

# Todd Oakley

PhD - Duke - Cliff L  
post doc - UChicago  
Asst Prof - UCSB

Evolution of Vision

Phylogeny and the origins of biodiversity

"It's an honor just to be nominated"

"Do you believe in ecology"

Darwin - I think

Tinkering Processes

Duplication  
Recombination

} He studies Origin/Evolution of Vision  
How do complex molecules arise?

Interested in where the variation comes from - parallel between gene + structural evolution

Two ?s

when did components originate  
How

Two Case Studies

Novel phototransduction  
Novel ostracod compound eyes

Case 1 - Animal phototransduction origins

Rhabdomeric - depolarized

Ciliary - hyperpolarized

How do components originate?

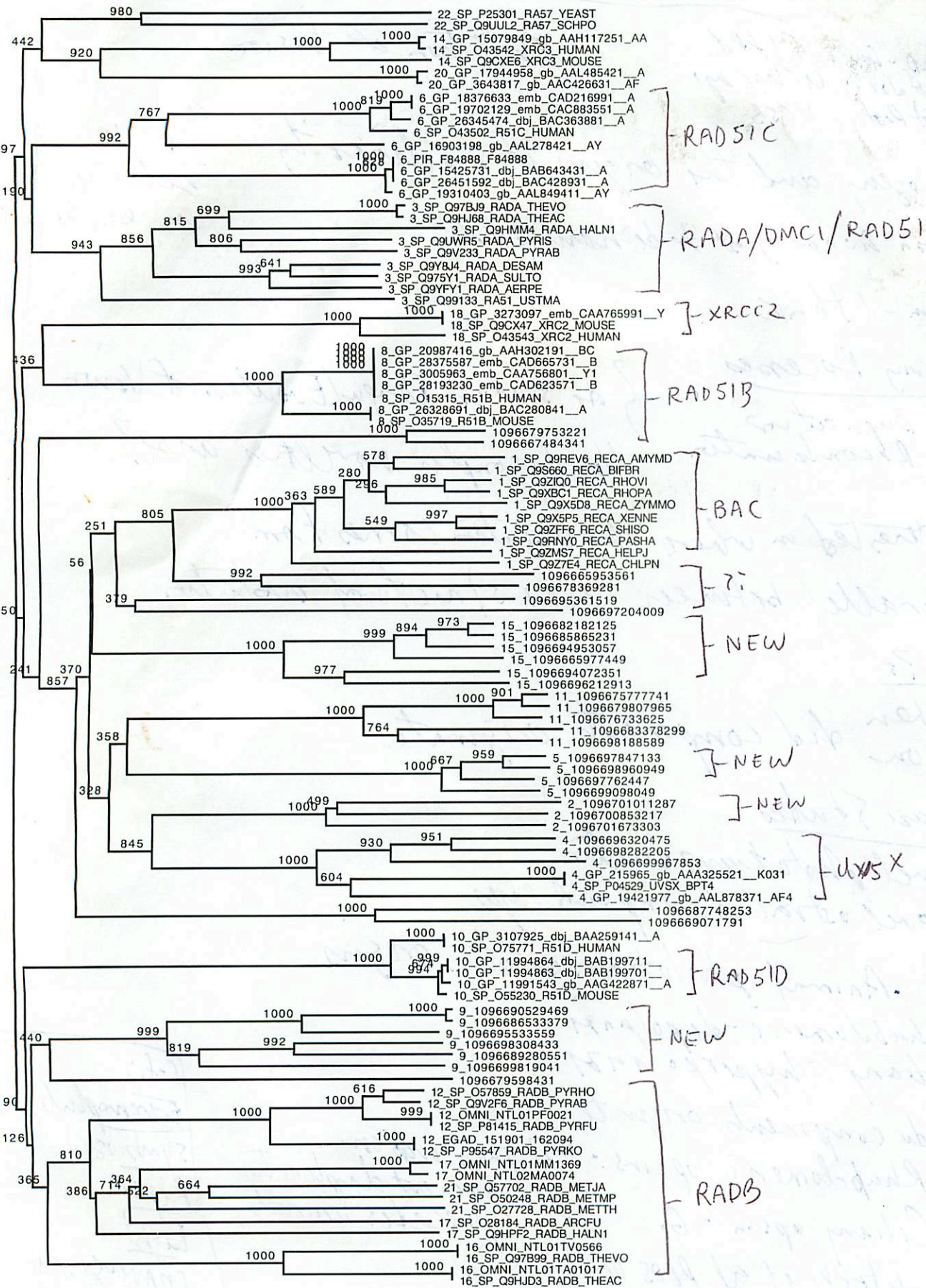
Rhabdomeric opsins - G<sub>i</sub>

Ciliary opsin - G<sub>o</sub>

Pfaffeneski et al PLOS ONE

} Then was an ancient duplication precedes animals

Cofix  
Extremophiles  
Symbiosis  
Repair  
Light  
Convergence  
Screen Hueren



Oakley p2

correlation between aa + f(x) detected  
by sim-map

Ostracods

- small bivalve crustaceans
- live wherever there is H<sub>2</sub>O
- live in diverse aquatic environments  
including deep sea

Reconstruct ancestral state for  $\theta$ -eyes

---

Do compare

Do components  
get replaced?

Table 1. Subfamilies of the RecA superfamily.

<u>Subfamily ID</u>	<u># of GOS Sequences</u>	<u>Subfamily</u>	<u>Commentss</u>
1		RecA	
7		RecA fragment	
23		RecA fragment	
19		RecA fragment	
11		<u>RecAL</u>	RecA related
2		UvsX2/Phage GOS1	In new cyanophage
4		UvsX	Original UvsX
5		<u>Novel/Phage GOS2</u>	UvsX related
18		XRCC2	
22		XRCC2	
8		Rad51B	
10		Rad51D	
6		Rad51C	
14		XRCC3/SpB	
20		XRCC3/SpB	
3		RadA/DMC1/Rad51	
13		RadA/DMC1/Rad51	
12		RadB	
17		RadB	
21		RadB	
16		RadB	
9		<u>Novel</u>	Distantly related to euks/archs
15		<u>Novel</u>	