THE IMMORTALITY PLATEAU DIET

LONGEVITY WEEKEND,
People Unlmited,
Scottsdale, Arizona
February 2020

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 & Grant A. Rutledge,
With Joe Bardin

The Search for a Diet that Optimizes Healthspan
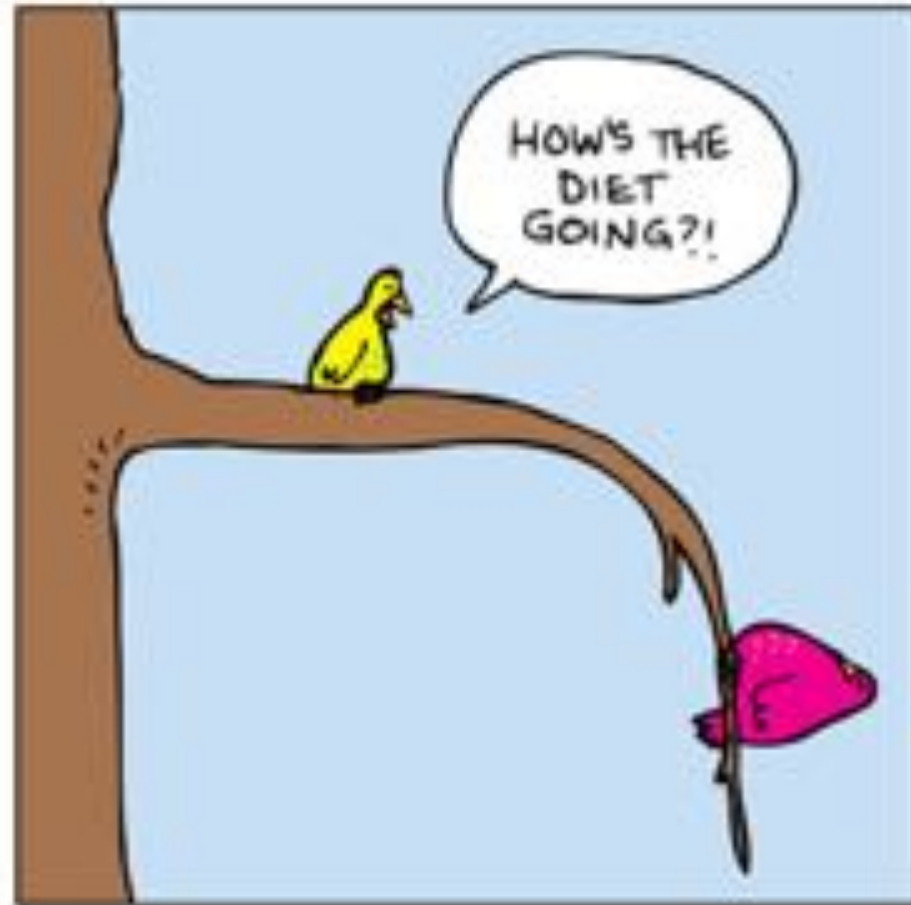
Two Evolutionary Theories
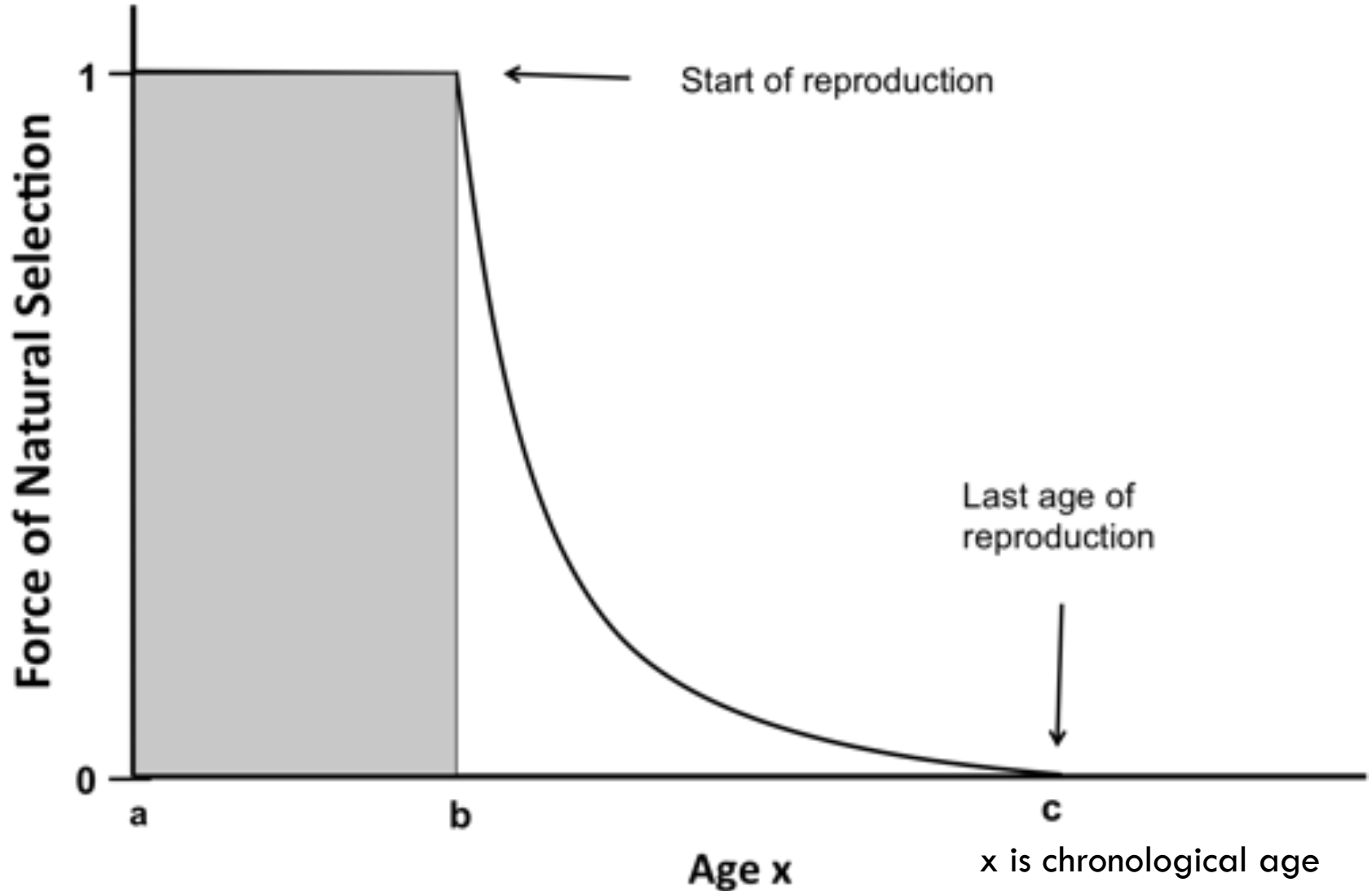

Paleo Hypothesis

Anti-Paleo Hypothesis

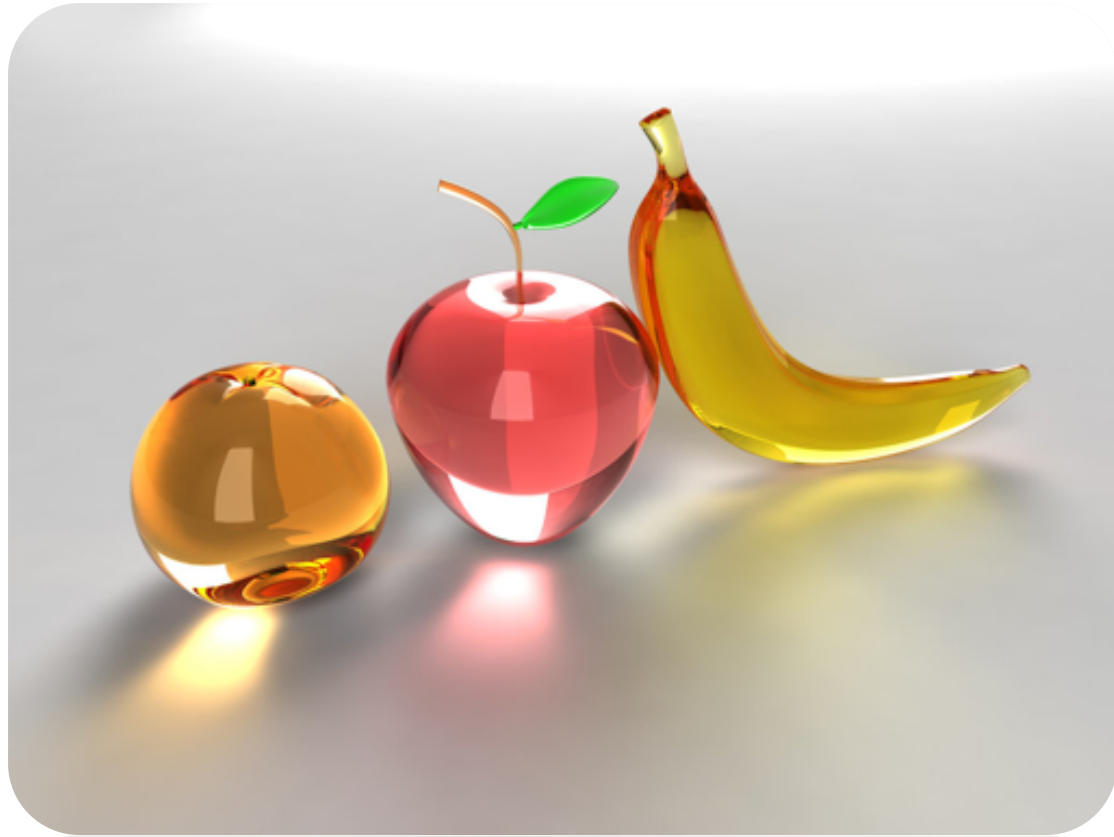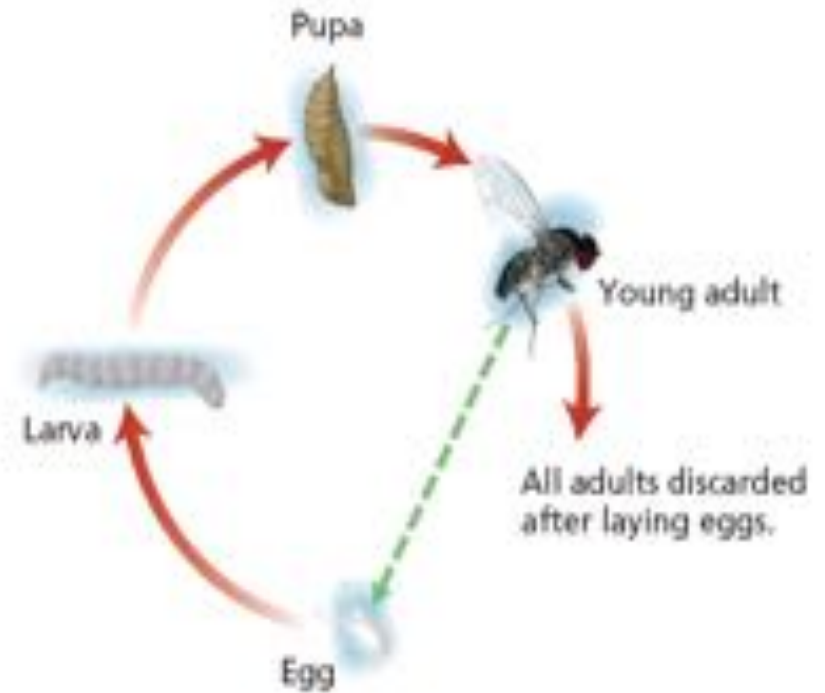# A New Evolutionary Approach to Diet
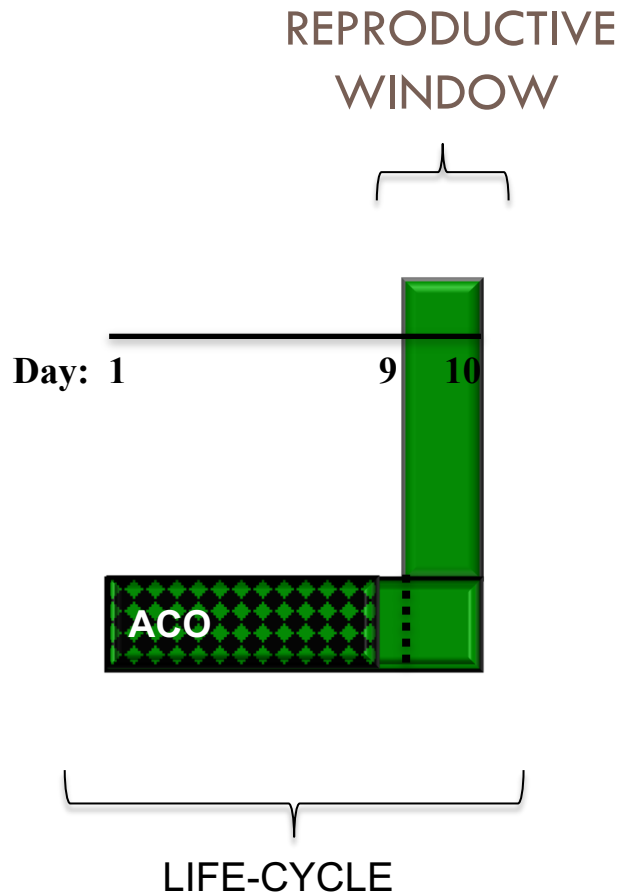
Evolutionary Theory of Aging

x is chronological age

Age-dependent Adaptation

☐ Adaptation depends on biological age: *later ages respond slower to selection, because the forces of natural selection are very weak then.*

☐ Natural selection will rapidly improve adaptation, after environmental change, only at younger ages

☐ Leaving older individuals best adapted to long-abandoned environments, **not** newer environments.

Age-dependent Patterns of Adaptation to Three Diets

Life-cycle of A populations

REPRODUCTIVE
WINDOW

Day: 1   9   10

ACO

LIFE-CYCLE

Pupa

Young adult

Larva

All adults discarded
after laying eggs.

Egg

Egg to Pupae

Adult

Transition from vial to cage

The Diet History of Our Flies

Long-Abandoned Diet

Evolutionarily Recent Diet

Entirely Novel Diet

10,000+ generations

~1000 generations

1600s apples and flies brought to From Europe

1981

Rotting apples

Banana molasses medium

Orange medium

How We Monitor Functional Health

☑ **$p_x m_x$**

◻ p_x = ♀ survival probability
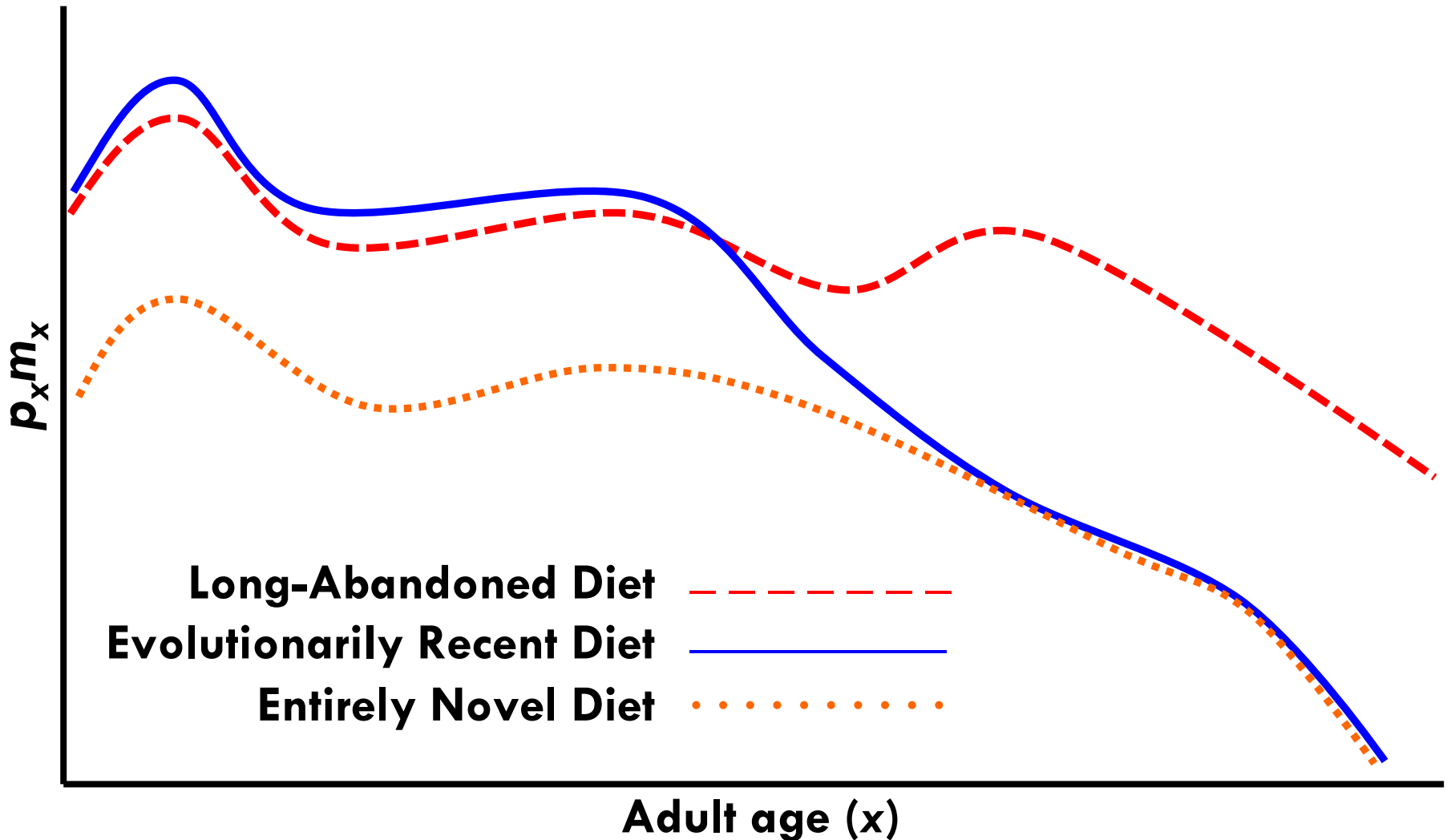
= 1 - (d_x / n_x)

◻ m_x = eggs laid per female

n_x = number of females alive at age x

d_x = number of female deaths age *x to x+1*

x is chronological age

Predicted $p_x m_x$ Trends on Three Diets

Long-Abandoned Diet — — —
Evolutionarily Recent Diet ———
Entirely Novel Diet ········

$p_x m_x$

Adult age (x)

Performance on entirely novel diet *versus* evolutionarily recent diet

A_{1-3}

Individuals = 12,000
Eggs ~1,000,000

Recent Diet (banana)
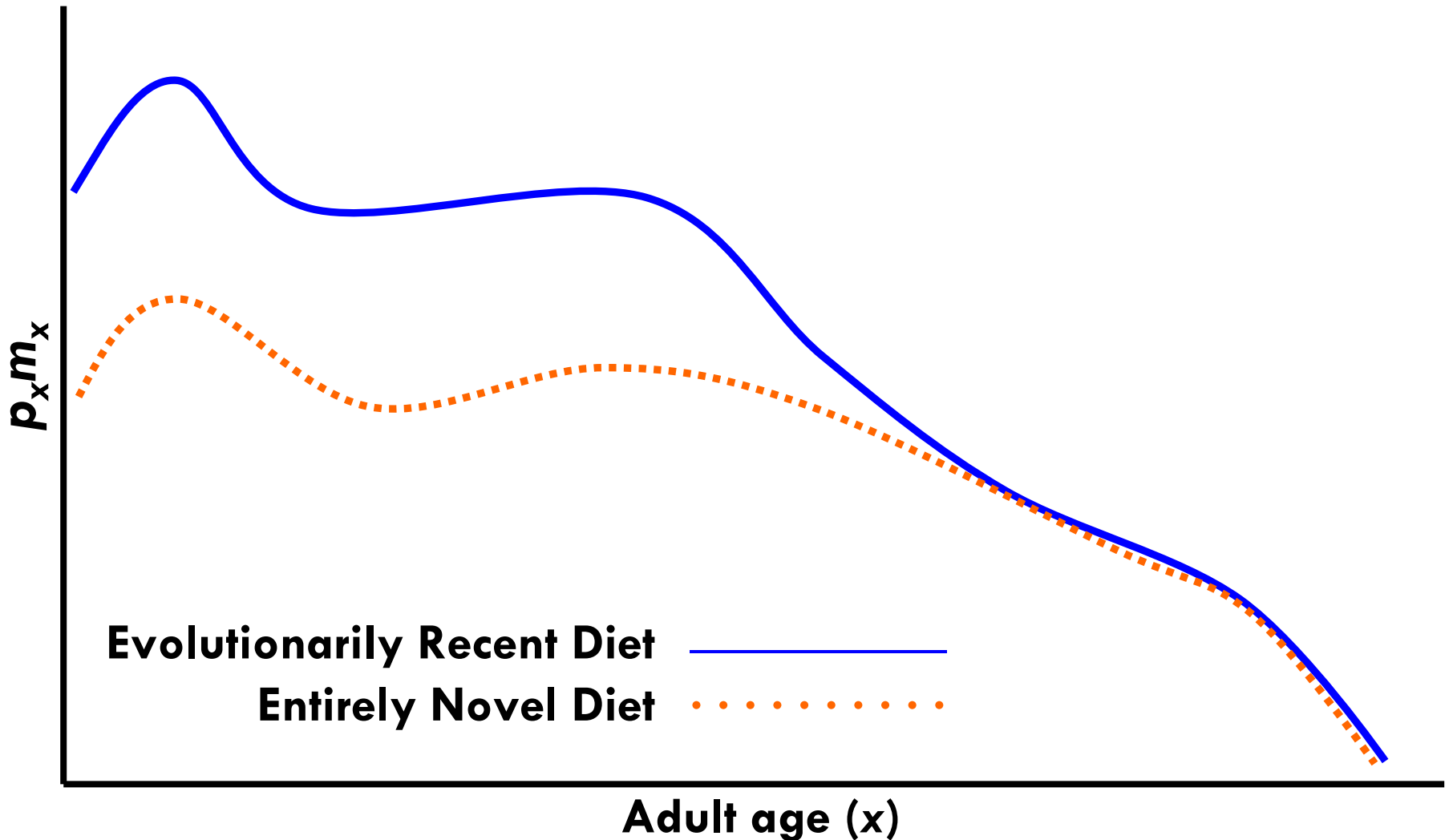
Novel Diet (orange)

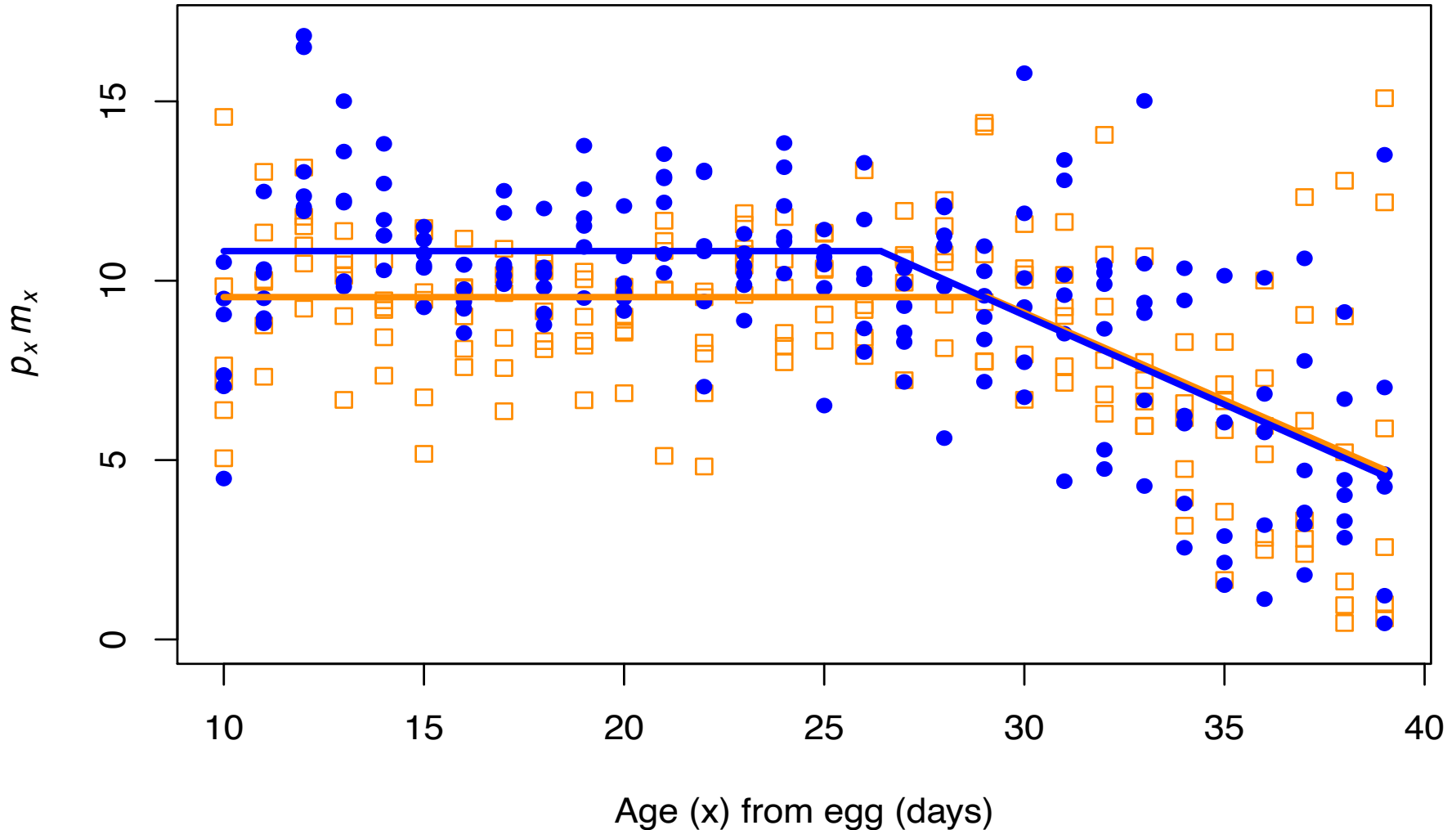Peeled bananas, yeast, high sugar syrups, yeast supplementation

Juice and pulp from oranges, yeast, high sugar syrups, yeast supplementation

Predicted $p_x m_x$ Trends on Two Diets

Banana (blue) diet is better at early ages, due to early-age adaptation

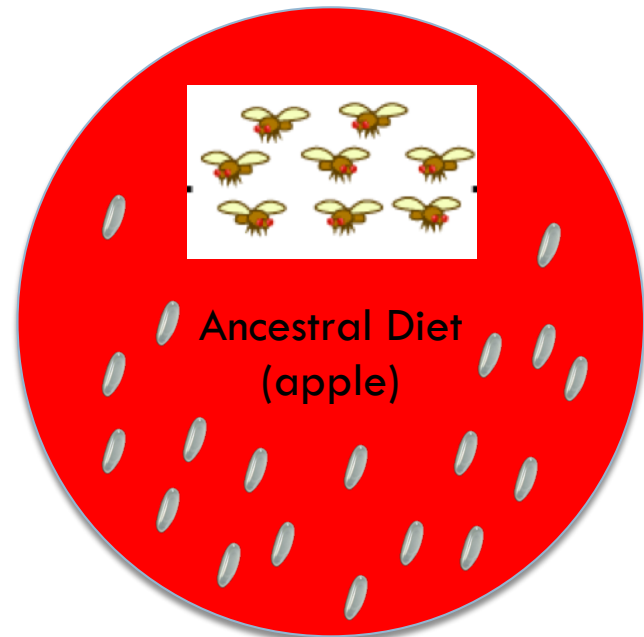# How do our flies perform on a long-abandoned diet vs. recent diet?

A$_{1-5}$

Individuals ~ 36,000
Eggs ~4,000,000

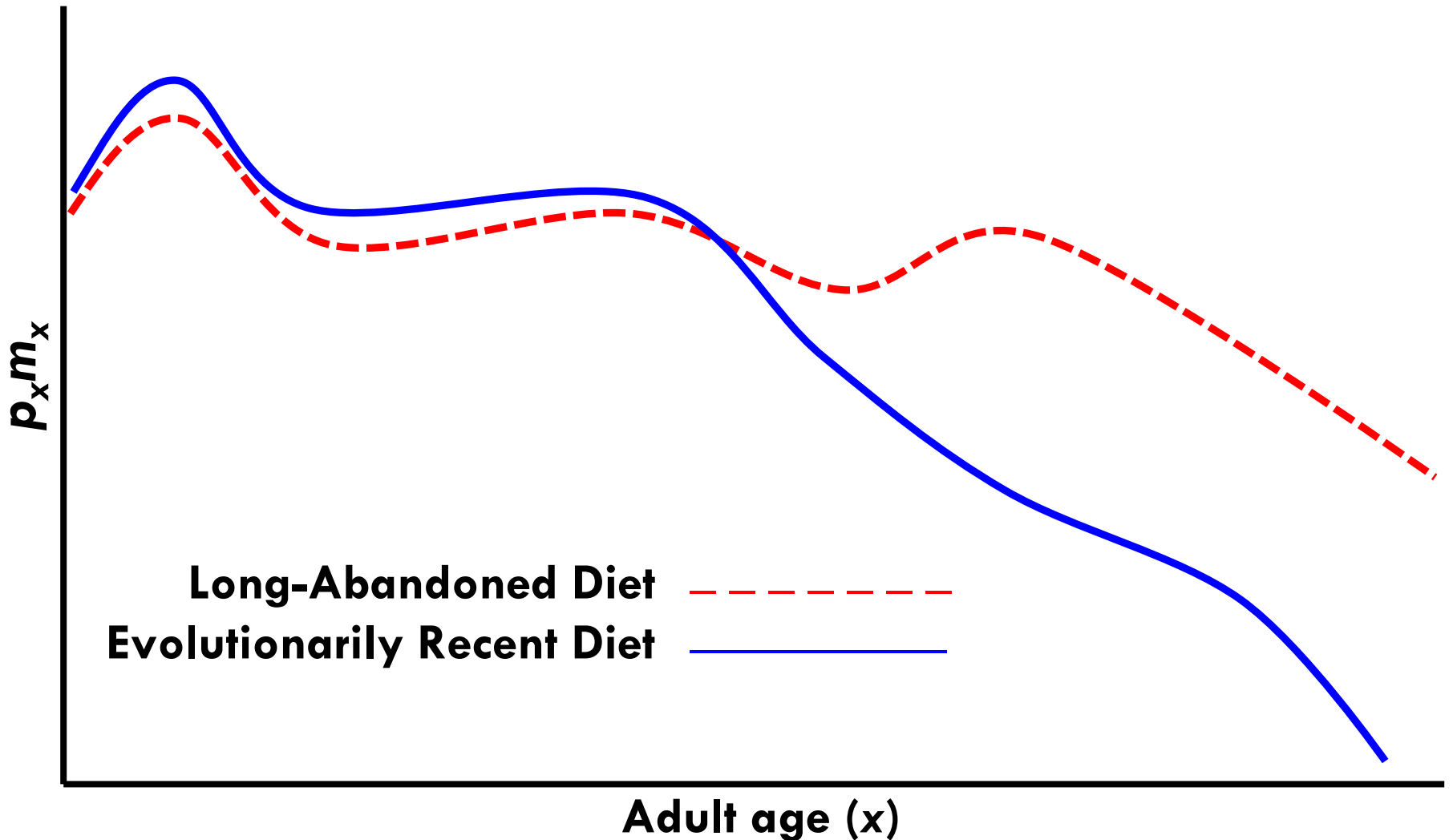Recent Diet
(banana)

Ancestral Diet
(apple)

Peeled bananas, yeast, high sugar syrups, yeast supplementation

Organic apple sauce, yeast, yeast supplementation

Predicted $p_x m_x$ Trends on Two Diets
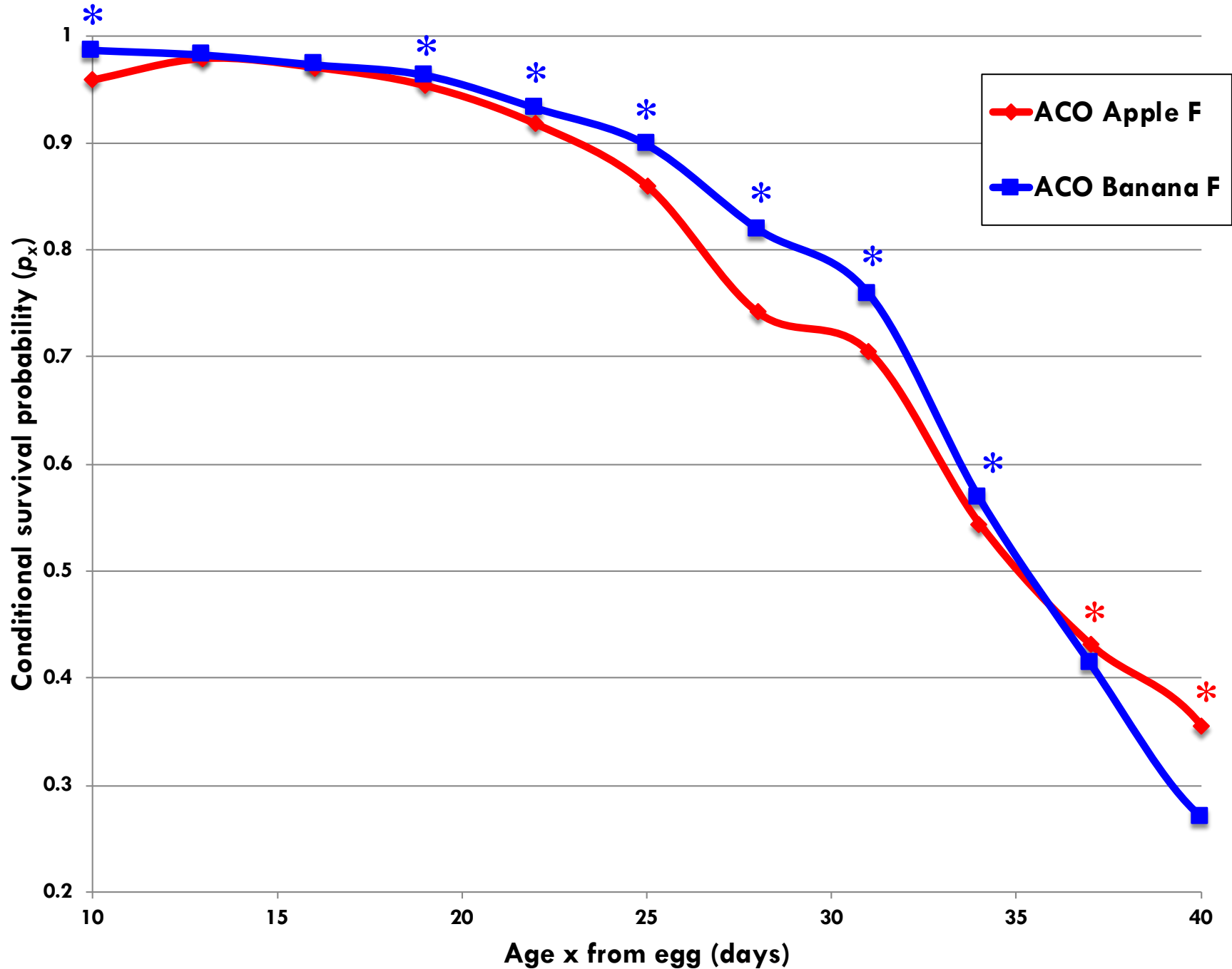

Long–Abandoned Diet — — — —

Evolutionarily Recent Diet ————

$p_x m_x$

Adult age (x)

Apple (red) diet is best at later ages, as a relic of adaptation long ago.
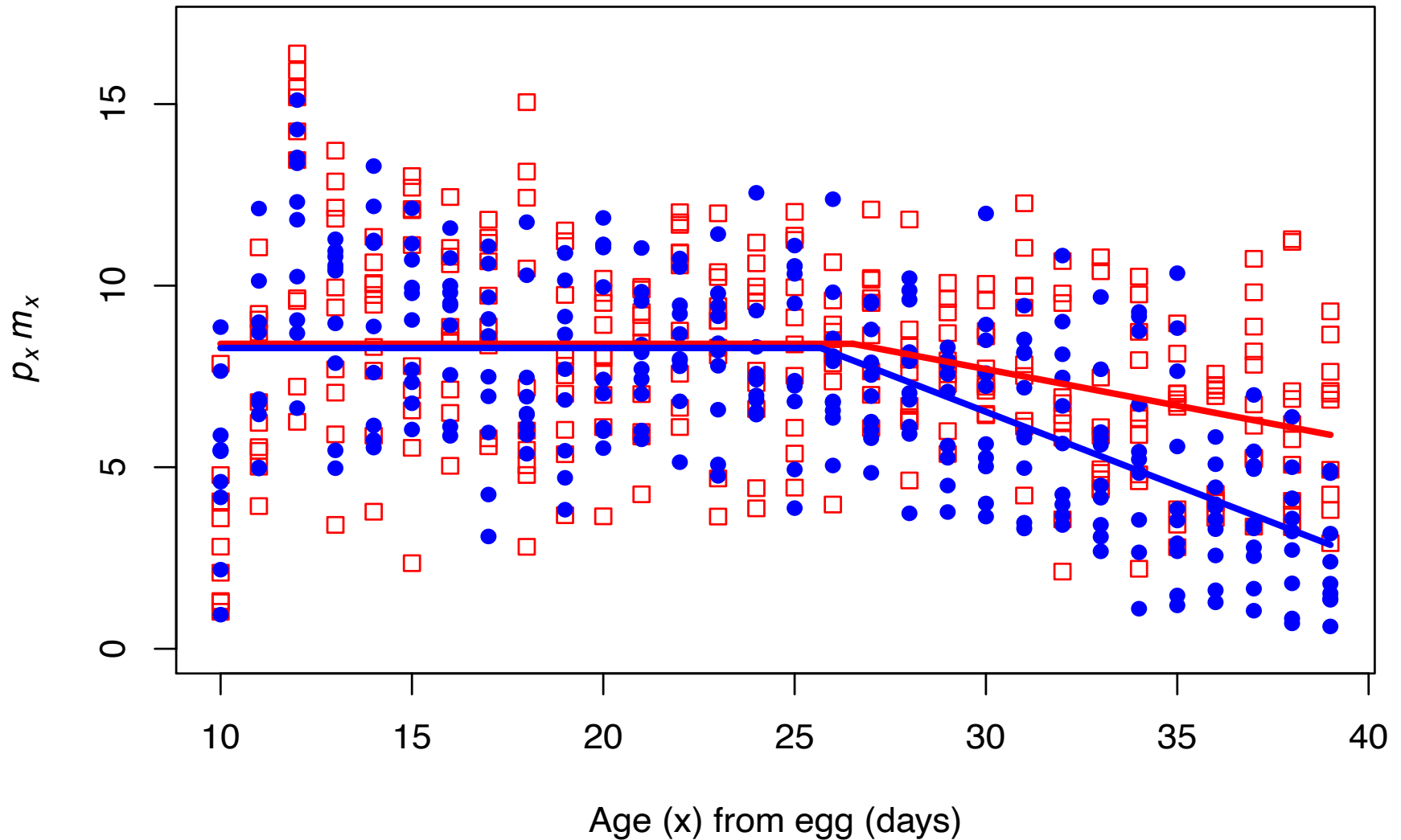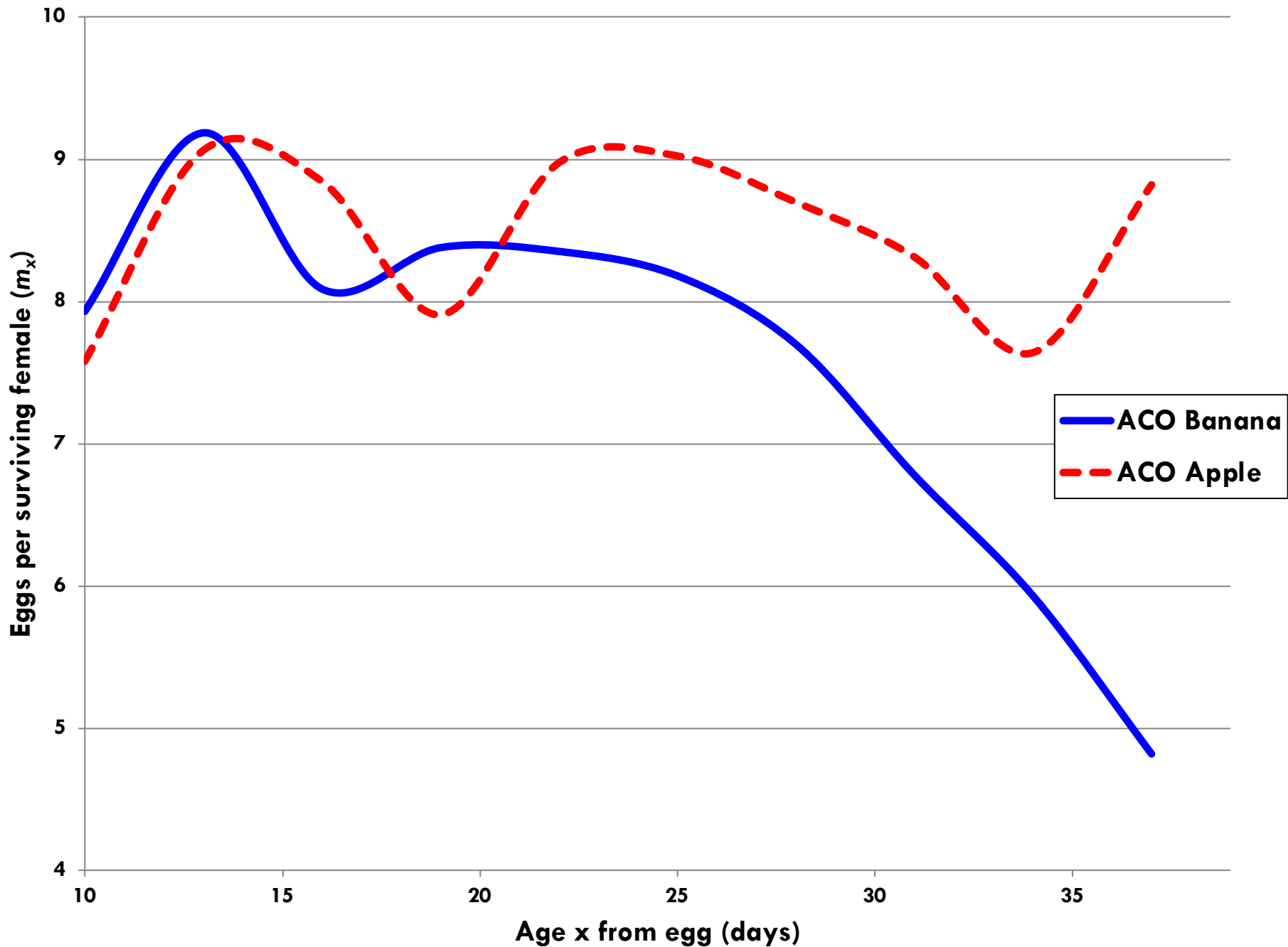
Female Conditional Survival Probability on Banana and Apple Diets (p_x)

Female Fecundity on Banana and Apple Diets (3-day average) (m_x)

Y-axis: Eggs per surviving female (m_x)

X-axis: Age x from egg (days)

Legend: ACO Banana, ACO Apple

Conclusions

- Humans could revert to an ancestral diet **at later ages** to alleviate aging related diseases.

- Ongoing research: this week I saw evidence for consumption of cooked starchy vegetables about 170,000 years ago

- But NO milk-derived foods, NO heavy use of grains, NO heavy use of legumes, OR and of products that contain them, like seed or bean oils

What do you eat?

- Best foods for our evolution
- How do you replace all that other food?

When do you eat?

- Evolution and patterns of eating
- Daily patterns
- Monthly patterns
- Seasonal patterns

Other implications beside diet

- Naps – patterns of rest
- Patterns of exercise

Implications for supplements & longevity

- [ ] Which are we best adapted for?
- [ ] Which should we avoid?