

Exploring the expression of chromoproteins in *Dictyostelium discoideum*

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PI: Gad Shaulsky, PhD

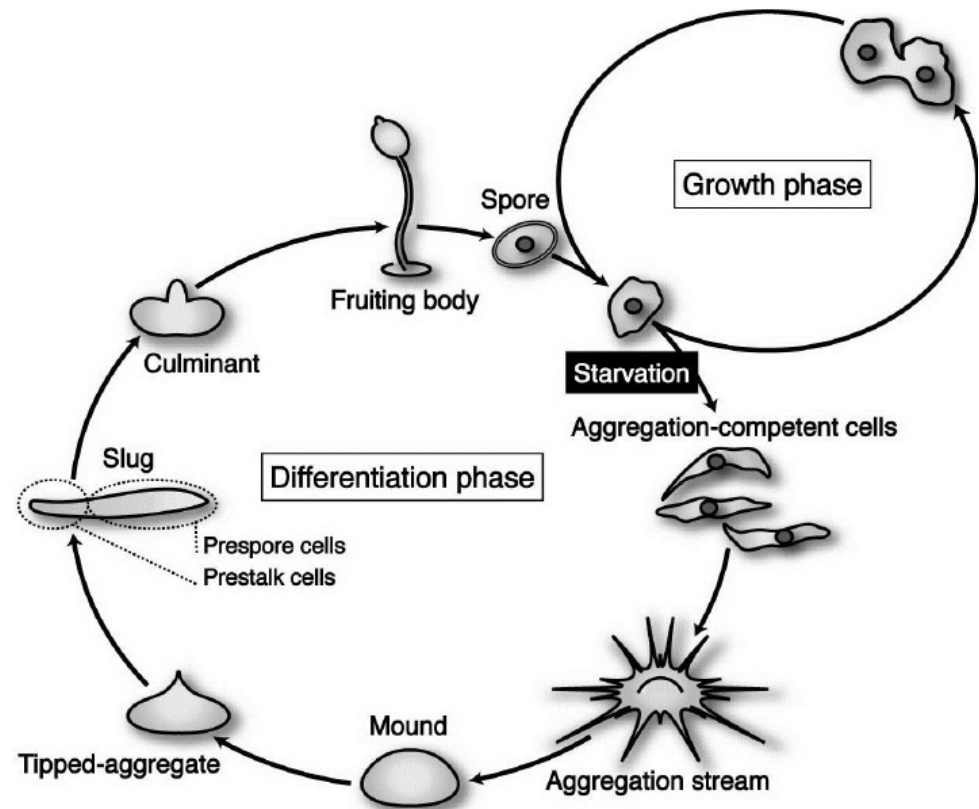
Bench Mentor: Mariko Kurasawa, PhD

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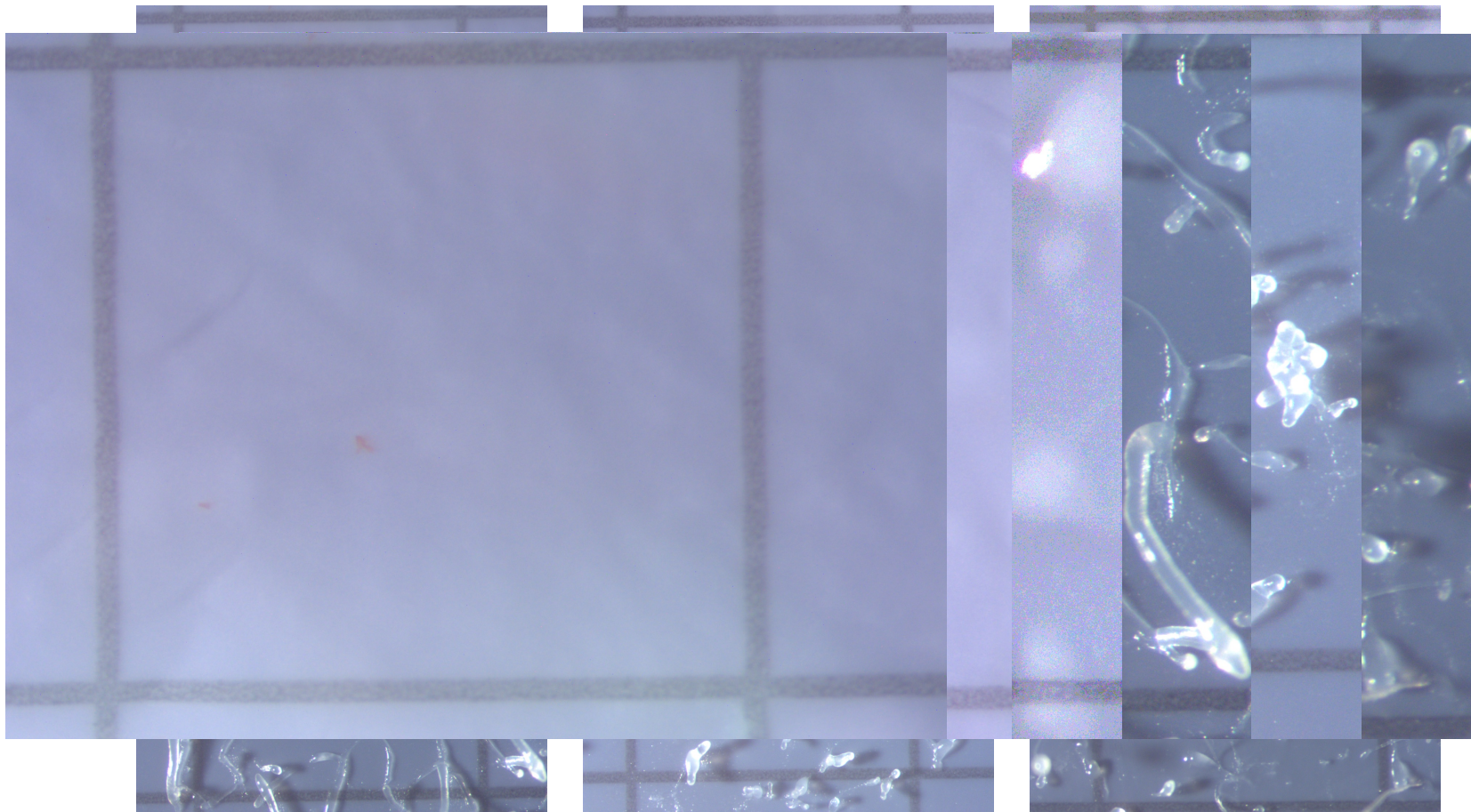


# Introduction

- Morphogenesis
- Availability of a comprehensive annotated database
- Easy to grow



Maeda, Yasuo & Chida, Junji. (2014). 3. 943-966.  
10.3390/biom3040943.



# Chromoprotein

- Homologous to fluorescent proteins
- Absorbs visible light to give strong colors
- Can be used as genetic markers

















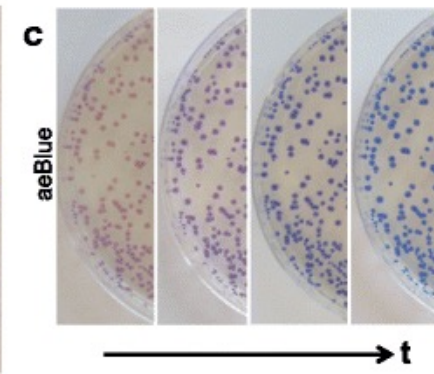
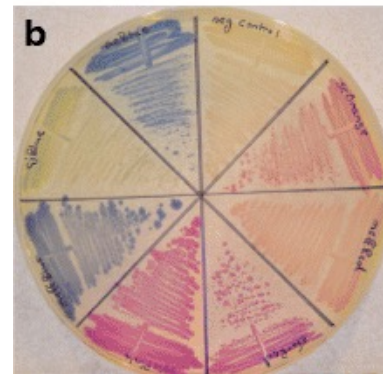
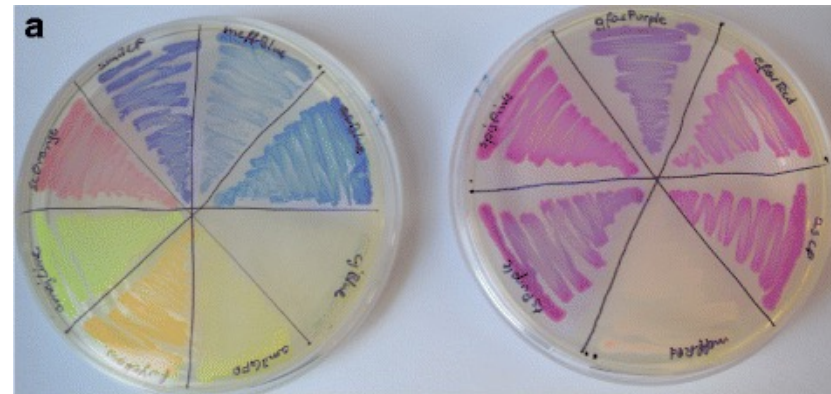
<https://www.southampton.ac.uk/news/2013/01/purple-and-pink-sunscreens.page>

“How the purple and pink sunscreens of reef corals work”

# Color variation in chromoproteins

- Different colored bacterial colonies

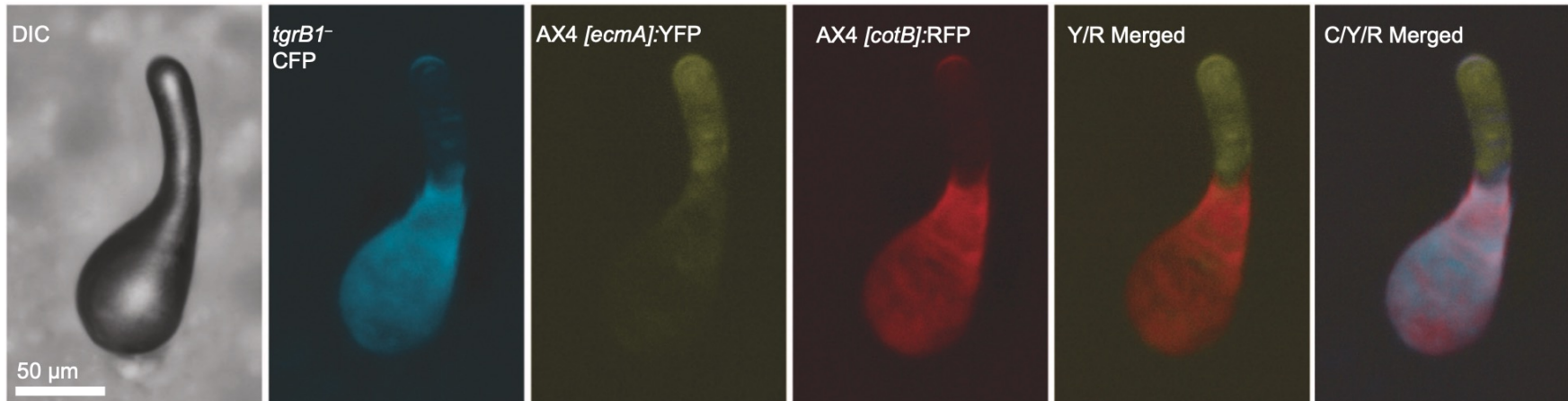
Pellet	Other names	Host eukaryote	Chromophore*	Excitation max. (nm)	Emission max. (nm)
	S meffRFP	<i>Montipora efflorescens</i>	F DYG	560	576
	eforCP	<i>Echinopora forskaliana</i>	H MYG	589	609
	asCP, asFP595	<i>Anemonia sulcata</i>	c MYG	568	595
	spisCP	<i>Stylophora pistillata</i>	L KYG	560	NF
	ScroogeOrange	Synthetic	c MYG		
	FezziwigYFP	Synthetic	L TYG	520	540
	amilGPF	<i>Acropora millepora</i>	F QYG	503	512
	amajCFP, amFP486	<i>Anemonia majano</i>	F KYG	458	486
	S cjBlue	<i>Cnidopus japonicus</i>	c QYG	610	NF
	S Rtns5, NF podilloporin	<i>Montipora efflorescens</i>	c QYG	592	NF
	aeCP597	<i>Actinia equina</i>	c MYG	597	NF
	amilCP	<i>Acropora millepora</i>	c QYG	588	NF
	TinselPurple	Synthetic	c MYG		
	gfasCP	<i>Galaxea fascicularis</i>	s QYG	577	NF



Liljeruhm J. et.al. J Biol Eng. 2018;12:8.

# Fluorescent proteins in *Dictyostelium discoideum*

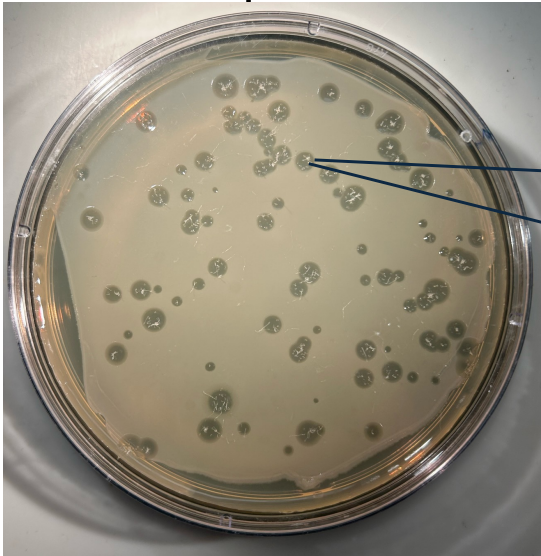
- Observe cell differentiation and behavior with fluorescent proteins



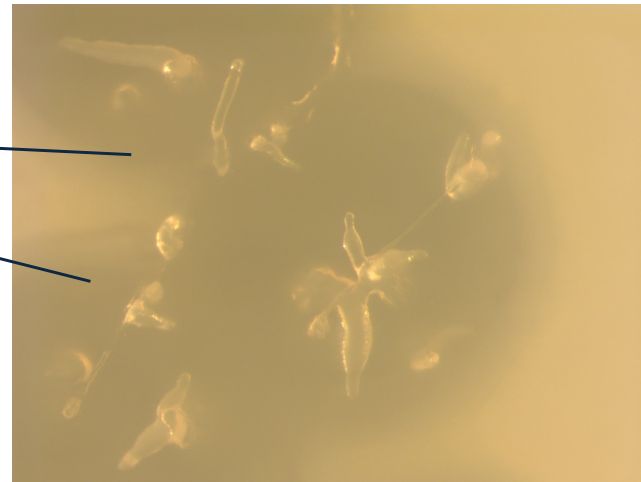
Katoh-Kurasawa M, Lehmann P, Shaulsky G. Nat Commun. 2024;15(1):3984.

# Transformation of *Dictyostelium* cells

- Electroporation for the DNA to enter the cells

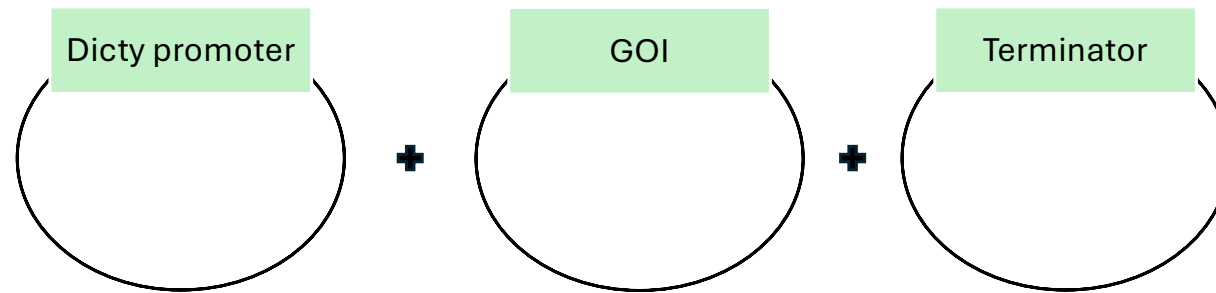


*Dictyostelium* cells with DreidelTeal expression vector on SM plate



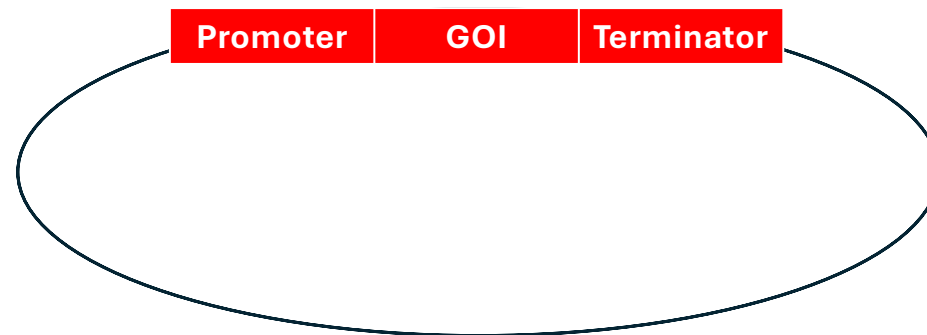
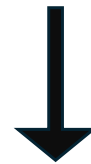
Developing transformed *Dictyostelium* cells with DreidelTeal expression vector

# GoldenBraid cloning system



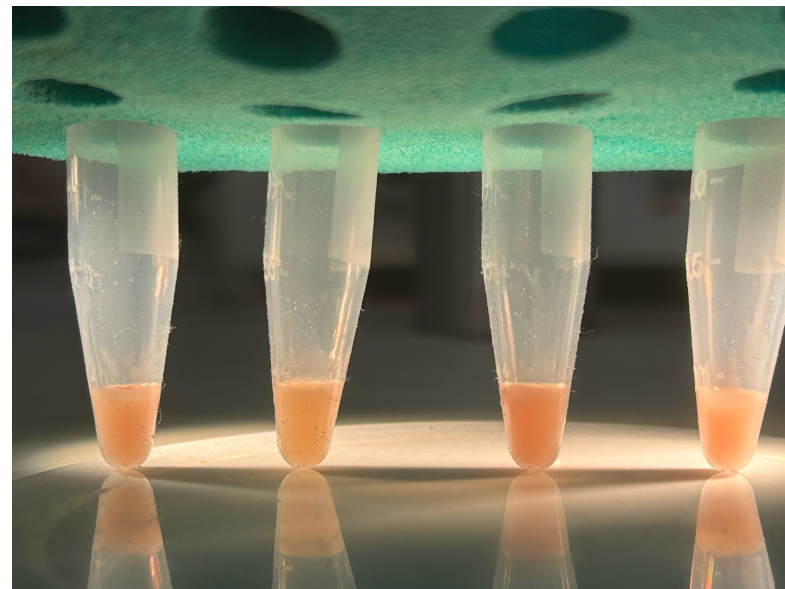
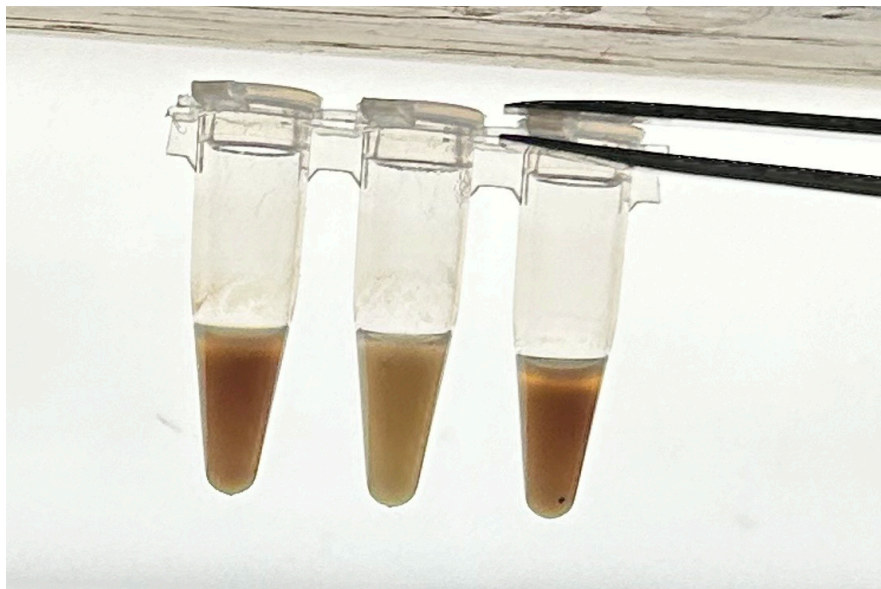
Chromoproteins:

- TinselPurple
- DreidelTeal
- ScroogeOrange



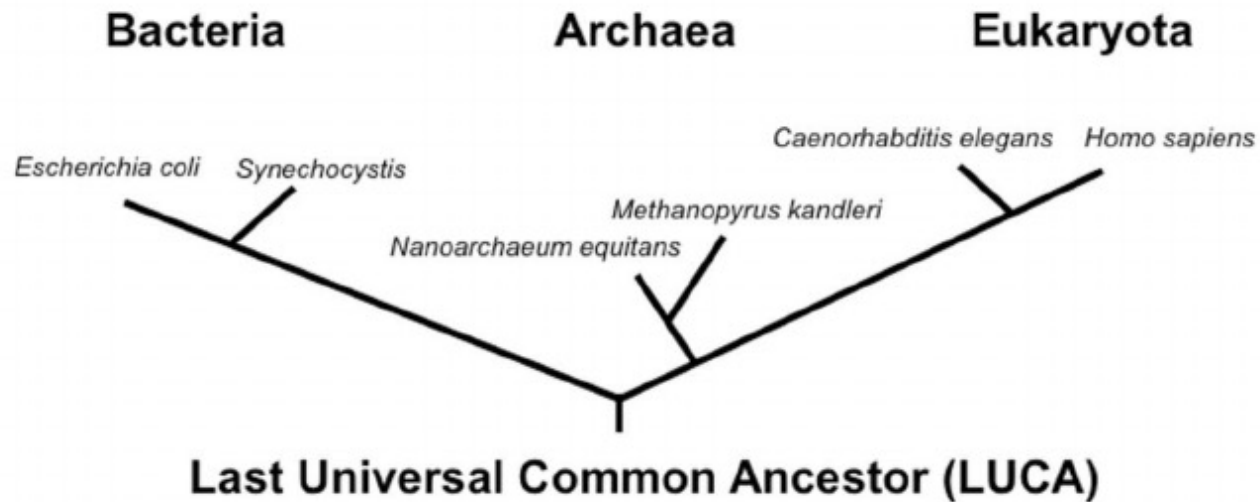


# Centrifugation



# Future















- Expand knowledge of chromoproteins and its functions
- Chromoprotein expression in other domains of life



Fujishima, Kosuke et. Al. (2008). 173. 206-218.  
10.1143/PTPS.173.206.

# Acknowledgements

I would like to thank the Shaulsky lab and the SMART program for devoting time and resources for my growth as a scientist and researcher.

Pellet	BloBrick <sup>16</sup>	Name	Other names	Host eukaryote	Chromophore <sup>a</sup>	Excitation max. (nm)	Emission max. (nm)	Source ref.
 S	K1033922	mefRed	mefRFP	<i>Montipora efflorescens</i>	FYDYG	560	576	2
	K592012	eforRed	eforCP	<i>Echinopora forskaliana</i>	HMYG	589	609	2
	K1033927	asPink	asCP, asFP595	<i>Anemonia sulcata</i>	cMYG	568	595	19
	K1033925	spisPink	spisCP	<i>Stylophora pistillata</i>	LKYG	560	NF	2
	K1033913	scOrange	ScroogeOrange	Synthetic	cMYG			15
	K1033910	fwYellow	FezziwigYFP	Synthetic	LYG	520	540	15
	K592010	amilGFP		<i>Acropora millepora</i>	FQYG	503	512	2
	K1033916	amajLime	amajCFP, amFP486	<i>Anemonia majano</i>	FKYG	458	486	18
 S	K592011	cjBlue		<i>Cnidopus japonicus</i>	cQYG	610	NF	20
 S	K1033902	mefBlue	Rtms5, NF pocilloporin	<i>Montipora efflorescens</i>	cQYG	592	NF	21
	K864401	aeBlue	aeCP597	<i>Actinia equina</i>	cMYG	597	NF	22
	K592009	amilCP		<i>Acropora millepora</i>	cQYG	588	NF	2
	K1033906	tsPurple	TinselPurple	Synthetic	cMYG			15
	K1033927	gfasPurple	gfasCP	<i>Galaxea fascicularis</i>	sQYG	577	NF	2