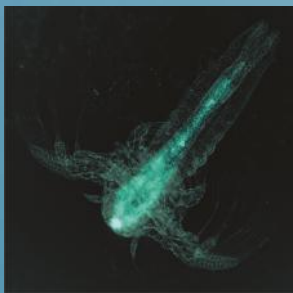
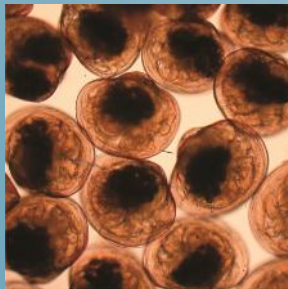
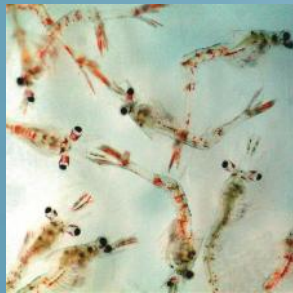
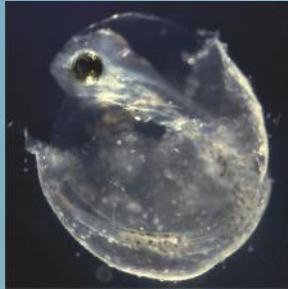


larvi 2013

6th fish & shellfish larviculture symposium



The self-fertilizing mangrove killifish
Kryptolebias marmoratus
as a model fish for breeding



Yoshitaka Sakakura



ghent university, belgium, 2-5 september 2013

The Self-fertilizing Mangrove Killifish *Kryptolebias marmoratus* as a Model Fish for Aquacultural Study

Yoshitaka SAKAKURA ^{*1}

Koushirou SUGA ¹

Akira KANAMORI ²

Atsushi HAGIWARA ¹

¹. *Graduate School of Fisheries Science and Environmental Studies,
Nagasaki University, Japan*

². *Graduate School of Science, Nagoya University, Japan*

Mangrove killifish (*Kryptolebias marmoratus* Poey)

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- distribute mangrove swamps from Florida to Brazil
- about 5 years lifespan, reaching 3-5 cm
- about 3 months to mature (short generation time)
- Euryhaline (0-60 ppt)
- 18-35(>) °C
- Tolerant to ammonia



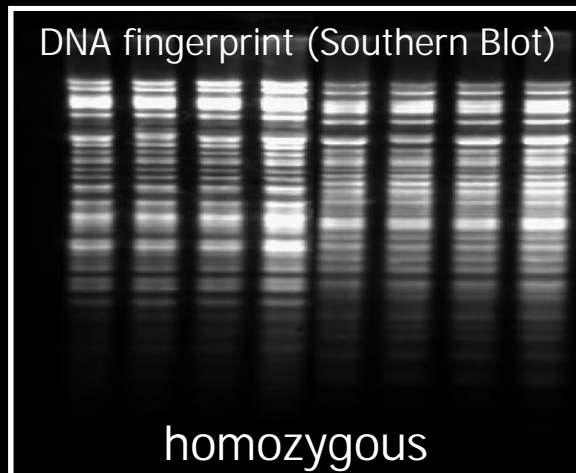
www.youtube.com
"Fish in a log!"

Kryptolebias marmoratus

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- Functional hermaphrodite
- Self-fertilization

(Harrington 1961 Science)



➤ **Test animal for various aspects in the marine teleosts**

Lee et al. (2008) J Fish Biol

Advantage

5/15

- Easy to keep
- Easy to handle
- Track individual record



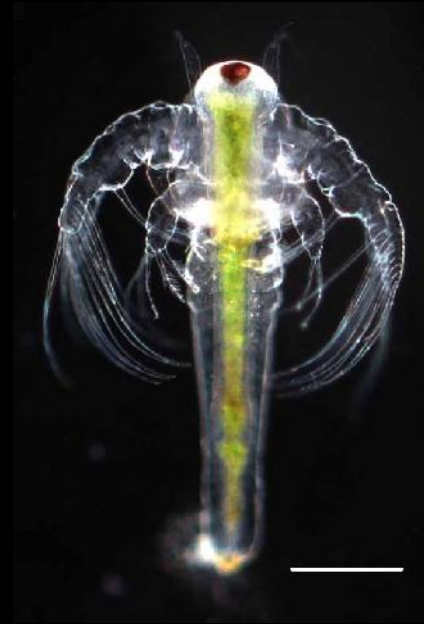
newly hatched larva
(4.4 mm SL)

1. Test for new live feed

- Establish clonal lineage

2. Model for breeding










1. Testing new live feed

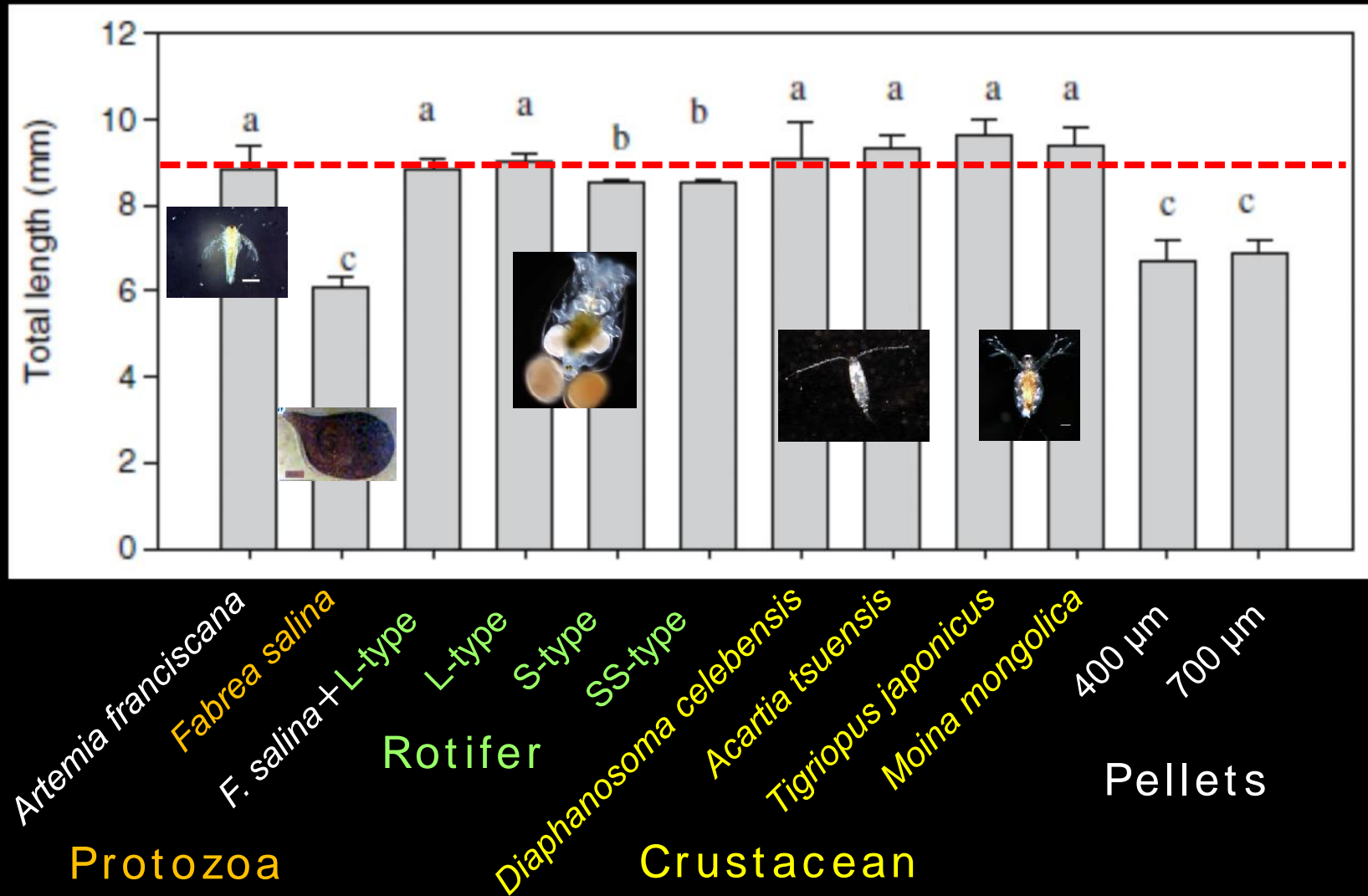


Feeding behavior of newly hatched larva (day 0) to various food items (1 hr)

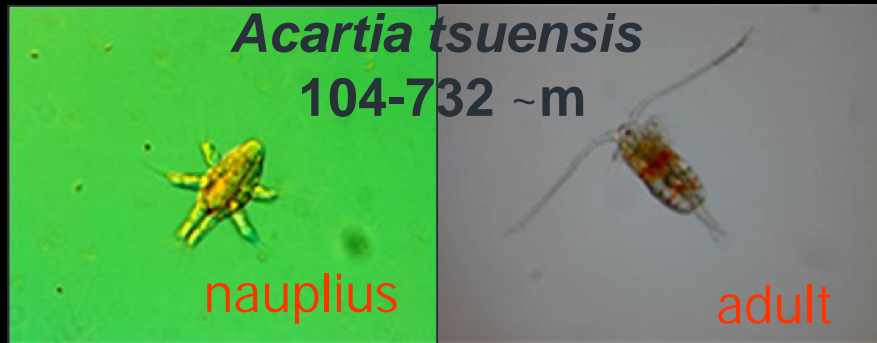
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	Food item		Feeding success (%)	Ingestion (/hr)
Artemia	<i>A. franciscana</i>		100	2.6±0.5
Protozoa	<i>Fabrea salina</i>		8.6±3.7	2.4±1.4
Rotifer	L-type		100	37.6±11.5
	S-type		100	21.8±4.8
	SS-type		100	42.8±22.5
Copepod	<i>Acartia tsuensis</i>		35.6±4.9	14.8±5.8
	<i>Tigriopus japonicus</i>		2.2±5.0	0.2±0.4
Cladoceran	<i>Diaphanosoma celebensis</i>		35.3±6.8	4.4±0.5
	<i>Moina mongolica</i>		3.5±4.8	0.8±1.1
Pellet	400 and 700 μm		0	0

Growth (10 days)



Nutrition (HUFA: mg/100 g·DW)



Diet	EPA	DHA
<i>Acartia tsuensis</i>	14.2	26.1
<i>Artemia franciscana</i>	17.3	0
DHA-enriched <i>Artemia</i>	71.4	57.9

2. Test animal for breeding study

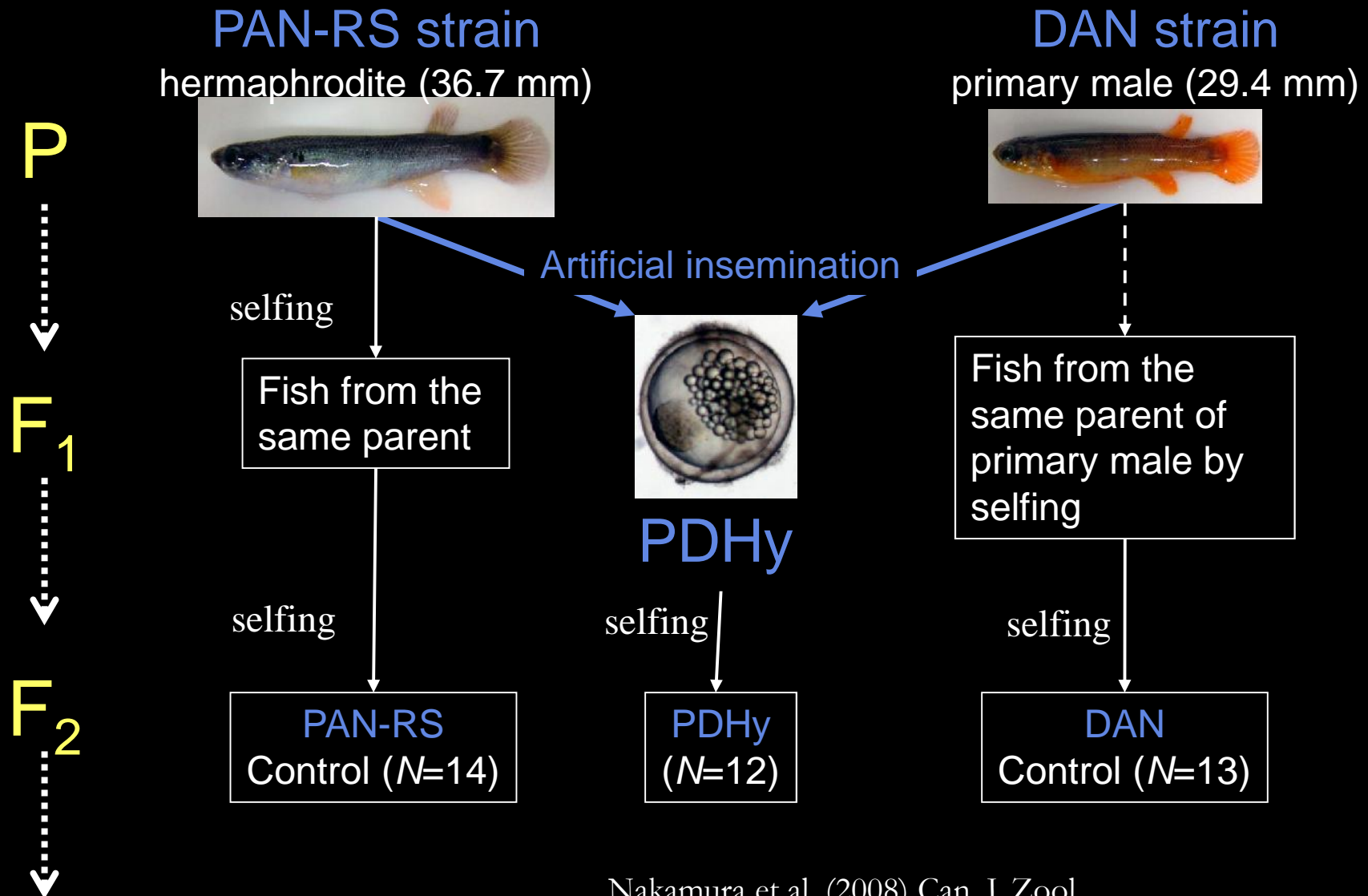
Clonal lineage	PAN-RS	DAN
country	Panama	Belize
growth	<i>high</i>	<i>low</i>
aggression	<i>high</i>	<i>low</i>
GH <i>mRNA</i>	<i>high</i>	<i>low</i>
fecundity	<i>high</i>	<i>low</i>

Grageda et al . (2005) Env. Biol. Fish.

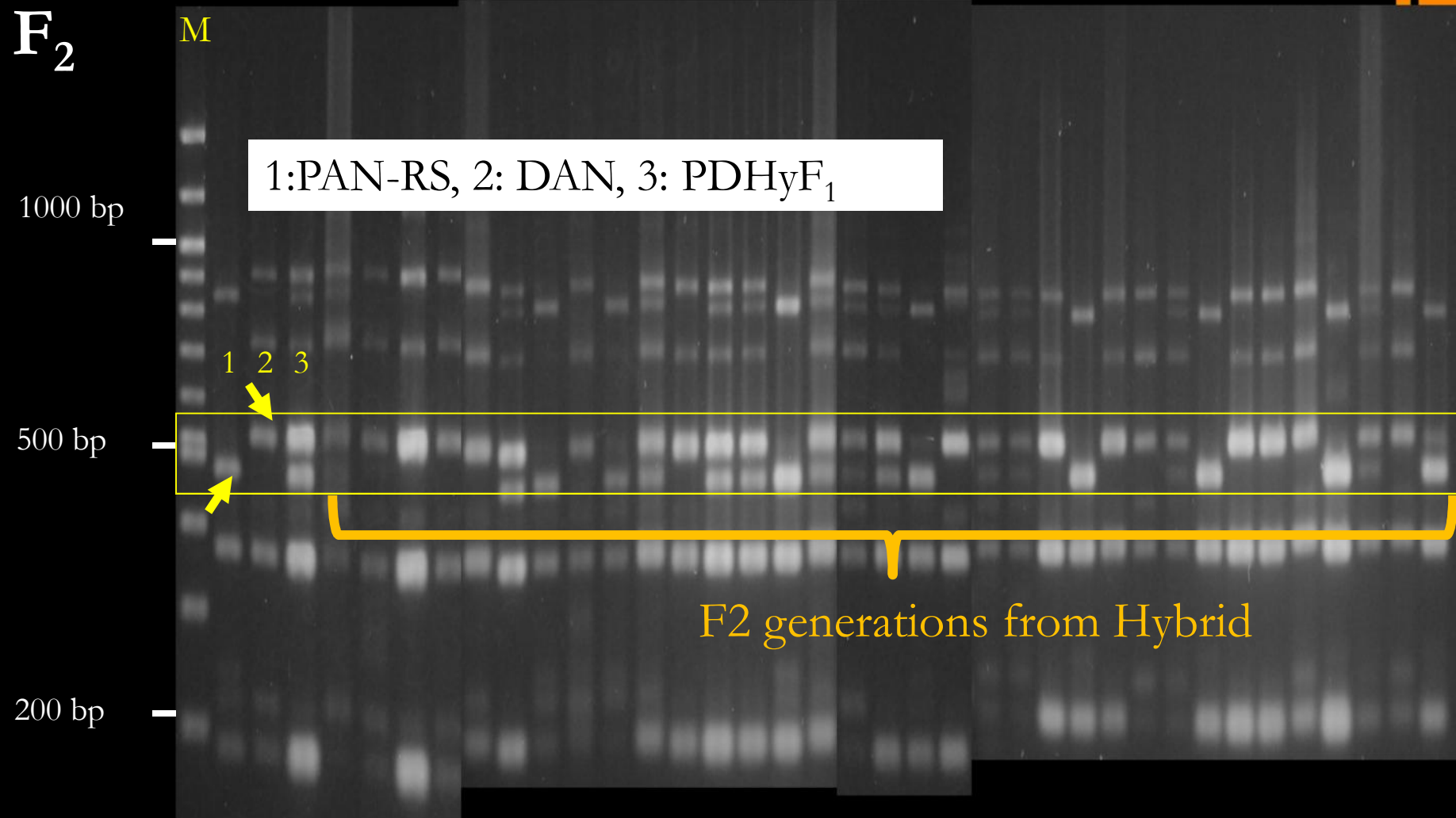
Rhee et al. (2013) Comp Biochem. Physiol. B

Production of hybrid

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CAPS marker (*Dmrt I*)

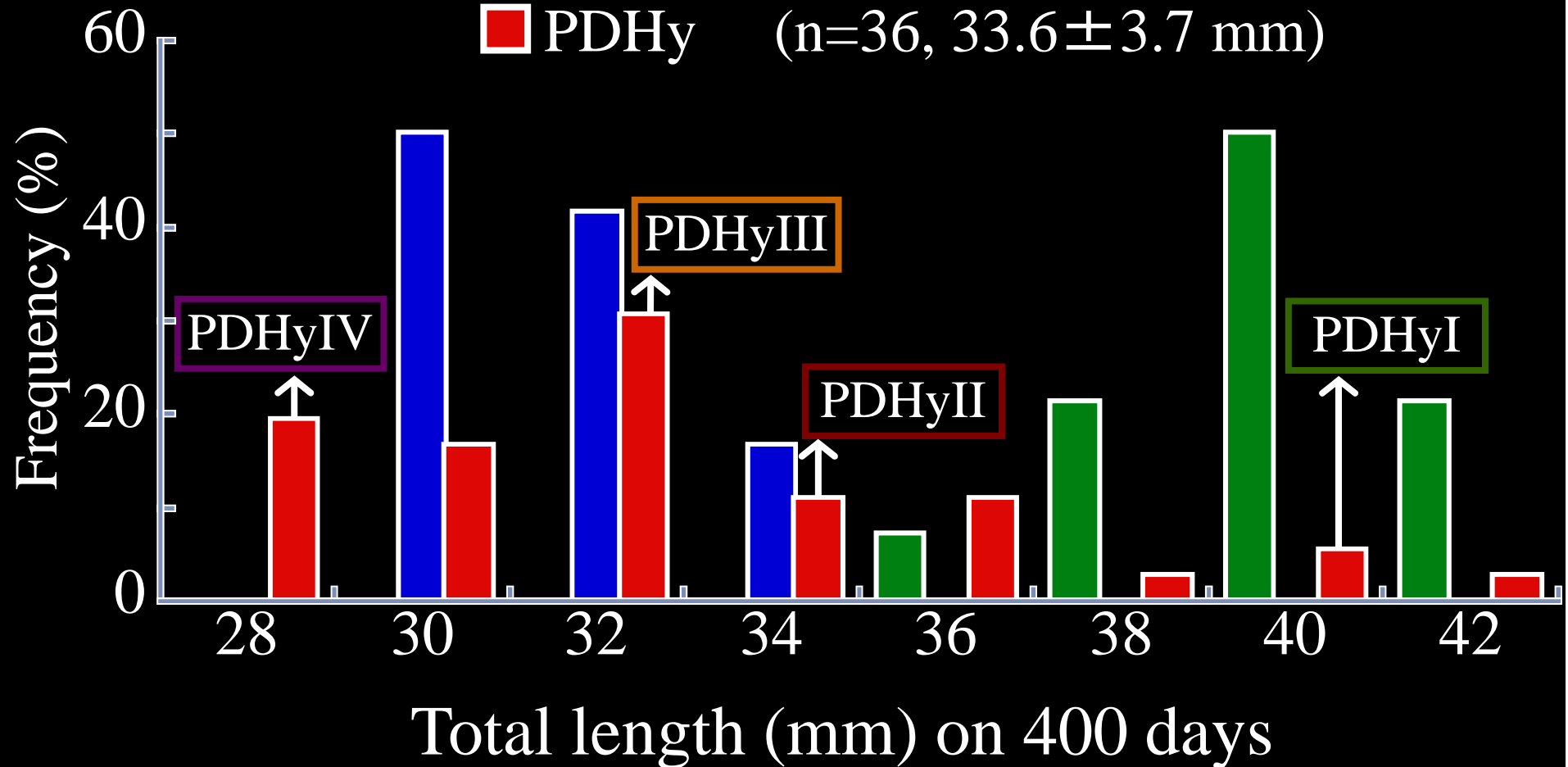


Growth of F₂

Nakamura et al. (2008) Can. J. Zool.

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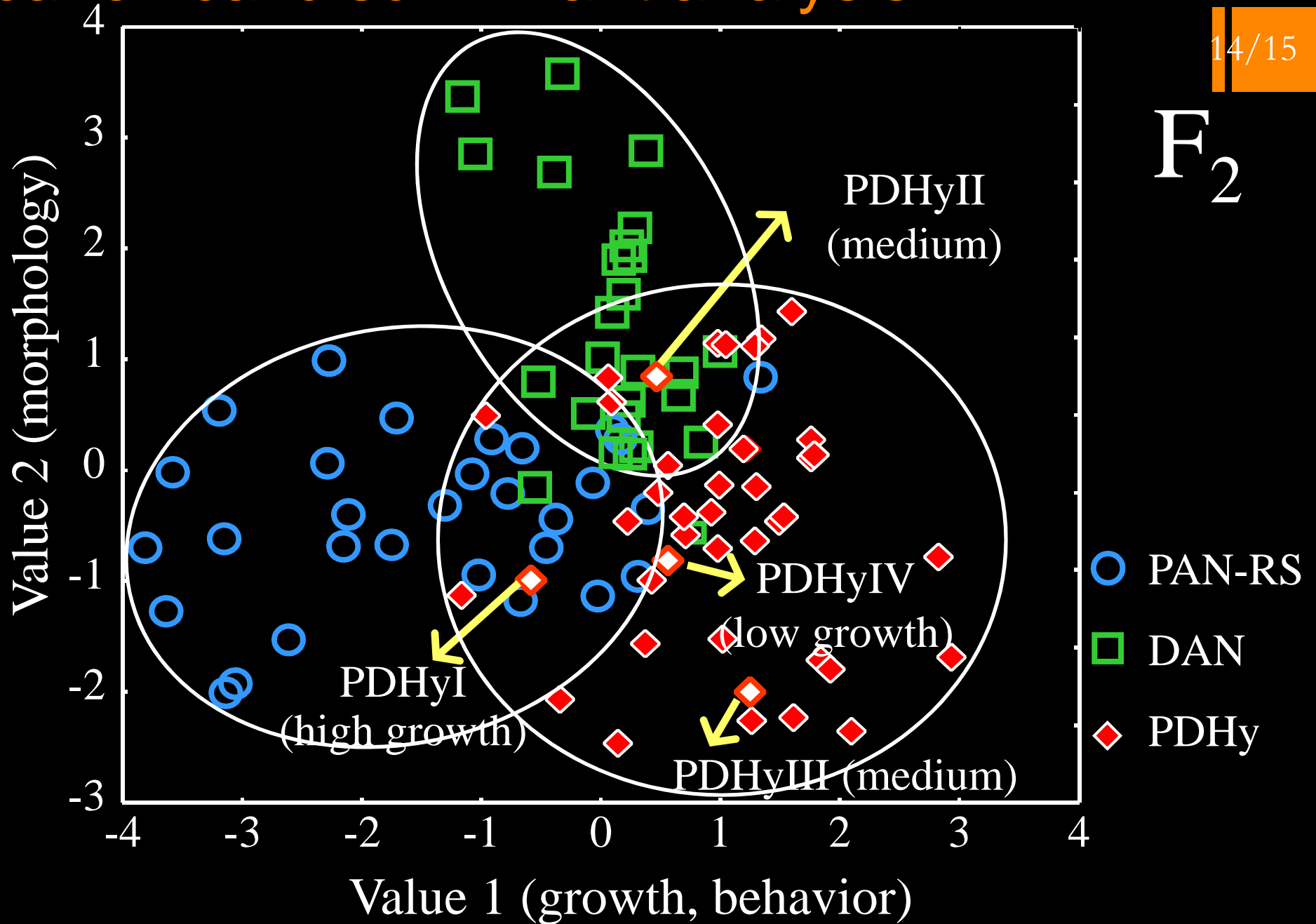
- PAN-RS (n=14, 40.6 ± 1.9 mm)
- DAN (n=12, 32.1 ± 1.1 mm)
- PDHy (n=36, 33.6 ± 3.7 mm)



canonical discriminant analysis

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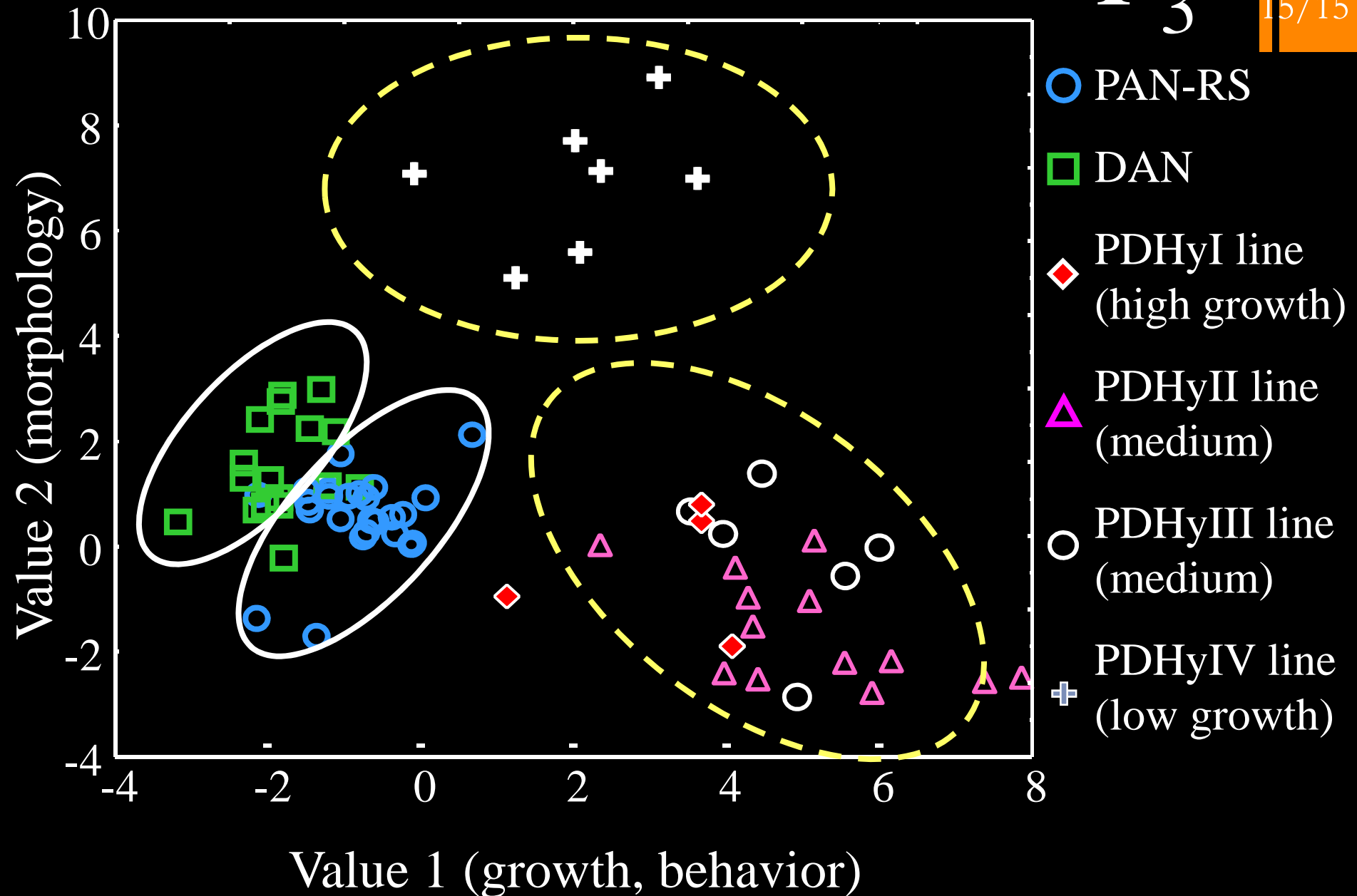
F_2



canonical discriminant analysis

F₃

15/15



Use of Mangrove killifish *Kryptolebias marmoratus*

15/15

- Trace individual records
 - Growth, behavior, nutritional study
- Establishment of clonal lineage (homozygote)
 - Different traits
 - Growth
 - Agonistic interactions
- Hybrid lineage (recombinant inbred strain)
 - Useful traits for aquaculture
 - Genetic markers



Thank
you!

Bluefin tuna
2.7 m, 367 kg