Biomark®

SPECIALISTS IN ELECTRONIC IDENTIFICATION

- 30 YEARS OF EXPERIENCE WITH RFID TECHNOLOGY
- PRODUCTS DESIGNED SPECIFICALLY FOR FISH
- EXPERT SCIENTIFIC AND TECHNICAL STAFF

Proprietario

AKUA MAKS

Genetik Numune alma ve Takip Uygulamaları

Tagging operations for the broodstock and future broodstock Genetic sampling methods

The ERA of fish domestication

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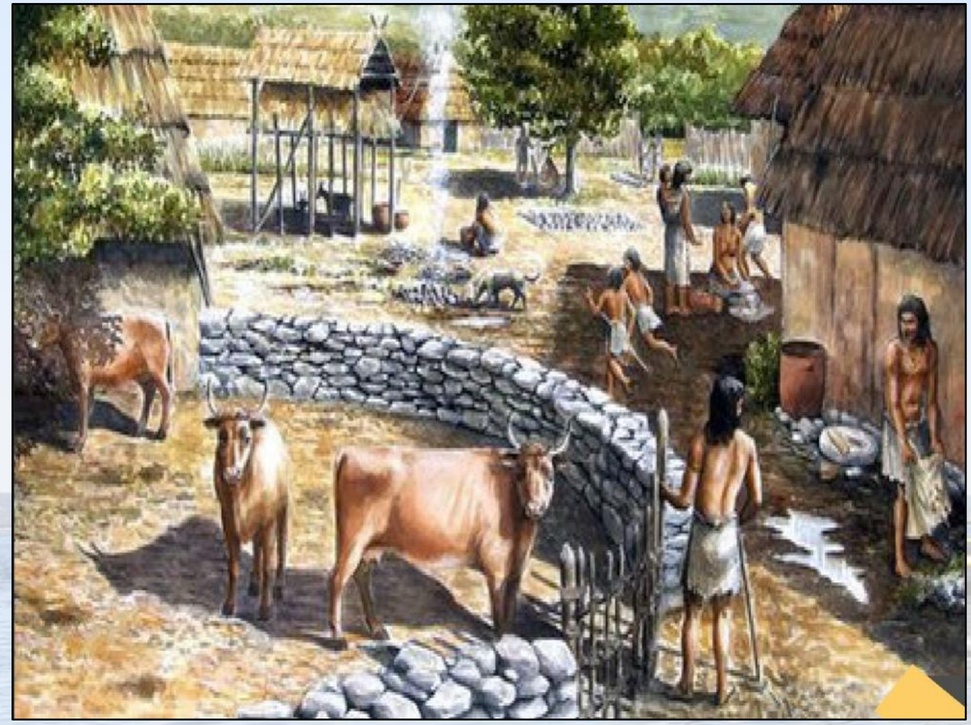
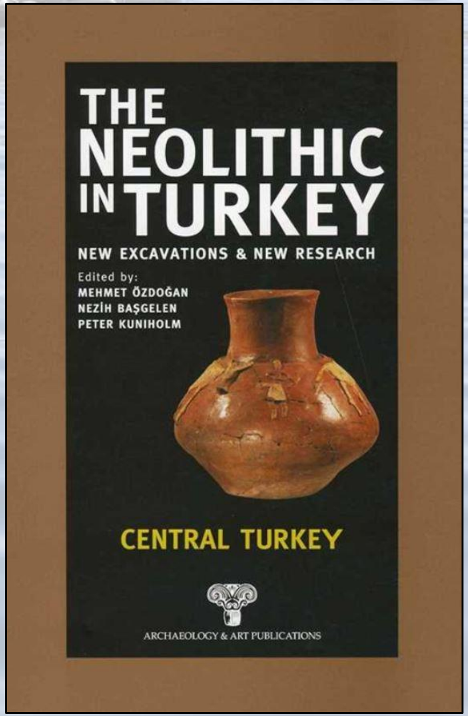
PhD. Armando Piccinini – Biomark biologist



The process of animal domestication began thousands of years ago . . .

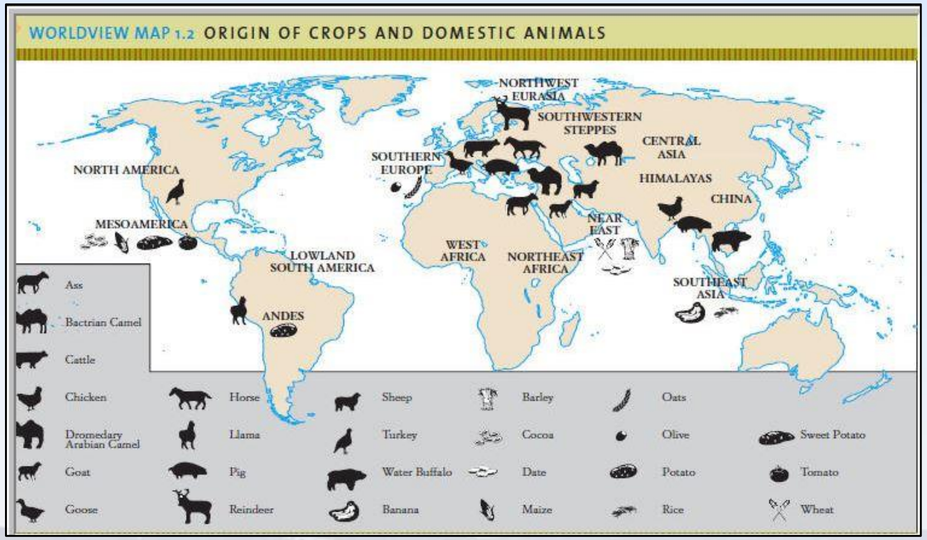


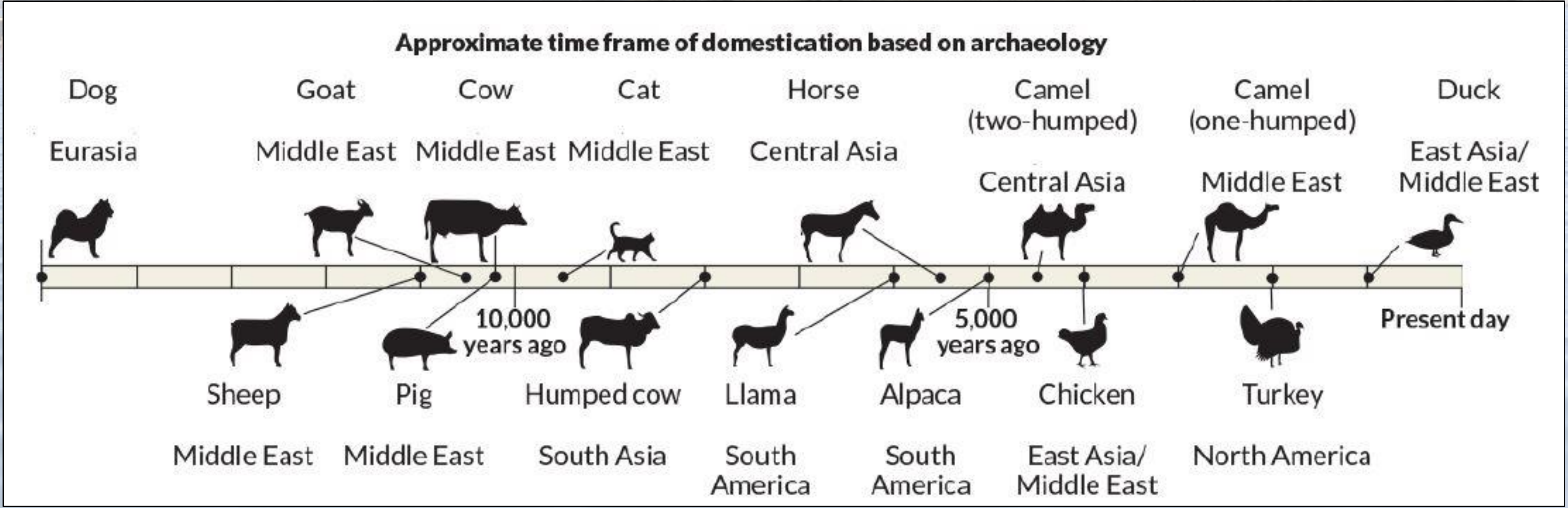
Domestications of animals

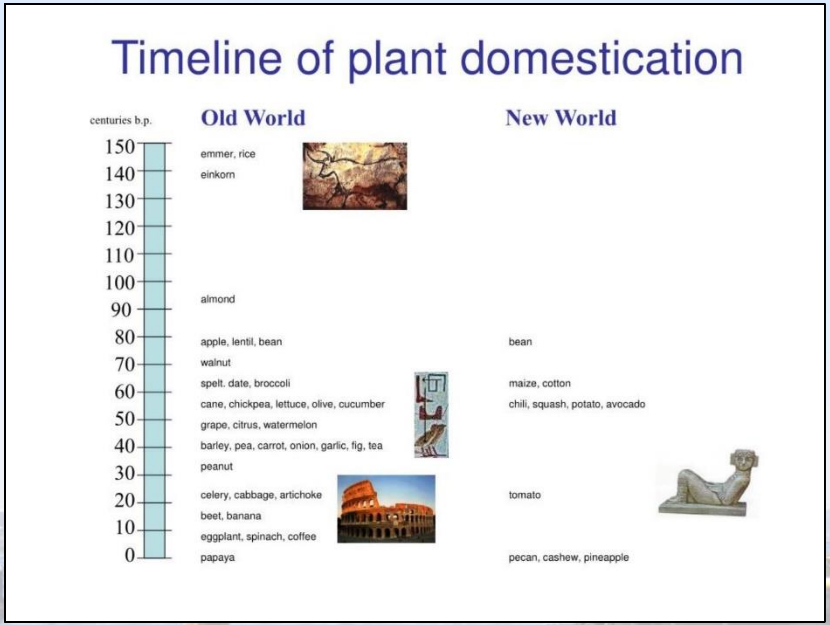
Domestication has been defined as a sustained multi-generational, **mutualistic relationship** in which one organism assumes a significant degree of influence over the reproduction and care of another organism in order **to secure a more predictable supply of a resource** of interest, and through which the partner organism gains advantage over individuals that remain outside this relationship, thereby benefitting and often increasing the fitness of both the domesticator and the target domesticate.

This definition recognizes both the biological and the cultural components of the domestication process and the effects on both humans and the domesticated animals and plants (Wikipedia).

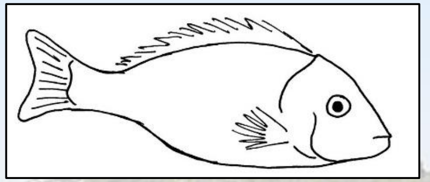
Domestication time frame



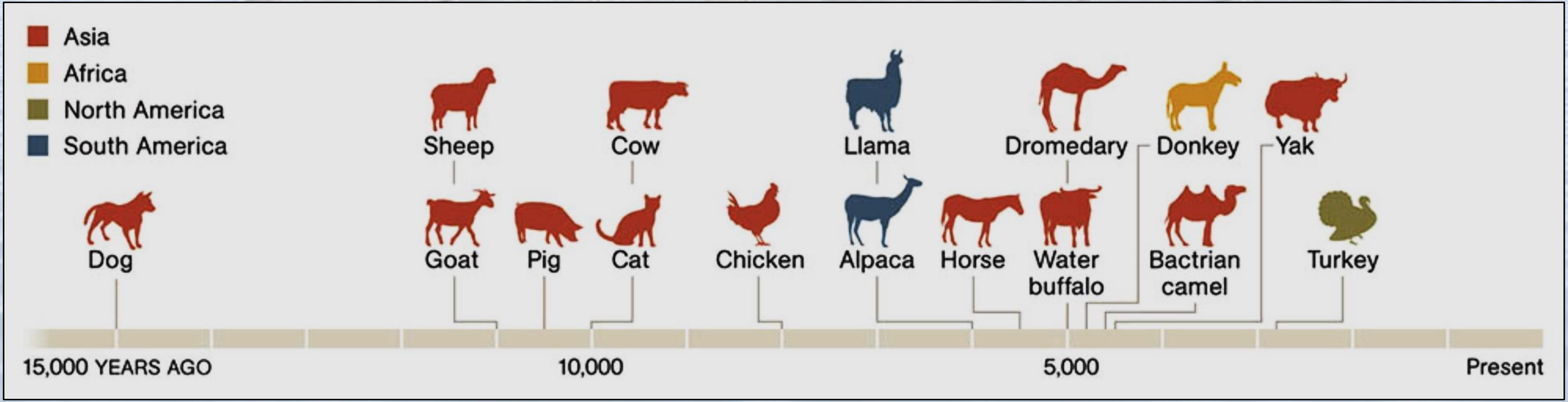




What about the fish ?



<u>Not in the domestication process !</u>



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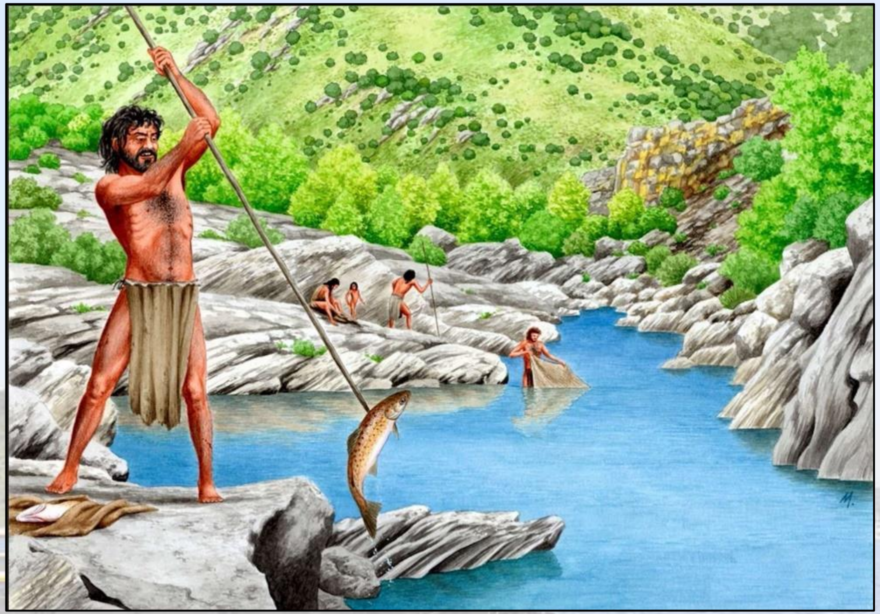

Fish were a very abundant food sources for our ancestors . . . . and no need for domestication

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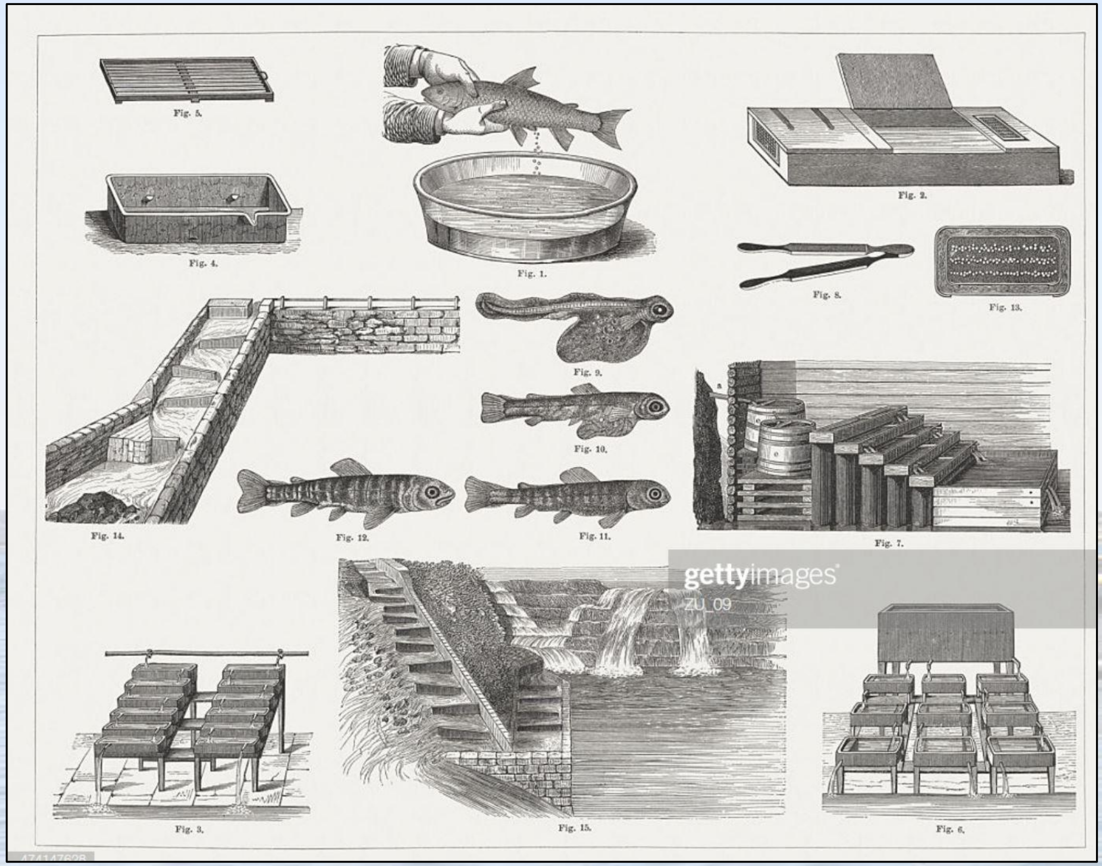
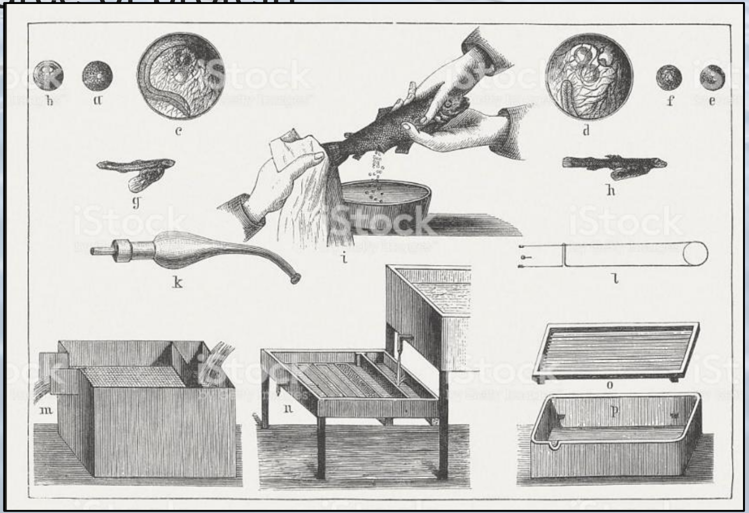


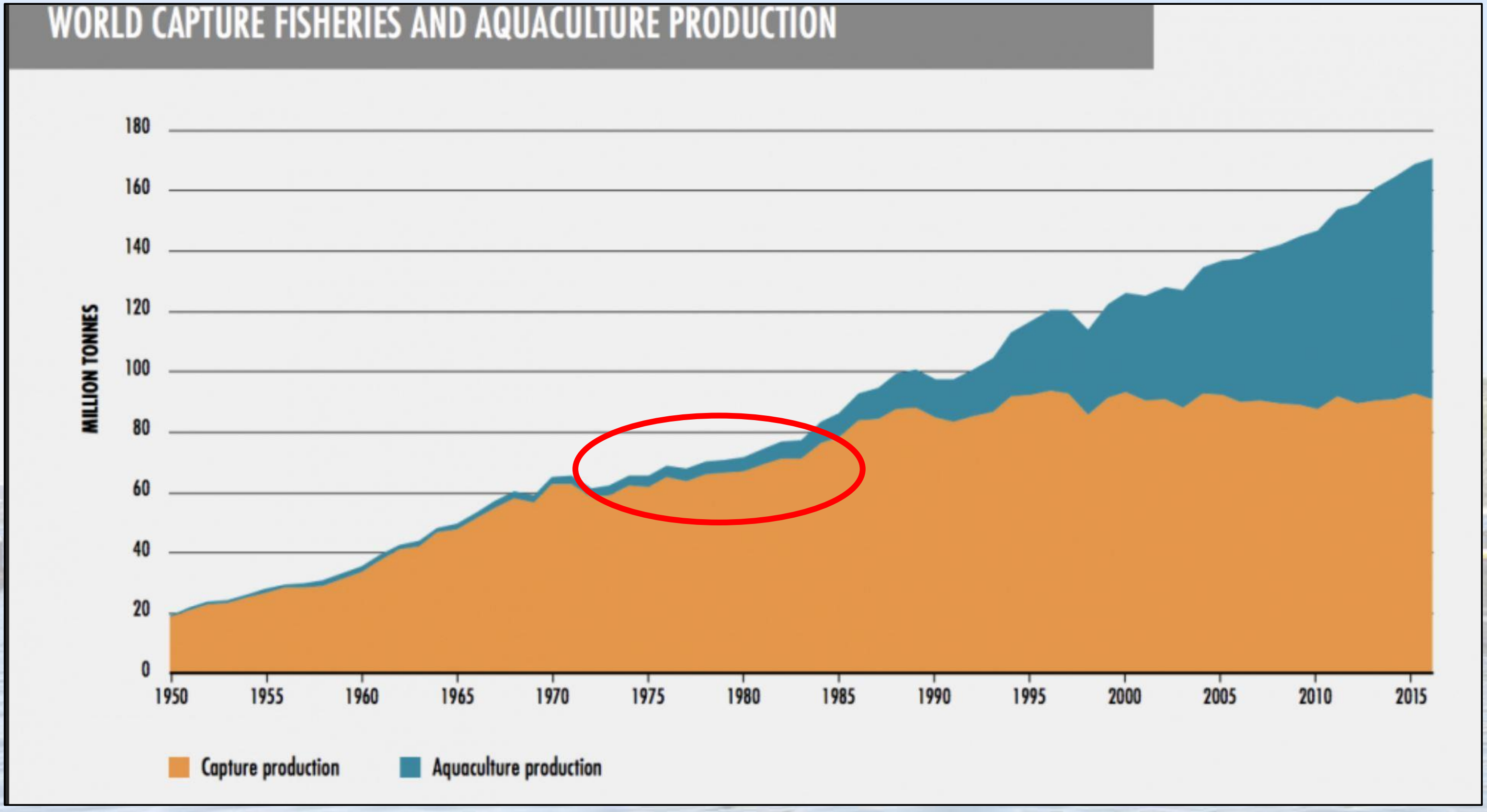
The first artificial fertilization of fish (salmonid) gametes took place in France in 1842; and in 1866 in the USA and Norway for the cod.

As a consequence, aquaculture is the fastest growing agricultural sector, in particular mariculture, which is now reaching a peak and will continue to expand over the next few years, both in terms of diversification of cultured species and scale of production.

Currently, around 16% (or more) of animal protein consumed on a world scale is derived from fish, with over a billion people dependent on fish as a main source of protein.

Aquaculture is a relatively new industry compared to sheep and cattle farming and poultry





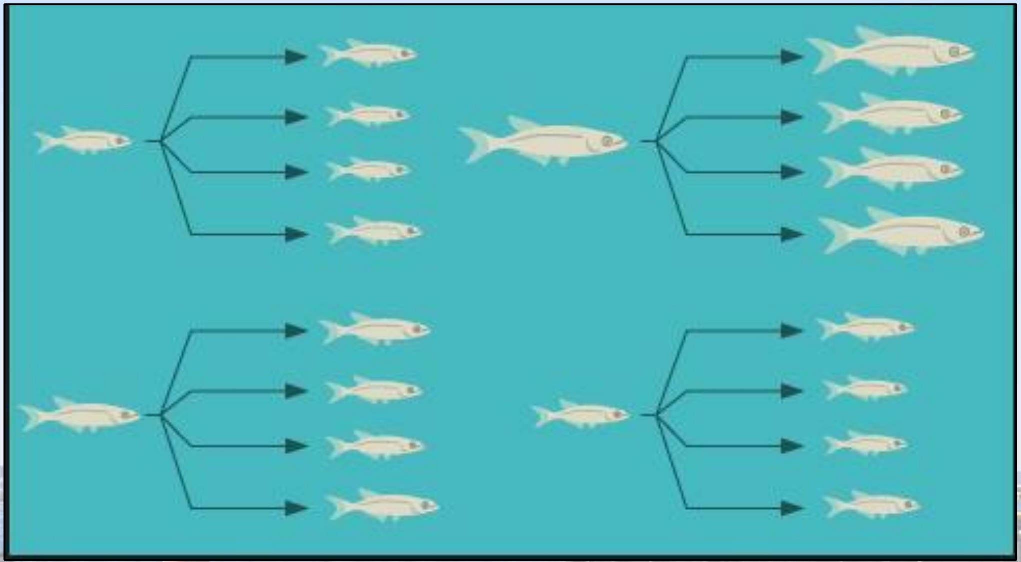
However . . .

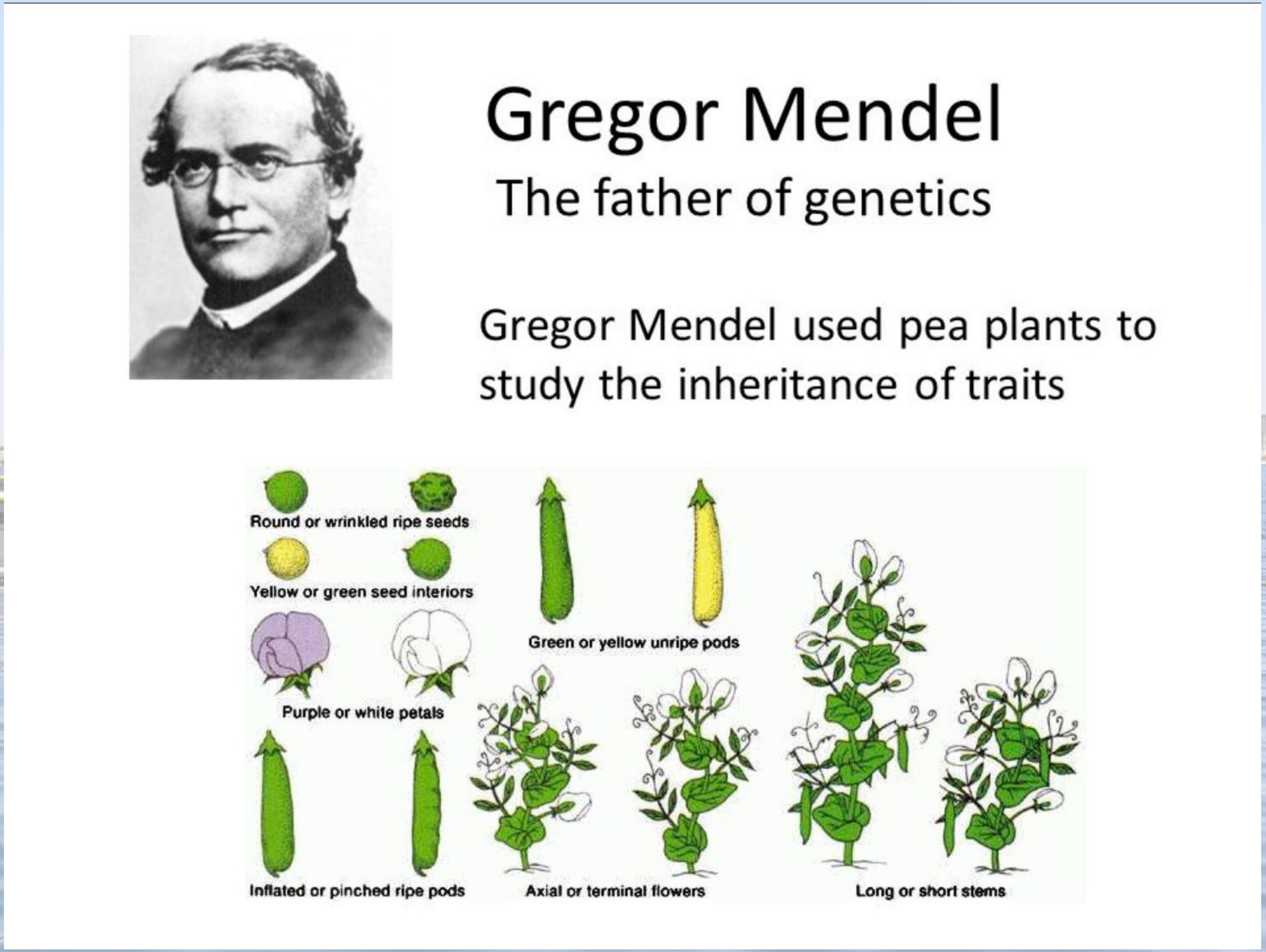
after thousands of year . . .

Fish and human beings were in a different situation . . . . and strongly pushed the domestication process

At the beginning of the 1980s, the improvements of rearing conditions, animal nutrition, larval rearing, and **more recently genetics allowed** strongly improving the production of an increasing number of species.

Between 1980 and 2010, global aquaculture production was multiplied by 12, with a mean annual increase of 8.8%, sometimes reaching more than 12% during certain





During XX and XXI centuries, new tools were available for selections and domestication

Gregor Johann Mendel, 20 July 1822 – 6 January 1884, was a scientist, Augustiniann friar and abbot of St. Thomas' Abbeyy in Brnoo, Margraviate of Moravia. Mendel was born in a German-speaking family in the Silesiann part of the Austrian Empire and gained posthumous recognition as the founder of the modern sciencee of geneticss. Though farmers had known for millennia that crossbreeding of animals and plants could favor certain desirable traits, Mendel's peaa plant experiments conducted between **1856 and 1863** established many of the rules of heredityy, now referred to as the laws of Mendelian inheritance.

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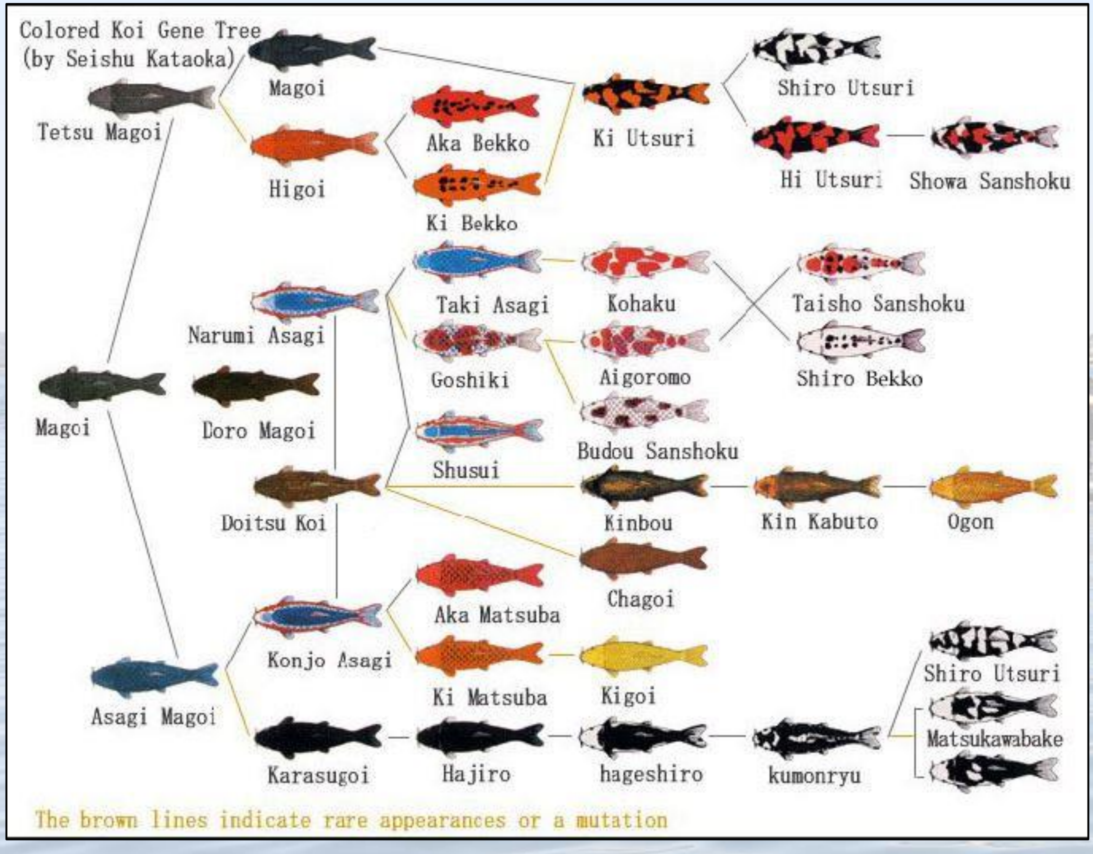
Carp were first bred for color in Japan in **the 1820s**, in the town of Ojiya in the Niigata Prefecture on the northeastern coast of Honshu Island.

The outside world was unaware of the development of color variations in Japanese koi until 1914, when the Niigata koi were exhibited at an annual exposition in Tokyo



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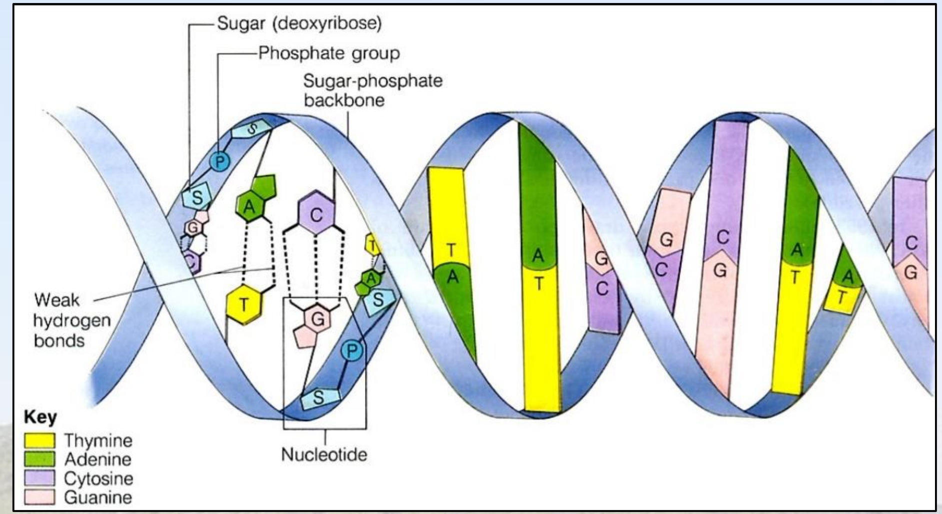
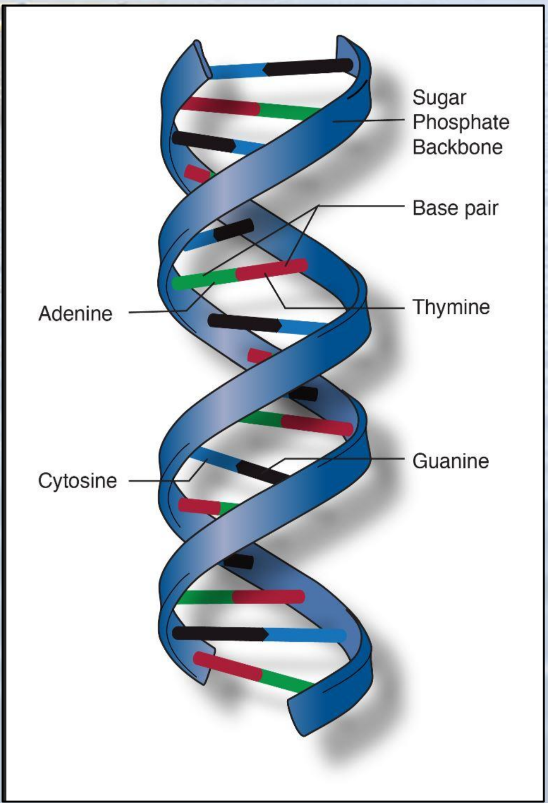
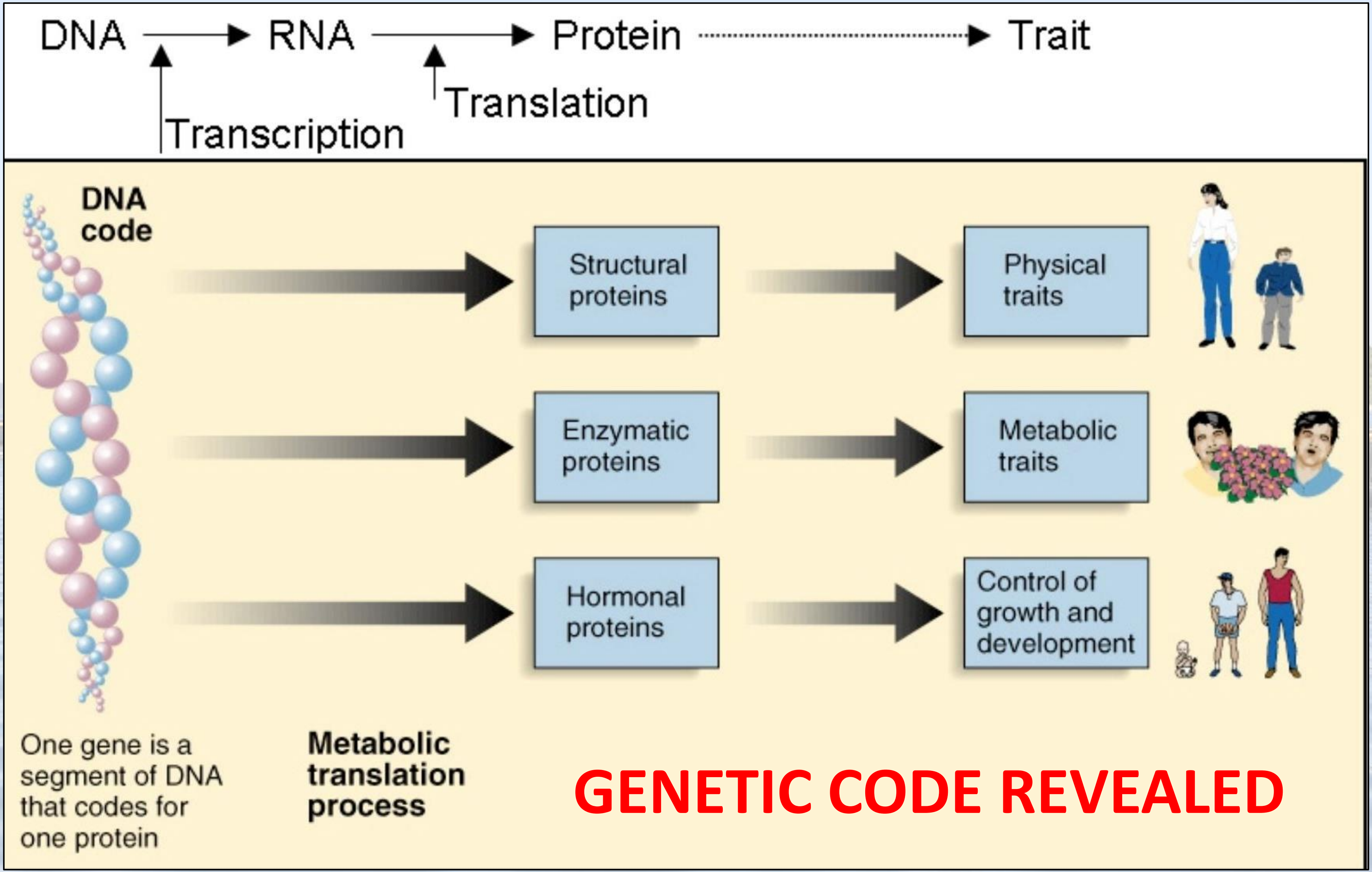
Watson and Crick

- An Englishman and an American discovered the structure of DNA in 1954.
- DNA is to small to see so they had to build a model using x-Rays and chemical information about Nitrogen bases





DNA structure and function was only discovered in 1954

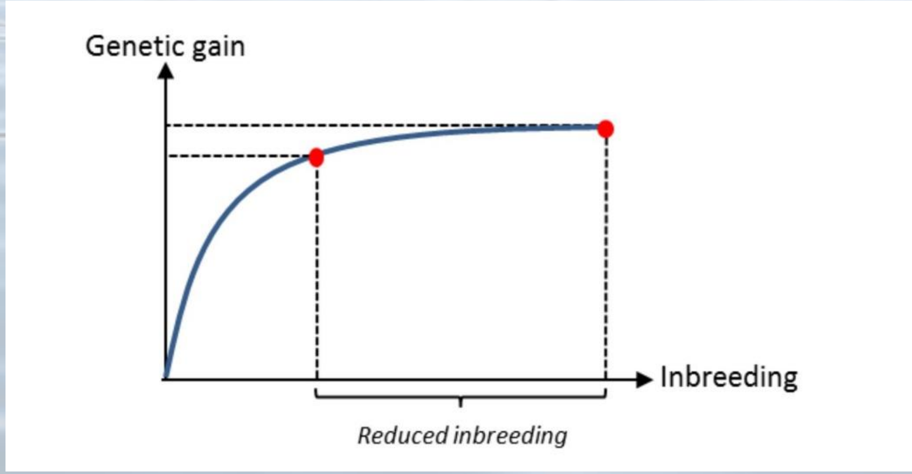


GENETIC CODE REVEALED

The TIME of fish domestication is NOW

Genetic Solutions for Aquaculture

Specialist genetics support to the global aquaculture industry



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Dedicated tools have been developed to support genetic investigations in aquaculture species

1 - Fish tissue sample unit

2 - Implant of PIT tags (RFID tags) to identify single individual

3 – Software and Apps

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IFN Schönow GmbH
Abteilung Abstammungskontrolle und Gendiagnostik
Bernauer Allee 10 *Phone ++49 (0)3338 709801* *www.ifn-gendiagnostik-gmbh.de*
D-16321 Bernau bei Berlin *Fax ++49 (0)3338 709804* *kurz@ifn-gendiagnostik-gmbh.de*

Final Project Report: Storage and Durability of Ear Punch Samples Using the Collection System of Allflex

Table 1: Overview of sample labeling and of sample storage.

Preservation		**Duration of storage**				
		0 months	**3 months**	**6 months**	**9 months**	**12 months**
Liquid D	**24°C**	D101-D105	D201-D205	D301-D305	D401-D405	D501-D505
	4°C	D106-D110	D206-D210	D306-D310	D406-D410	D506-D510
	-20°C	D111-D115	D211-D215	D311-D315	D411-D415	D511-D515

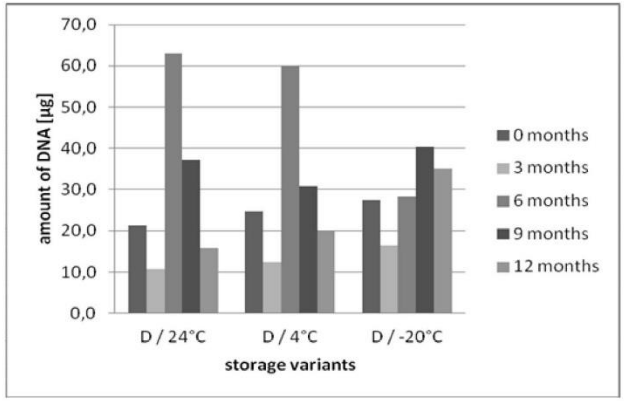

Figure 1: Overview of the total amount of isolated DNA [µg]. Each bar represents the mean value of 5 samples (3 temperature conditions at 5 points in time).

DNA buffer D (DND)

Safety Data Sheet

according to Regulation (EC) No. 1907/2006 (REACH) with its amendment Regulation (EU) 2015/830

2.3. Other hazards

No additional information available

SECTION 3: Composition/information on ingredients

3.1. Substance

Not applicable

3.2. Mixture

Name	Product identifier	%	Classification according to Directive 67/548/EEC	Classification according to Regulation (EC) No. 1272/2008 [CLP]
Ultrapure water	(CAS No) 7732-18-5 (EC no) 231-791-2	70 - 90	Not classified	Not classified
Sodium Chloride	(CAS No) 7647-14-5 (EC no) 231-598-3	5 - 10	Not classified	Not classified
Tris Hydrochloride	(CAS No) 1185-53-1	1 - 5	Not classified	Not classified
SODIUM LAUROYL SARCOSINATE	(CAS No) 137-16-6 (EC no) 205-281-5	1 - 5	T; R23 Xi; R41 Xi; R38	Acute Tox. 2 (Inhalation), H330 Skin Irrit. 2, H315 Eye Dam. 1, H318
Disodium EDTA	(CAS No) 6381-92-6 (EC no) 205-358-3	0.1 - 1	Not classified	Not classified
Sodium Hydroxide	(CAS No) 1310-73-2 (EC no) 215-185-5 (EC index no) 011-002-00-6	0.1 - 1	C; R35	Skin Corr. 1A, H314

Specific concentration limits:

Name	Product identifier	Specific concentration limits: DSD/DPD	Specific concentration limits: CLP calculator
Sodium Hydroxide	(CAS No) 1310-73-2 (EC no) 215-185-5 (EC index no) 011-002-00-6	(0.5 =< C < 2) Xi;R36/38 (2 =< C < 5) C;R34 (C >= 5) C;R35	(0.5 =<C < 2) Skin Irrit. 2, H315 (0.5 =<C < 2) Eye Irrit. 2, H319 (2 =<C < 5) Skin Corr. 1B, H314 (C >= 5) Skin Corr. 1A, H314

Full text of R- and H-statements: see section 16

Alcohol free for easy shipment and storage – STANDARD SAMPLE

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Passive Integrated Transponders (PIT Tags or RFID)

ALL BIOMARK PIT TAGS ARE 134.2 KHZ, ISO 11784/11785 COMPLIANT AND ICAR APPROVED.

Tag model »	Bulk »	Pre-load trays »	Individual pre-load »	Sterile syringe/ needle combo »	Compatible needle/ syringe »
MiniHPT8 *(8.4 mm x 1.4 mm)*	■	■	■	■	N165 MK165 / MK65
HPT9 *(9 mm x 2.1 mm)*	■	■	■		N125 MK10/MK7 / MK25
MiniHPT10 *(10.3 mm x 1.4 mm)*	■	■	■	■	N165 MK165 / MK65
APT12 *(12.5 mm x 2.03 mm)*	■	■	■		N125 MK10/MK7 / MK25
GPT12 *(12.5 mm x 2.1 mm)*	■	■	■	■	N125 MK10/MK7 / MK25
BioTherm13 *(13 mm x 2.1 mm)*	■	■	■	■	N125 MK10/MK7 / MK25
HPT23 *(23 mm x 3.85 mm)*	■				N206 MK10
HDX12 *(12 mm x 2.12 mm)*	■	■	■		N125 MK10/MK7
HDX23 *(23.1 mm x 3.85 mm)*	■				N206 MK10
HDX32 *(32.2 mm x 3.85 mm)*	■				N206 MK10

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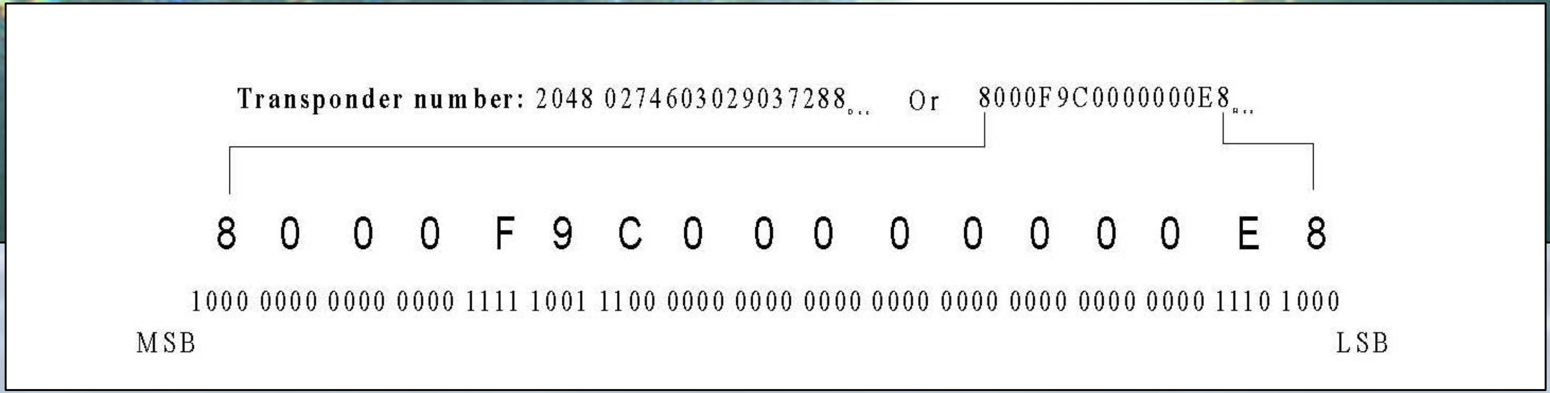
PIT tag – each fish is associated to a unique code (ICAR approved)



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Possible to have performance data related to each tagged fish

Proper tagging techniques

TAGGED FIELD MUST PERFORM AS A NOT TAGGED FISH

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PIT tagged fish for:

1. Growth rate
2. Growth rate for different genetic
3. Growth rate for different feeding
4. Growth rate for different condition
5. Growth rate for different treatment
6. Growth rate for different sites
7. Different fingerlings/eggs supplier

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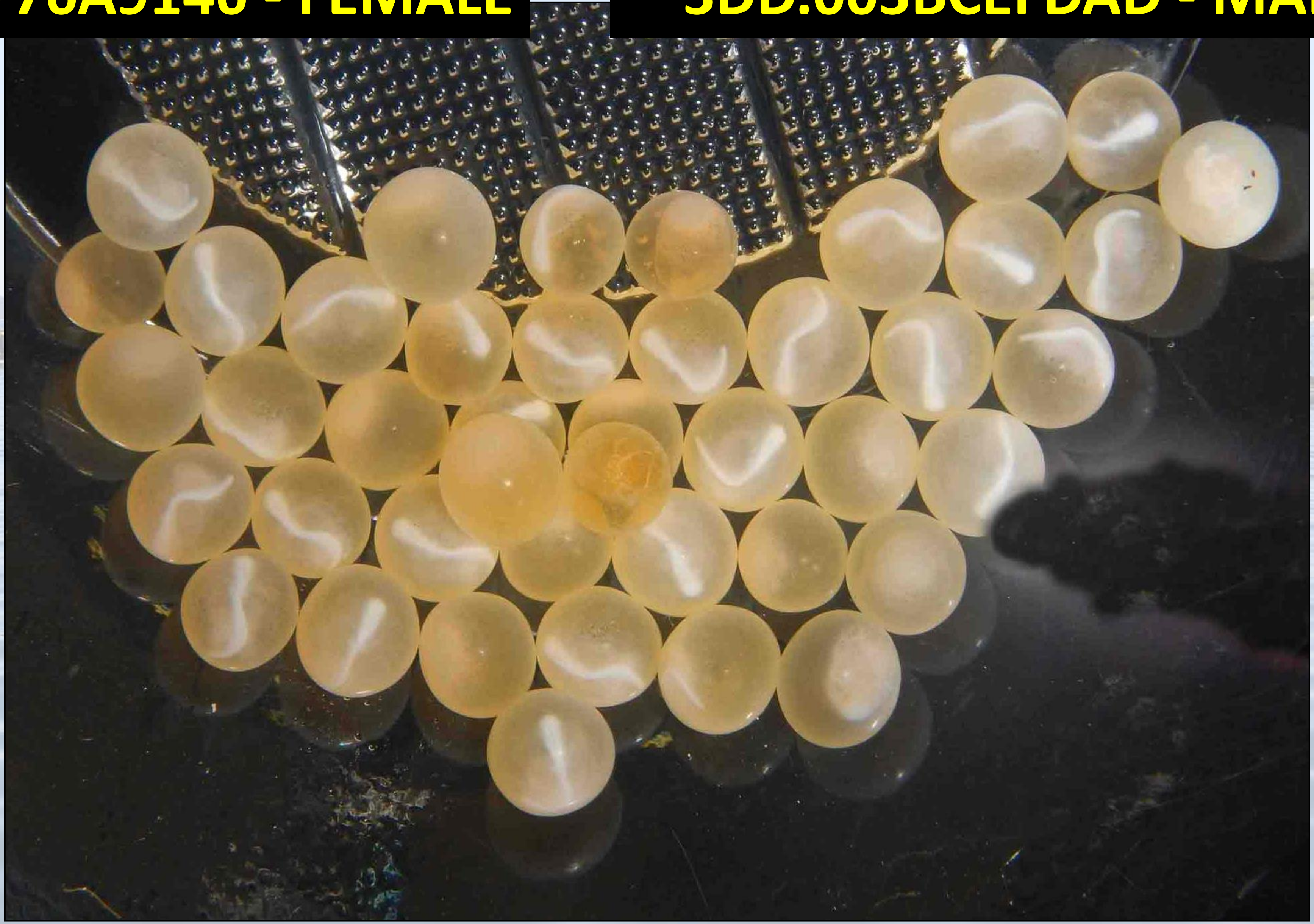
3DD.00776A9146 - FEMALE

3DD.003BCEFDAD - MALE



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B	C	D	E	F	G	H	I
STOCKING\HARVEST	HEX Tag ID	DEC Tag ID	Site ID	Species	Length	Weight	Notes
10 03 2014	3DD.003BCEFD15	989.001003420949	CAGE 1	Atlantic EGGS 1	135	150	Good health
10 03 2016	3DD.003BCEFD15	989.001003420949	CAGE 1	Atlantic EGGS 1	670	3214	Sea lices
10 03 2014	3DD.003BCEFD1A	989.001003420954	CAGE 1	Atlantic EGGS 1	120	180	Good health
10 03 2016	3DD.003BCEFD1A	989.001003420954	CAGE 1	Atlantic EGGS 1	765	3217	
10 03 2014	3DD.003BCEFD81	989.001003421057	CAGE 1	Atlantic EGGS 2	112	80	Poor growth
10 03 2016	3DD.003BCEFD81	989.001003421057	CAGE 1	Atlantic EGGS 2	840	4532	Good healt
10 03 2014	3DD.003BCEFDC2	989.001003421122	CAGE 1	Atlantic EGGS 1	141	161	Big fish
10 03 2016	3DD.003BCEFDC2	989.001003421122	CAGE 1	Atlantic EGGS 1	875	6543	Excellent
10 03 2014	3DD.003BCEFE22	989.001003421218	CAGE 1	Atlantic EGGS 2	144	170	Good growth
10 03 2016	3DD.003BCEFE22	989.001003421218	CAGE 1	Atlantic EGGS 2	453	2674	Sea lice
10 03 2014	3DD.003BCEFE51	989.001003421265	CAGE 1	Atlantic EGGS 2	121	145	Normal
10 03 2016	3DD.003BCEFE51	989.001003421265	CAGE 1	Atlantic EGGS 2	789	4321	Good

Better planning or decision accordingly to field and genetic data

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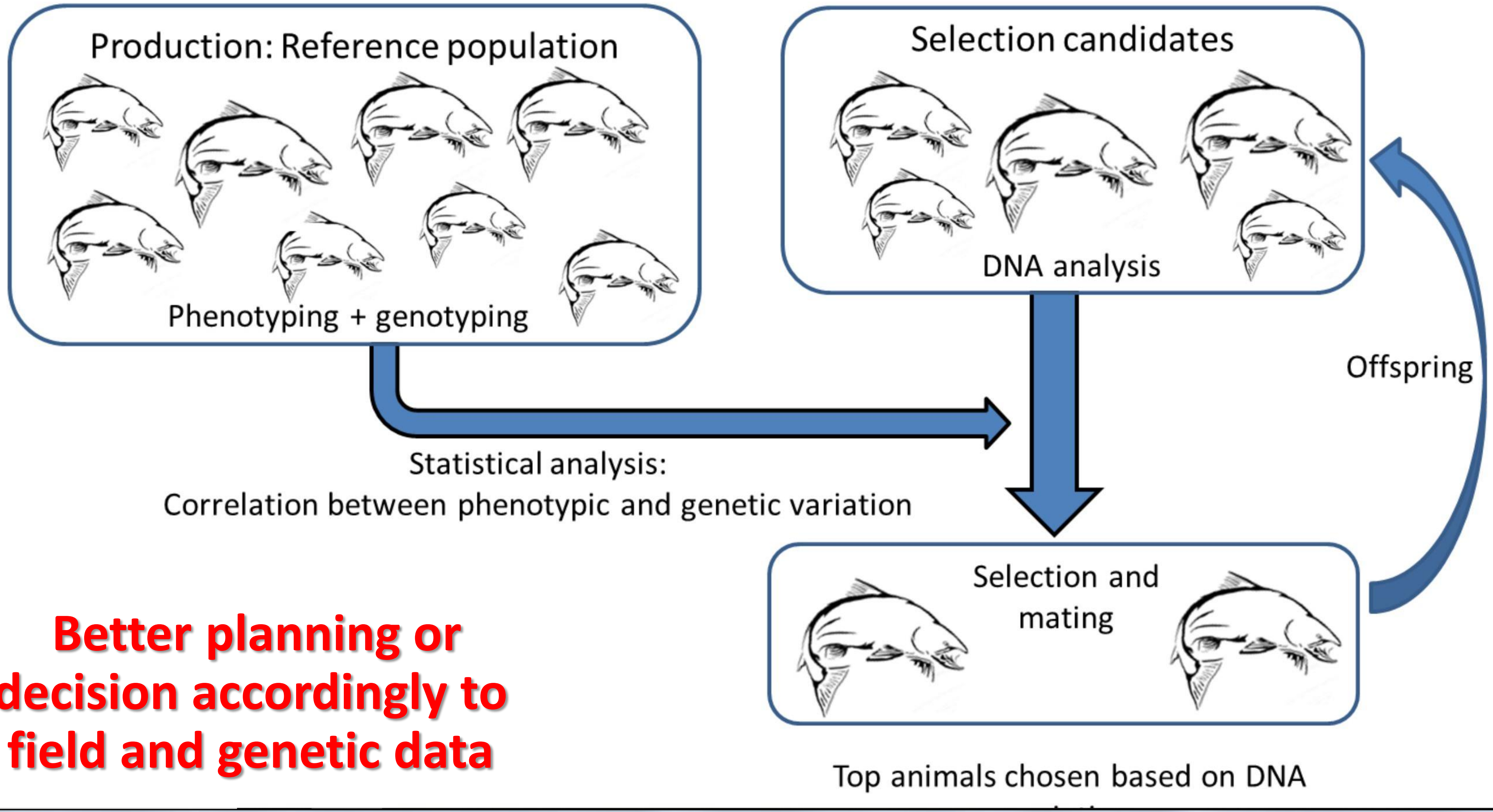

Better planning or decision accordingly to field and genetic data

Thank you for your attention

Data collection module video

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