RNA



https://player.slideplayer.com.br/26/8862880/data/images/img11.jpg

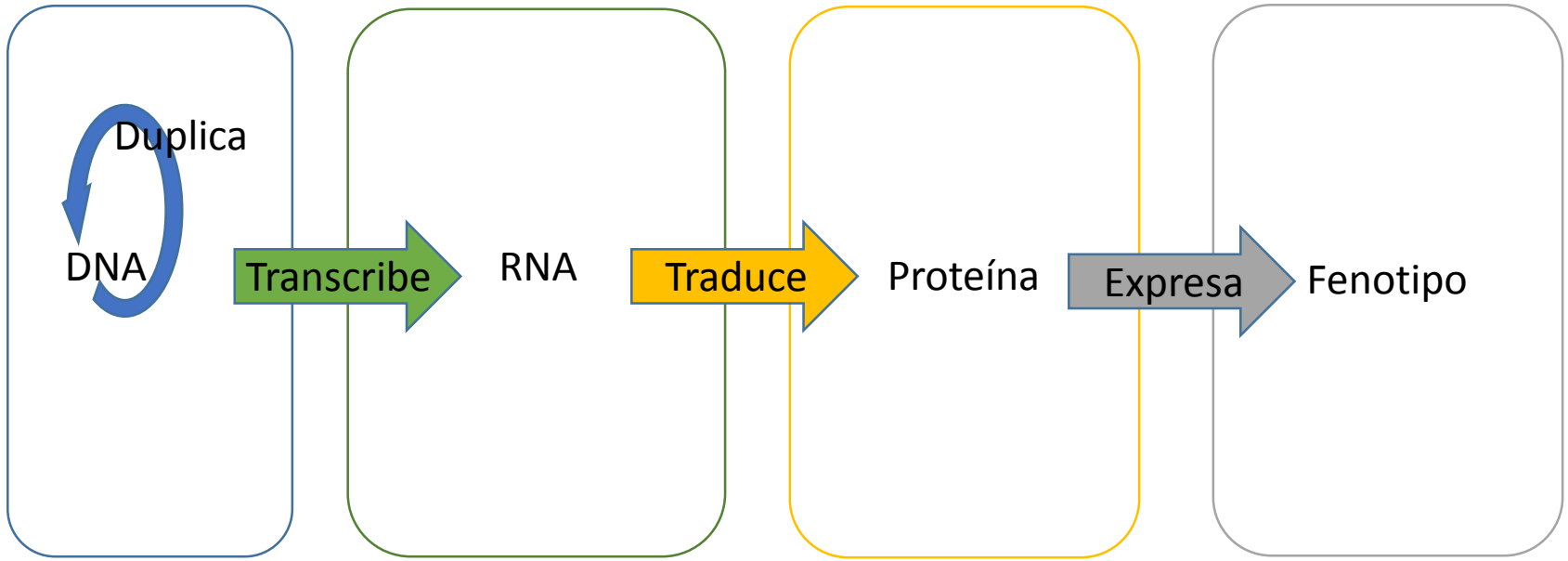
Conformación del DNA y el RNA



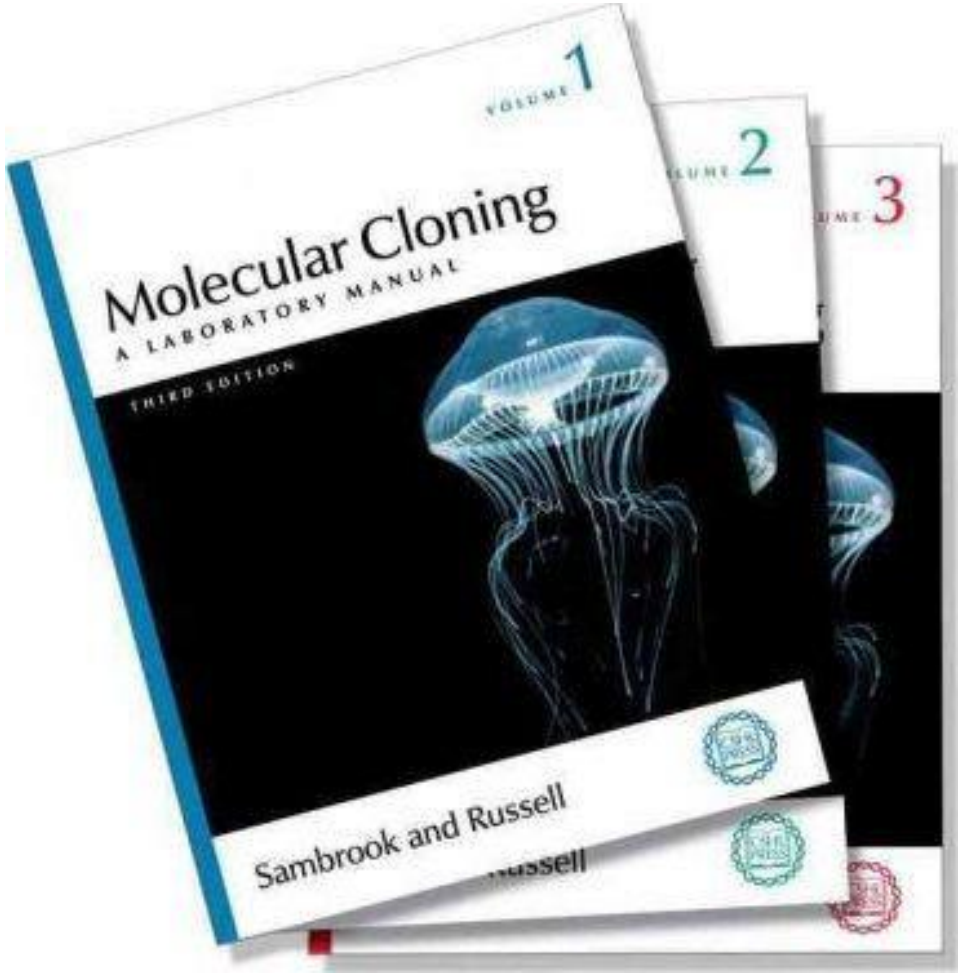
https://www.sobiologia.com.br/conteudos/figuras/Citologia2/DNA10.jpg

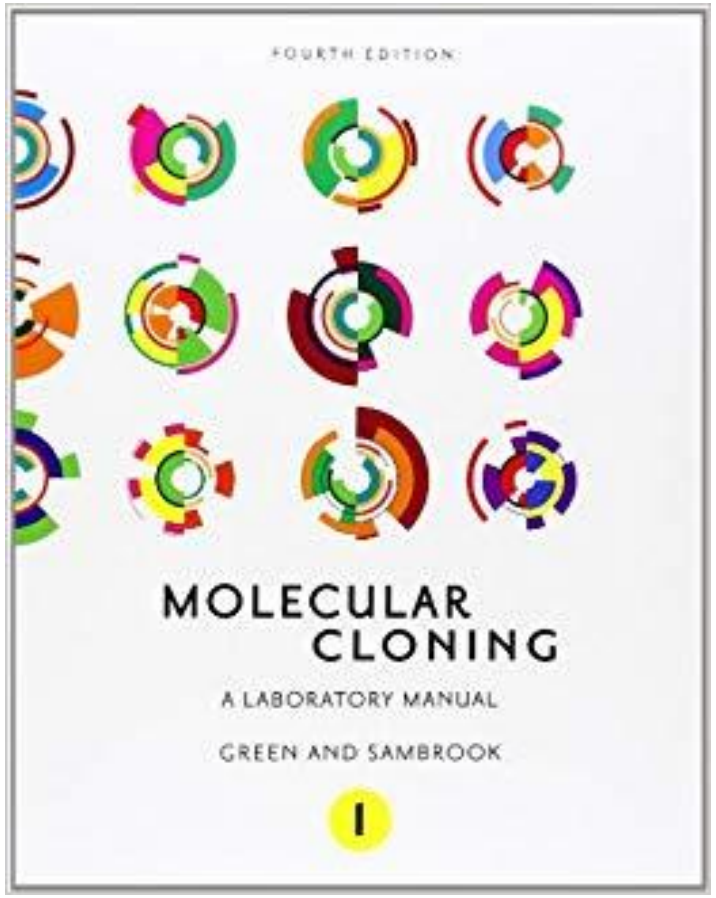
Dogma central de la biología molecular

1957: Francis Crick



Procesos de obtención del material genético





¿Cómo seleccionar el mejor protocolo de extracción?

1. Origen de la muestra	
Material puro	Matriz compleja

2. Método de preparación	
Fresco	Preservado

3. Cantidad del material	
MP= células de mamífero cultivadas (10^5-10^7) y células bacterianas (10^6-10^{11})	MC= 250 mg – 1 g

¿Cómo seleccionar el mejor protocolo de extracción?

4. Finalidad del material

Pureza, calidad y cantidad	Integridad (Téc. molecular)

5. Método a utilizar

Disponibilidad económica	Capacitación del personal

6. Preservación del material genético

Uso inmediato	A largo plazo

Procesos de obtención del material genético

Buffer	• Conceda mejor estabilidad y costo.
Lisis	• Enzimática (Química) • Mecánica (Física)
Proteínas	• Detergentes SDS, CTAB NaCl. • Proteinasa K
Debris	• Fenol, Cloroformo, Alcohol isoamílico. • Centrifugación.

	Origen de muestra								
	CC	TM	Sa	Ba	Fu	Al	Le	Pl	In
microbios									
Bacterial Genomic DNA Mini-prep Kit (BayGene)				*					
QIAprep Spin Miniprep Kit (Qiagen)				*					
QIASymphony Virus/Bacteria Kits (Qiagen)				*					
ZR Fecal DNA Mini Prep (Zymo Research)			*	*					
Plasmid Maxi Kit (Qiagen)				*					
BACMAX DNA purification kit (Epicentre Biotechnologies)				*					
PowerMax Soil DNA Isolation Kit (MO BIO Laboratories)				*	*	*			
PowerSoil DNA isolation kit (MO BIO Laboratories)				*	*	*			
Células y tejidos de mamíferos									
AccuPrep Genomic DNA Extraction Kit (Bioneer)	*	*	*						
Arcturus DNA Extraction Kit (Arcturus)	*	*							
GFX Genomic Blood DNA Purification Kit (GE Healthcare)	*		*						
DNA Isolation Kit for mammalian blood (Roche)			*						
InnuPrep DNA minikit (AJ Innuscreen)	*	*							
QIAamp DNA mini kit (Qiagen)	*	*	*						
AllPrep DNA/RNA Mini Kit (Qiagen)	*	*							
Agencourt DNAdvance Kit (Beckman Coulter)	*	*							

	Origen de muestra								
	CC	TM	Sa	Ba	Fu	Al	Le	Pl	In
plantas									
NucleoSpin 8 Plant and NucleoSpin 96 Plant II, Clontech								*	
DNeasy 96 Plant Kit (Qiagen)					*			*	
Nucleon PhytoPure Genomic DNA Extraction Kits (GE Healthcare)					*			*	
Células de mamíferos y microbios									
DNA Isolation Kit for cells and tissues (Roche)	*	*		*			*		
Purelink Genomic DNA extraction kit (Invitrogen)	*	*	*	*					
DNeasy Blood and Tissue Kit (Qiagen)	*	*	*	*			*		*
Genomic DNA from Tissue kit (Macherey Nagel)	*	*	*	*			*		
GeneJET Genomic DNA Purification Kit	*	*	*	*			*		
FastDNA SPIN Kit (MP Biomedicals)	*	*		*	*	*	*	*	
Células de mamíferos, microbios y plantas									
ArchivePure DNA purification kit (5Prime)	*	*	*	*			*	*	
DNA Isolation Kits (BioBasic)	*	*	*	*	*		*	*	
FastDNA Kit (MP Biomedicals LLC)	*	*	*	*	*	*	*	*	*
DNAzol® Reagent (Invitrogen)	*	*	*	*	*	*	*	*	
Easy-DNA® Kit (Invitrogen)	*	*	*	*			*	*	
Wizard® Genomic DNA Purification Kit (Promega)	*	*	*	*			*	*	*
sangre									
DNA Isolation Kit for mammalian blood (Roche)			*						
InnuPREP Blood DNA Mini Kit (AJ Innuscreen)			*						

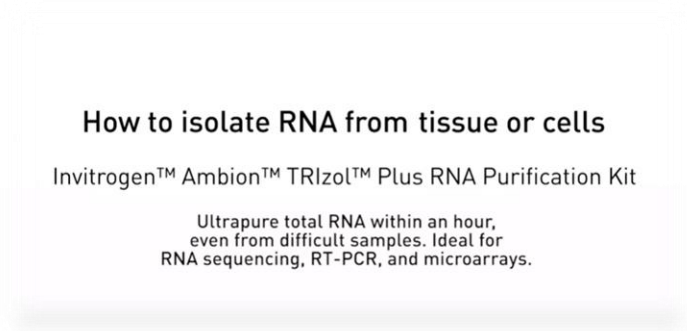
Tabla 1. Diferentes kits de extracción de DNA y RNA. Tomado de: http://www.labome.es/method/DNA-Extraction-and-Purification.html

CC: células en cultivo; TM: tejido de mamíferos; Sa: sangre; Ba: bacterias; Fu: hongos (fungi); Al: algas; Le: levaduras; Pl: plantas; In: insectos

Porductos de PCR	*Extracción de gel*
Wizard® PCR Preps DNA Purification System (Promega)	MinElute Gel Extraction Kit (Qiagen)
QIAquick PCR Purification Kit (Qiagen)	Zymoclean™ Gel DNA Recovery Kit (Zymo Research)
MinElute PCR Purification Kit (Qiagen)	*Otros Kits*
GenElute™ PCR Clean-Up (Sigma-Aldrich)	NEBNext DNA Sample Prep Reagent Set 1 (New England Biolabs)
PureLink® PCR Purification Kit (Life Technologies)	GS FLX Titanium Rapid Library Preparation Kit (Roche)
GeneJet PCR Purification Kit (Thermo Scientific)	

Tabla 2. Otros kits de purificación de DNA . Tomado de: http://www.labome.es/method/DNA-Extraction-and-Purification.html

https://www.youtube.com/watch?v=h6NvCd94eng&list=PLGlvFEwL2wDFs3L_mbHpyfnbRrj5W3A0Q&index=4



https://www.youtube.com/watch?v=L5XlB8KkKt4&list=PLGlvFEwL2wDFs3L_mbHpyfnbRrj5W3A0Q&index=8

https://www.youtube.com/watch?v=7muQSoATQV8&list=PLGlvFEwL2wDFs3L_mbHpyfnbRrj5W3A0Q&index=6