Relative Risks from Parasitism

Some Thoughts about Glitz and the Internal Workings of the Human (= Non-parasitologist's) Mind.

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090408

picasaweb.google.com

www.wingsphotography.com

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The Typical Default Assertions about Parasites*:

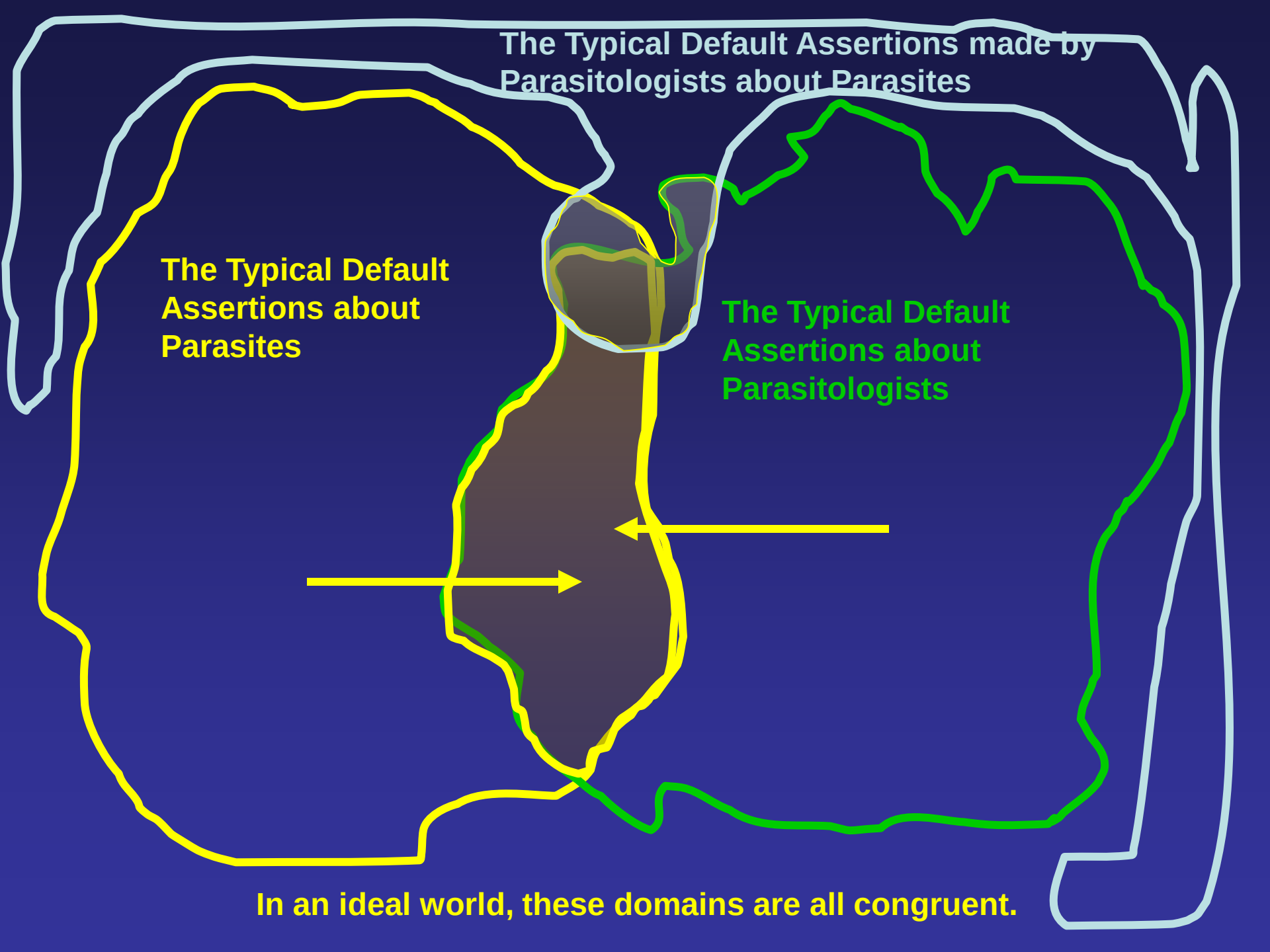
- They hurt you or make you sick;
- Potential mates are turned off by them;
- If you have them, you can't rear as many babies as you could if you didn't have them;
- Only weirdos like them or study them or think they're cool;
- They're actually very ugly;
- They're also the work of the Devil.

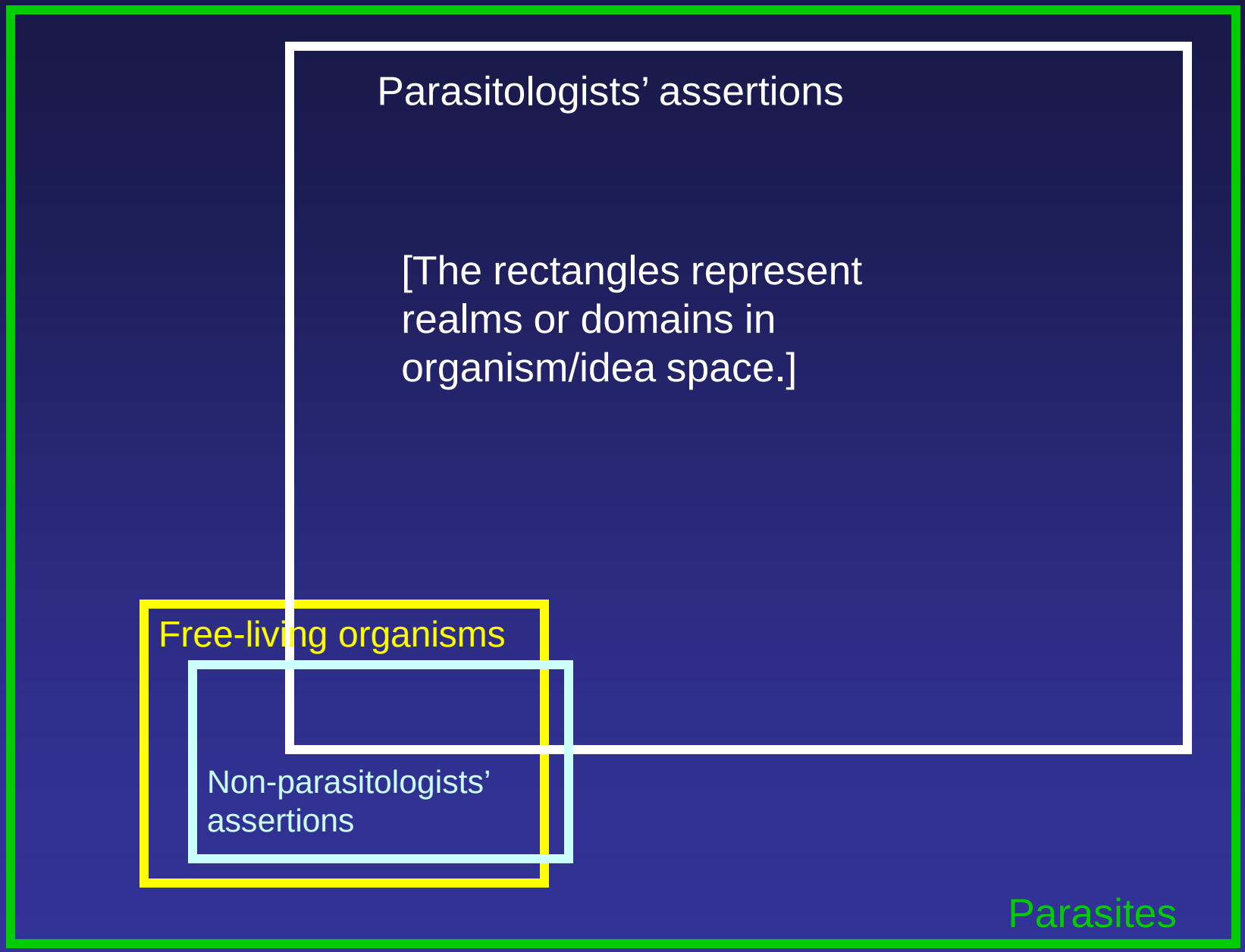
*At least the first three are supported by sources from the primary literature.

The Typical Default Assertions about Parasitologists*:

- They never study the right stuff, which is whatever I believe is really cool;
- They don't need much money;
- They're really hung up on descriptive biology, which everyone knows is passé;
- They're dirty, and furthermore, they like dirty stuff like mud and guts;
- They think my default assertions are really very dumb and ill-founded.

*JJ's impressions based on ~50 years of academic politics.


The Typical Default Assertions made by Parasitologists about Parasites
The Typical Default Assertions about Parasites
The Typical Default Assertions about Parasitologists
In an ideal world, these domains are all congruent.



Venn diagram of intellectual and biological issues surrounding parasitism

The rather obvious device for making these domains congruent, of course, is . . .

(Previously cited source)

A Careful Examination of the Life of *Ischnura verticalis*, with Special Focus on the Role of Parasitism in Reproductive Success.

www.pbase.com/crocodile/image/19049803

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(Previously cited source)

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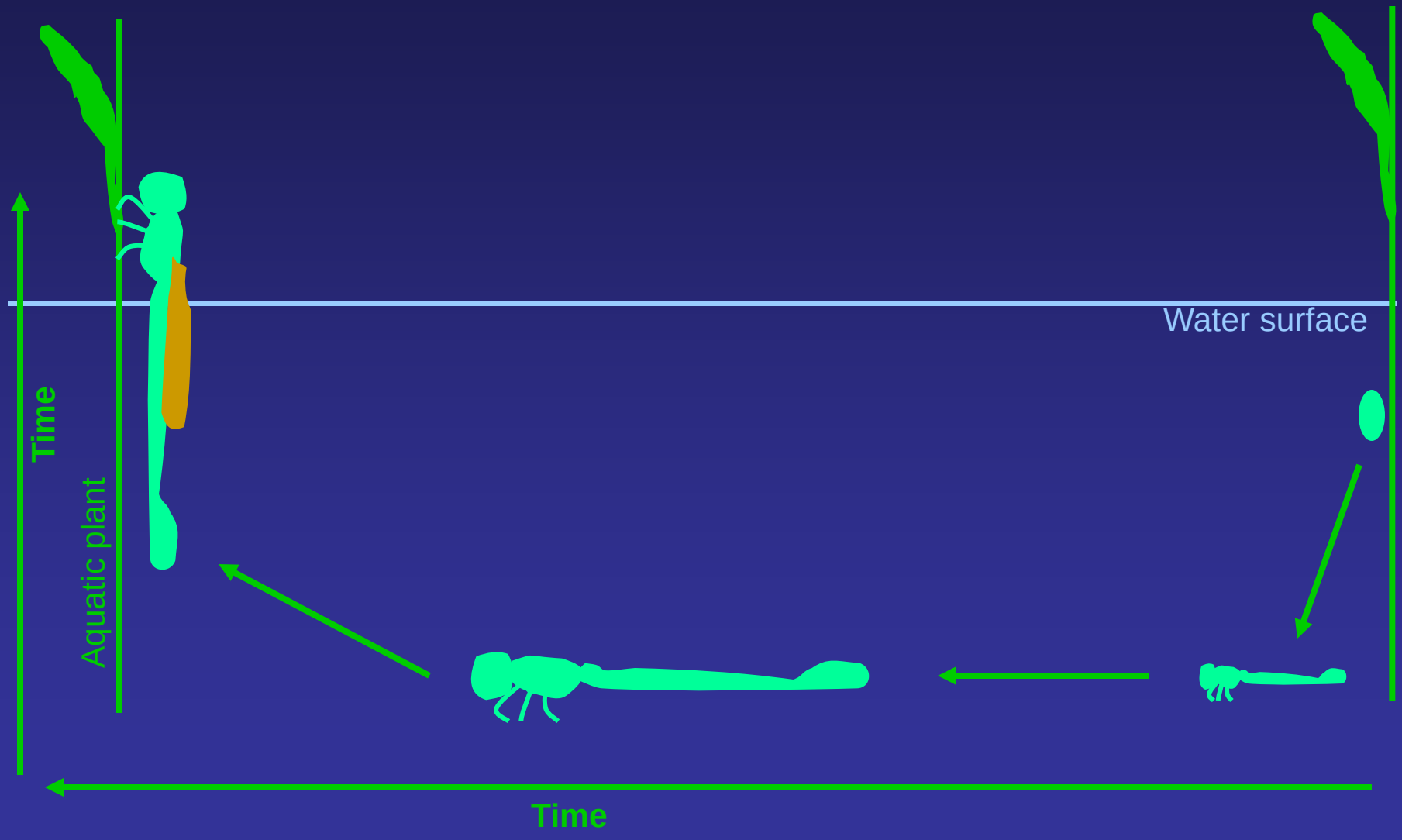
A MODEL should account for the factors that influence this set of events:



Risk factors for a larval *I. verticalis**:

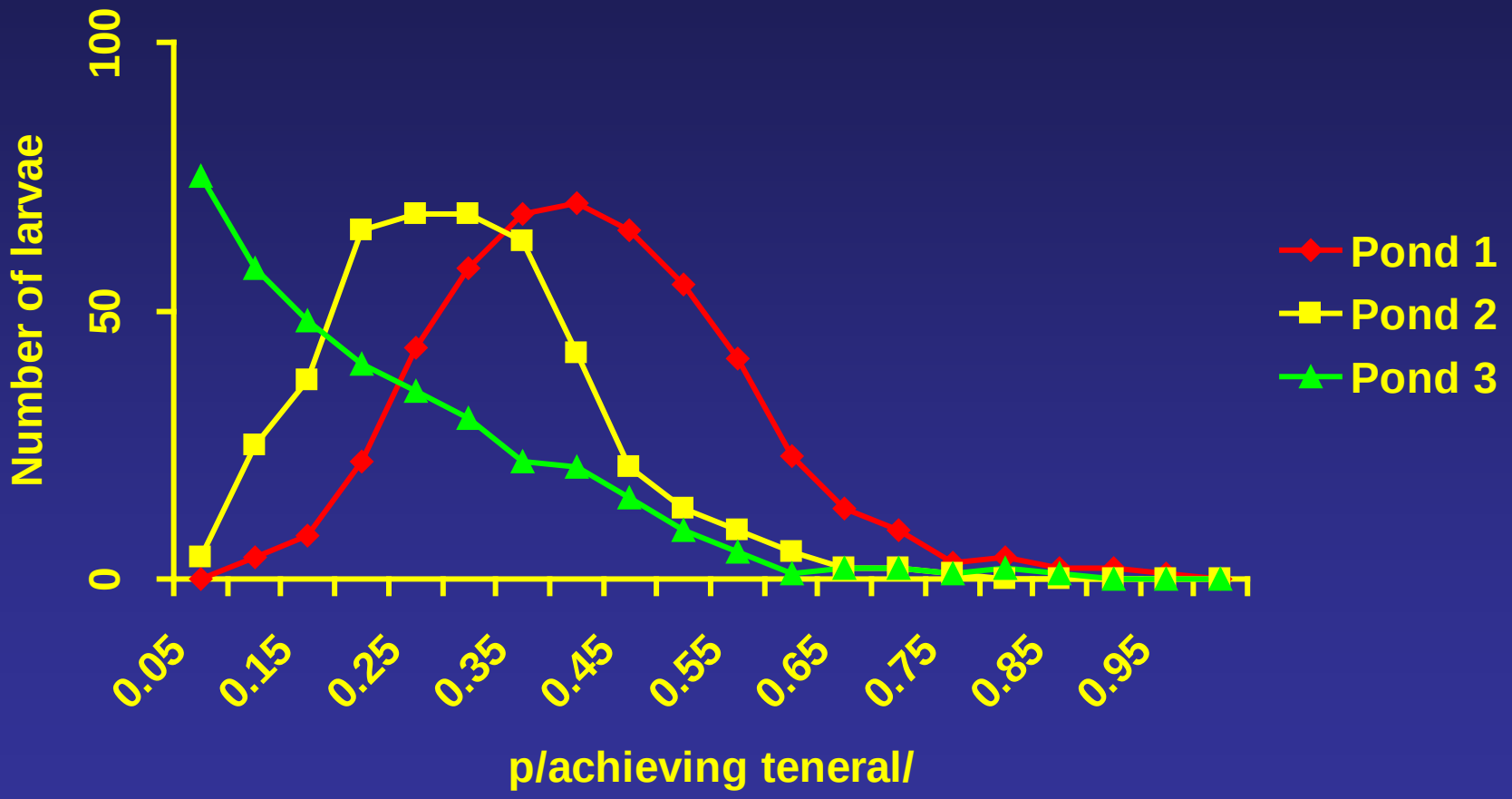
- Date the eggs are laid (A);
- Nature of pond eggs laid in (B);
- Nature of vegetation in pond eggs laid in (C);
- Run-off from land surrounding pond (D);
- Diversity of micro-invertebrate community (= potential prey items) (E);
- Diversity of predators (fish, dragonfly larvae, etc.) (F);
- Parasites (mites, gregarines, trematode larvae) (G);
- Combinations of the above (H).

* = minimum set of factors; i.e., the obvious ones.

Probability that a larval *I. vertícalis* will reach teneral stage, p/achieving teneral/ = $f(A) \cdot f((B + C)) \cdot f(D) \cdot f(E) \cdot f(F) \cdot f(G)$*

*Applies only to a single pond at a single location over a single warm season.

Probability curves for three ponds:



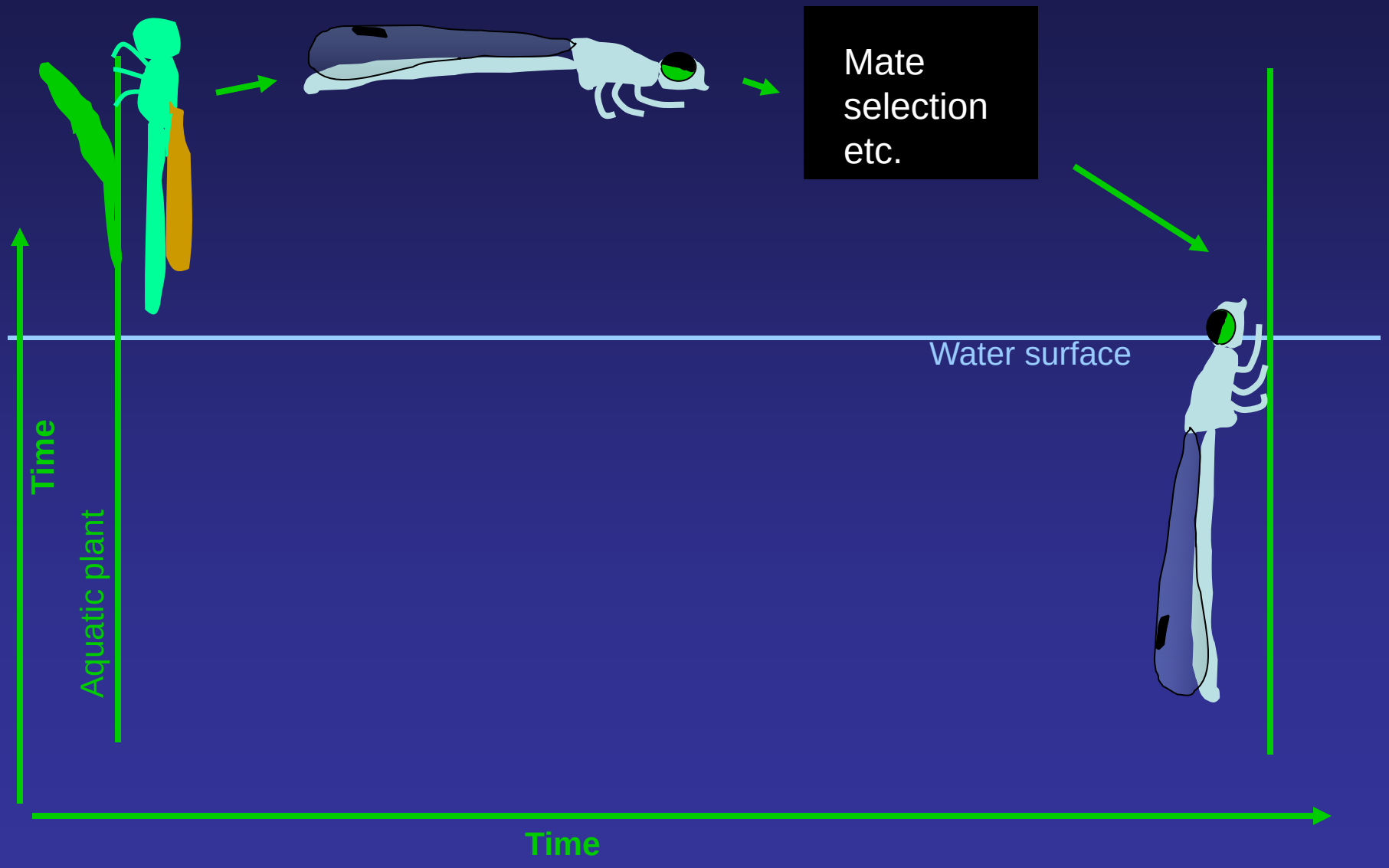
Probability that a larval *I. verticalis* will reach teneral stage,

p/achieving teneral/ = f(A) • f((B + C)) • f(D) • f(E) • f(F) • f(G)*

Once the equation for p/achieving teneral/ has been developed, then f(H) becomes some version of the multiple kind lottery.*

*Applies only to a single pond at a single location over a single warm season.

A MODEL should account for the factors that influence this set of events:



Risk factors for a teneral *I. verticalis**:

- Date of emergence (A);
- Nature of pond (B);
- Nature of vegetation in pond (C);
- Run-off from land surrounding pond (D);
- Diversity of micro-flying insect community (= potential prey items) (E);
- Diversity of predators (birds, adult dragonflies, etc.) (F);
- Parasites (mites, gregarines, trematode larvae) (G);
- Combinations of the above (H).

* = minimum set of factors; i.e., the obvious ones.

Probability that a teneral *I. verticalis* will actually lay eggs, p/laying eggs/ = $f(A) \cdot f((B + C)) \cdot f(D) \cdot f(E) \cdot f(F) \cdot f(G)$*

*Applies only to a single pond at a single location over a single warm season.

Probability that a teneral *I. verticalis* will actually lay eggs, p/laying eggs/ = *f*(A) • *f*((B + C)) • *f*(D) • *f*(E) • *f*(F) • *f*(G)*

Once equation for p/laying eggs/ has been developed, then *f*(H) becomes some version of the multiple kind lottery.*

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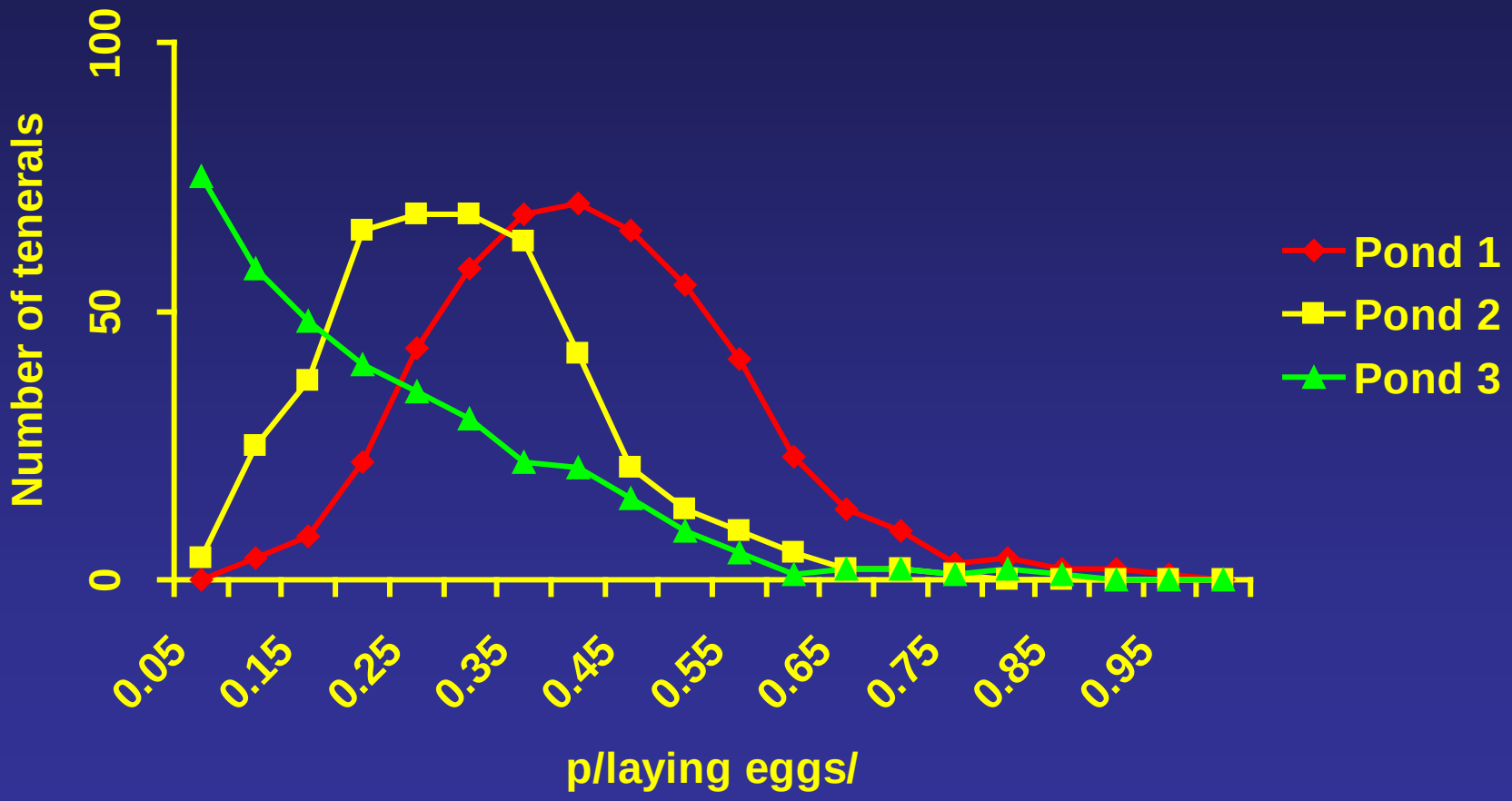
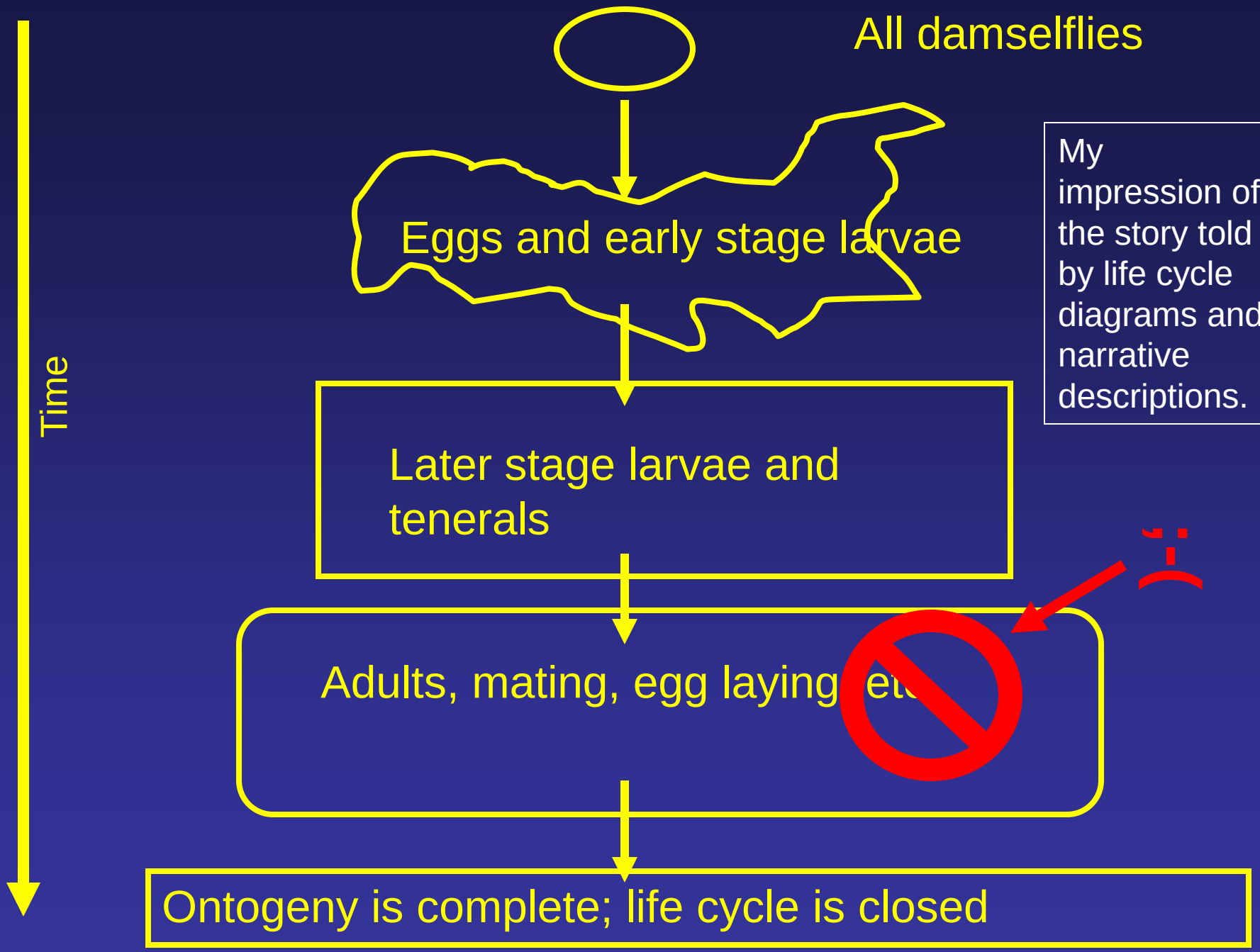
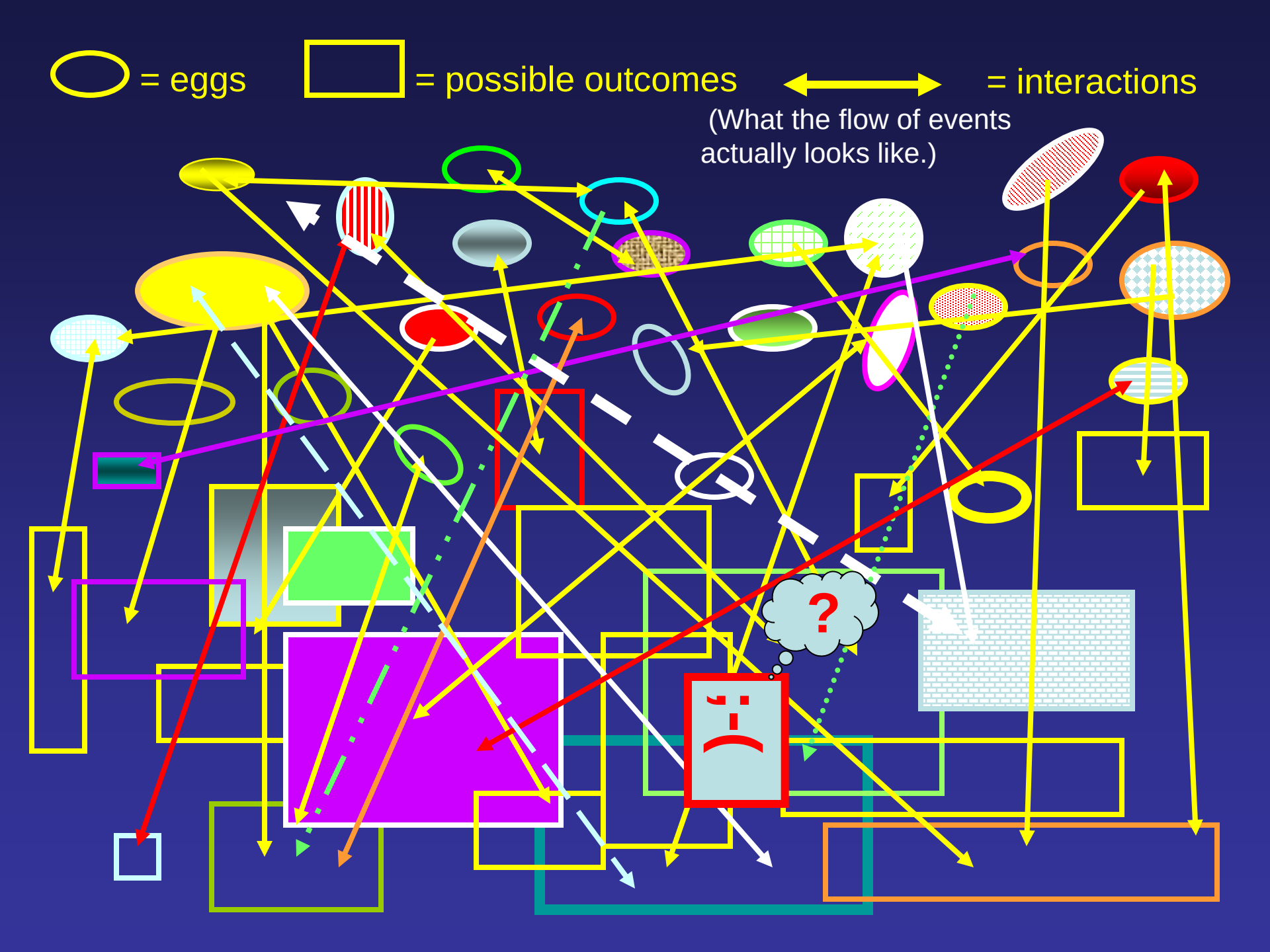
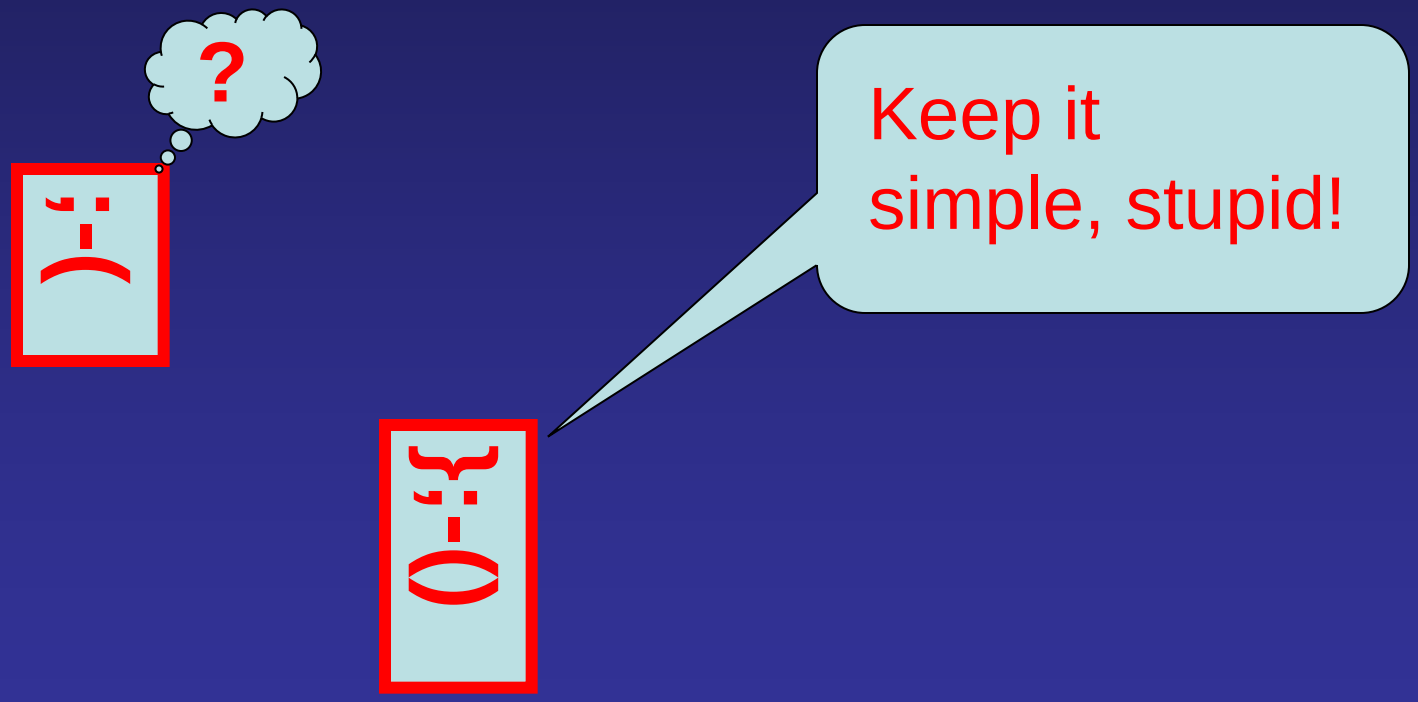
Probability curves for three ponds:




All damselflies
Eggs and early stage larvae
Later stage larvae and tenerals
Adults, mating, egg laying etc
Ontogeny is complete; life cycle is closed
Time
My impression of the story told by life cycle diagrams and narrative descriptions.


= eggs
= possible outcomes
= interactions
(What the flow of events actually looks like.)
?

So, what is the best way to approach this problem of assessing the role of parasitism in the life of *Ischnura verticalis*?



www.glerl.noaa.gov/seagrant

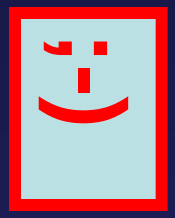
Calculate probability of death by predation.

p/survive_1/ = 1 – p/dbp/

Calculate probability of death by all other causes.

p/survive_2/ = p/survive_1/ – p/dbaoc/

Calculate probability of successful metamorphosis into teneral.



= our symbol for do-able studies

1. The effect of gregarine parasites on metamorphosis success (lab).

   a. Concurrent treatment groups

   b. Individual containers

   c. Parasite-free prey

2. Paired-t statistical design

Make up a very simple program and ask what happens to fraction of eggs surviving through metamorphosis as probabilities of death from various causes vary.

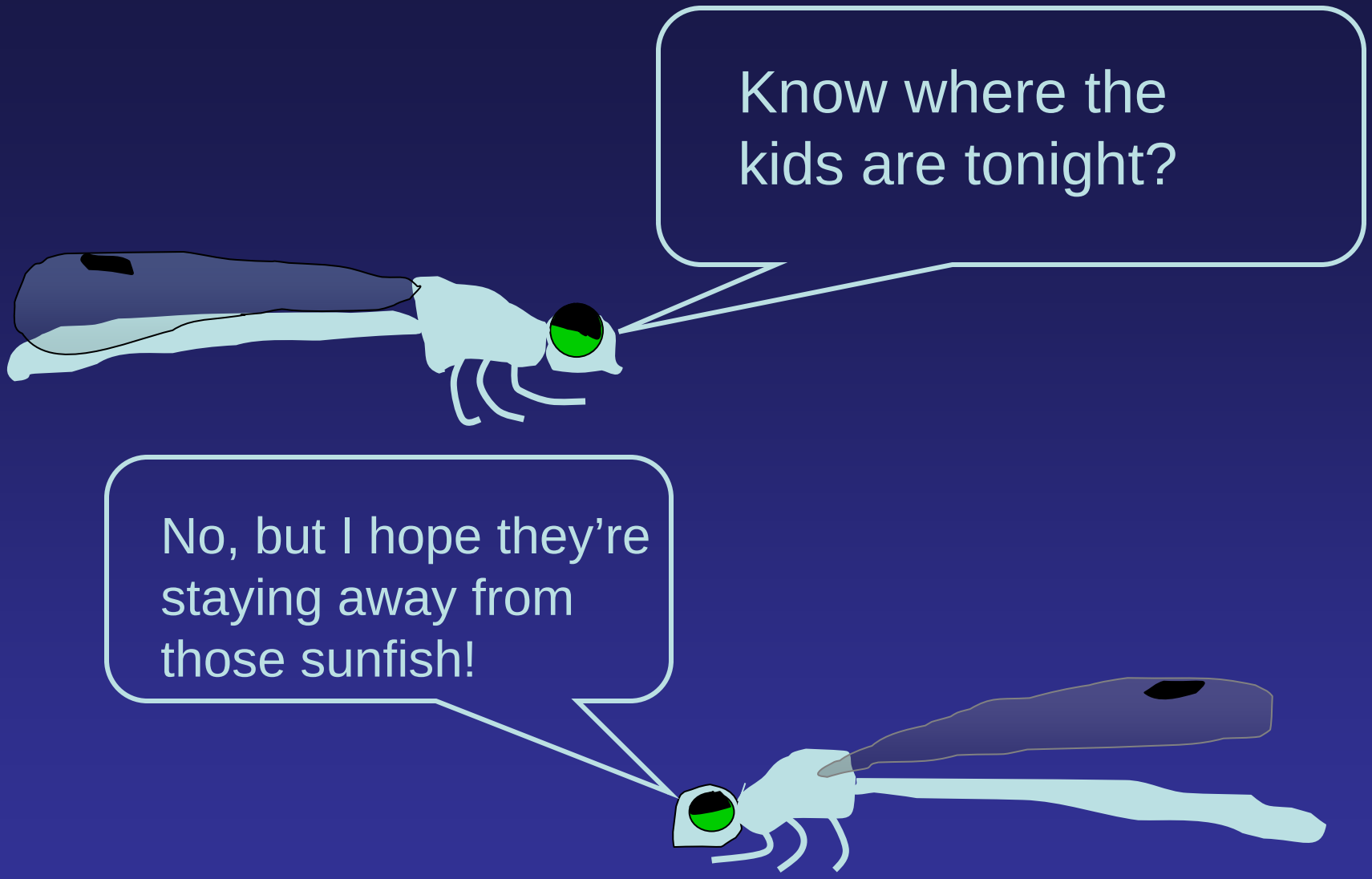
Starting values:

DBP = DBP + 0.01

DBAOC = DBAOC + 0.001

PEFF = PEFF + 0.001

Fraction surviving metamorphosis under varying probabilities of death


Know where the kids are tonight?
No, but I hope they're staying away from those sunfish!