



# LABY RINTH



COLLEGE OF SAN MATEO • THE WRITERS' PROJECT

ISSUE 2 VOLUME 1

MAY 2015



# LABYRINTH



**Skyline  
Students'  
Collaboration  
Artwork**  
pg. 5 & 22



pg. 7



pg. 16

*The Writers' Project and Labyrinth staff would like to extend our sincere thanks to –*

*The CSM Honors Project faculty, staff, and students, with special thanks to David Laderman and Jennifer Taylor-Mendoza for their continued support of our club and our vision,*

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*and*

*the students who submitted their work to be considered for this publication.*

*Keep writing. Keep creating. Keep learning.*

## Labyrinth Issue 2, Volume 1

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Writing  
Contest  
Winner  
pg.12

# CONTENTS

Letter from the Editor 3 Dee Dee Pickard

## CREATIVE

The Butler Did It 4 Steve Bayne  
Sestina for Dora Maar 7 Lisa Andreini  
A Letter to Injustice 8 Cody Bustos  
Genesis 9 Mondana Bathai  
Luck of the Draw 12 James Hall

## ACADEMIC

Road Movies of the 1970s 14 Andrew Jittasaad  
The Rebirth of Science Fiction 17 Divyashish Kumar  
Cellular Mechanism for Counteracting  
Protein Misfolding 19 Eric Wong

# Letter from the Editor

As another academic year comes to an end, I can't help but think about transformation. The same thing happens each spring; I start to feel the excitement of another radiant summer, and I start to notice all the small ways in which I'm not the same person who ventured into a fresh, fall semester. Looking back on my academic experiences gives me a nostalgic sensation much like the one I get when I thumb through the pages of our little publication. Each issue of Labyrinth tells a story of creativity and endurance, and I can't express how much I admire the people who work to make a masterpiece from the hundreds of rough art and writing submissions we receive.

Recently, the editorial staff, along with members of The Writers' Project got a chance to meet with students from each of CSM's learning communities at our spring mixer. Members of Puente, Writing in the End-Zone, Umoja, Pathway to College, and Project Change recounted what makes their programs unique and gave accounts of the personal transformations experienced in these diverse communities throughout the year. Listening to these stories, I recognized how important it is that they are shared — not just for the sake of the listener, but for the storyteller, whose narrative affirms her or his transformative victories.

The staff of Labyrinth is privileged to offer you just one of the concurrent narratives told on the SMCCCD campuses and grateful to you, our readers, for allowing us to showcase the fruits of our academic and creative transformations.



Dee Dee Pickard  
Editor in Chief

## LABYRINTH

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**Yin Mei Lawrence**

# CREATIVE



*Patterns in Still Life* by Christian Petty **p.6**

Chapter Two from the novel *Genesis* by Mondana Bathai **p.9**

Creative Writing Contest Winner: "Luck of the Draw" by James Hall **p.12**



*Untitled* SHERRIE BAYER

## The Butler Did It

by STEVE BAYNE

"The butler did it. Has to be, right?"

"Geez, Bukowski, let's get there first," I say as I close the door to the car and start it up. I prefer driving and I think this bothers my partner. *To hell with 'im though, I'm senior.*

"I'm just saying, it's always the fuckin' butler." He grins and I'm not sure if he is messing with me or not.

I've been on the force for 17 years, a detective for 12 of them and I can tell you one thing for sure – despite all the terrible cop shows or mystery novels saying otherwise – it's never the damn butler. Of course, I can't recall a case that ever had a butler even remotely connected to it, but it's 2013... even in Beverly Hills, who the hell has a butler anymore? "Don't be an idiot, Bukowski."

"All I'm saying is that it's on Mulholland Drive. If there is a butler in L.A. County, it's there." Mark Bukowski is my partner and, while he is new to being a homicide detective and new to me personally, he isn't exactly a rookie. Four years on the streets as a beat cop, two years in narcotics and a good service record meant that he was ready for this assignment. Maybe I was getting too old for the wave of new young cops, but he could sure piss me off sometimes.

"You can make your grand pronouncement when we get there. For

now, sit tight and don't roll down your window. I've got the air-conditioning on."

He mumbles, "Sure, Rogers," like he's heard me, but I have my doubts. He's looking out the window and, even behind dark sunglasses, I can tell he's not paying attention to me. I'm telling you, kids today...

• • •

The crime scene is a big house – from the outside I'd say it's something crazy, like 15 bedrooms. I compare it to the modest three bedroom I share with Cynthia, my wife, and seventeen year old son, Doug. Or, as my wife says, while I own the house, it's really theirs and I get to sleep there when I'm not married to my job. My wife is an alright lady, but like all women who are married to a cop, she knows I have two wives. I guess she accepts it as best she can.

None of that concerns Bukowski though and he gives me a look like "I told you so" when he sees the house. *Yeah, we'll see,* I gesture and look back at him. I'm still a skeptic.

Office Reynolds greets us and lifts the yellow crime scene tape. "What we got here, John?" I ask him. I've known him over 10 years and together we've seen dozens of dead bodies over the years. It loses its luster pretty quickly.

"Good to see you, Lou," he grunts and continues, "Looks like a heart



*Exquisite Corpse* KALEA YOUNG (large), GARRETT LEW, NADINE MOREY, NANCY RUSSELL, BARRY WONG, GENALLY DAVID, GALE FRANCES, DENNIS GARRIDO, SIDNEY H. LIKWONG, JAMES RODRIGUEZ, JOSEPH PASCUAL, GIAN MONTES, YASMINE BANIHANI, JUSTIN De GUZMAN

attack, but it could be poisoning or something.” He looks down at his notes and reads them off mechanically. “Got on scene about 20 minutes ago and talked to the owner. Larry Madison. Lived here for 14 years. In the *cement business*,” he glances up and raises an eyebrow, but I don’t say anything. Not everyone in construction is in the mob, you know. He’s just joking anyway, probably.

Bukowski doesn’t take the bait either; he just takes off his glasses and rolls his eyes.

“Get to it, John,” I say. “Who’s the vic?”

Reynolds grins and continues from his notepad. “Mr. Madison says he returned home from shopping and found his wife, Helen, in the kitchen. She wasn’t breathing and he tried to resuscitate her, then calls 911. Ambulance got here before I did, but she was DOA. Me and Clark talked to the neighbors on both sides; they didn’t hear or see anything. We’re canvassing, but for something like this...”

“Yeah, probably not gonna have anything for us,” I complete his sentence.

Maybe Cynthia is right – in this cop world, is John my second wife? “The husband’s story?” I ask.

“Checks out– he has a receipt from Tiffany’s that is about 40 minutes before the call. We’ll have to wait for the M.E.’s report, but the paramedics said she was pretty cold and probably been dead for hours.”

“So he killed her and then went shopping.” Bukowski decides he’s gonna contribute. It was a good point, but he said it like he had solved the case.

“I thought the butler did it,” I say sarcastically.

John doesn’t know how to respond to me – I’m not usually like this, but Bukowski really gets under my skin sometimes, even for the smallest stuff. Instead, he tells my partner, “He says he was at work since six this morning and got off at around five. I’ll let you two do the detective shit and check that out.”

“Anyway, no signs of a struggle. Since she was dead when they got here, they didn’t move her, so she’s still face down in her breakfast.”

“Ok, let’s go check it out.”

When we get inside she is just as Reynolds had said, face down in her sausage and eggs with spilled coffee all over the table and floor. I would guess she’s in her 40’s, not bad looking, but not a trophy wife. Pretty dressed up for breakfast, though.

The coroner is taking pictures and there is not much to see, so we go talk to Mr. Madison.

Right off the bat Bukowski asks, “You have a butler?” It is hard to tell if he’s being serious or a deadpan comic, but Madison takes him at his word.

“No...well we did sort of, but he died about four months ago. Didn’t take good care of himself, smoked and such. He died while visiting his sister in Oregon. Heart attack...why do you ask anyway?”

“No replacement?” *Jesus, give it up Bukowski*, I think, and shoot him a glance.

“No. We found that we could get by without him and it seems a bit inappropriate what with all the suffering and unemployment out there in this economy these days.”

“I see. Yeah, hiring people when there is unemployment is pretty

*impolite*.” With that, I decide two things; one– to apologize for my partner’s rudeness, and two– to chew him out later for being an asshole.

Bukowski ignores me though and, before I can say anything, continues, “Well, if it isn’t the butler, then it’s got to be you, right?”

“What?” Mr. Madison is taken aback and stumbles over his next sentence in disbelief. “Are you saying someone killed her?”

“Well sir,” I say to calm the situation, “we don’t know yet. But we have to go down every avenue and, if your wife was killed, most murders are committed by someone that the victim knows. We are just trying to rule people out at this time.”

He calms down a little, but he’s still unhappy. “Fine, but I don’t know anyone who would want her dead.”

“Anyone else live here?”

“Just my son, Henry, who was at school all day,” he says.

Fifteen bedrooms – probably—and three people live here. *This is strange*, I think, but I let it pass. Rich people do bizarre stuff that doesn’t seem unusual to them at all. “How long have you been married?”

“17 years”

“How’s the marriage been? Any trouble?”

“Not really,” he says, but I think he looks uncomfortable, so I press.

“Not really is not exactly a ringing endorsement for 17 years of marriage, is it?”

He stammers, but eventually comes out with it. “The marriage was fine, but about a year and a half ago Helen lost her job. There aren’t any money problems – my business pays our bills – it was just something she did to pass the time.”

“What did she do?”

“She was a bookkeeper. I didn’t realize it until later, but I guess a lot of her identity was wrapped up in what she did. When she lost that job, she fell into a pretty deep depression.”

“Any chance she could have done this to herself?” Bukowski asked and it seemed reasonable enough. When people off themselves, sometime they get all dressed up and have a nice meal. Usually they leave a note though.

“I really doubt it. She actually had an interview at eleven and seemed really excited about it. I hadn’t seen her that happy in months really. I’m not someone who is real big on psychologists,” he shrugs and looks down on the marble entryway floor. “She switched to a new doctor a few months ago, but it wasn’t really helping. Niles – our butler – who never cooked before she lost her job, recently took to making her sausage and eggs every morning just to get her out of bed. That didn’t help either. She hardly ate and was constantly tired.”

“But she was alert this morning?”

“Yes,” he beams, probably at the last thought of his wife finally being happy, before his lip starts to curl and he fights off the redness in his eyes.

“Was it something she did this morning or did she just drink a lot of coffee?” Bukowski always finds a way to be a jerk, I guess.

“No, my wife doesn’t drink coffee. She probably doesn’t even know how to make it.”

Bukowski and I immediately look at each other. “Did you have coffee

this morning, sir?" I ask.

"No, neither of us are big coffee drinkers. We do have it in the house because Niles drank it. He even tried to get Helen to drink some to get her moving. I think he might have showed her how to make it, but I never saw her actually drink it."

"She was drinking it this morning." Bukowski is always deadpan and I'm starting to believe it's a strategy rather than dickishness. "Didn't you notice that when you tried to resuscitate her? It was all over the table and floor."

He pauses and seems pretty shocked. "I didn't see what she was drinking. I just checked her pulse. I don't know CPR or anything, so I didn't move her."

"Probably the medics knocked it over when they came in...or you people."

I make a mental note to ask around about that, but Bukowski is already going back to the butler. "Were Niles and Helen close?"

"Not really. Well more so lately I guess. See, I've had Niles in my life longer than my wife. He took care of my mother when she was sick. He used to be a nurse, doing in-home care. He took care of my mother; she fought cancer on and off for nearly 15 years. We got along so well, I asked him to stay. Really, he looked after me as much as he did my mother before I met my wife." He pauses, like he's turning something over in his head. "I think he got jealous when she started taking up more and more of my time. You know, I've known them for near 40 years combined and now they are both gone." He rubs the red from his eyes and I'm pretty sure he's not faking it.

"Still think the butler did it, Bukowski?" I snicker as we drive away.

• • •

Despite my insistence that we wait for the M.E. to tell us the cause of death, Bukowski is impatient and wants to get a move on, so the next few days we get around town. What we get is a lot of nothing. The Paramedic admits knocking over the coffee. We confirm that Mrs. Madison had an interview at an accounting firm downtown. Mr. Madison's alibi works out – meetings all day starting at seven-thirty. Every teacher backs up that Henry was in class starting at seven. I'm pissed 'cause I hate wasting time, but I remember being a newbie on my first murder case, so I let it slip by without complaint.

We found something interesting when we went to Hardy and Son's Electronics, where she used to work. At first they clam up thinking we were auditors or something, but when we explained that we're homicide, they split open and start babbling. After they laid her off, the IRS started looking into their business and they wondered if the same could be said about Mr. Madison's business dealings. She must have done his books too, right?

• • •

It's two months later, when the IRS calls me to say that Hardy and Son's was cleared of wrong doing and Mr. Madison's business was clean that I finally accept that this is another dead end. I tell Bukowski, but he never bought into that in the first place and is not surprised. As he sits down, the phone rings; the M.E. finally has finished her report.

It takes us about ten minutes to get to the coroner's office, which is six floors downstairs. "We're gonna be best friends, Lou," is the first thing, medical examiner, Cathy Limpsky says.

"Tell me you know who killed her."

"Well I can't do that, but I can tell you what she died from."

"You're paid to do that. Friendship can't be bought you know."

"That's not true. But I can do one better. I know why she died and what caused it. I found high levels of Sertraline in her system – Zolofit is the name you probably recognize. Probably twice the normal dose. That isn't uncommon and

it isn't what killed her. Well, not exactly. She died of a stroke caused by a hypertensive reaction." She snaps her fingers. "Boom, she's done."

"Reaction? To what?"

"Mixing Zolofit and foods high in the amino acid tyramine can cause a reaction that gives you a stroke or heart attack."

"Time?"

"I'd say around 10 or 11 a.m. Do you know what she ate for breakfast?"

"Uh," I check my notes. "Sausage, toast, and eggs."

"And coffee," Bukowski chips in.

"No wonder," Cathy says. "With the higher dose of Zolofit and sausage, and if the eggs had cheese, both are high in tyramine. And, if she liked her coffee strong, that's probably what did it."

Bukowski looks sad; his first murder investigation is really an accident.

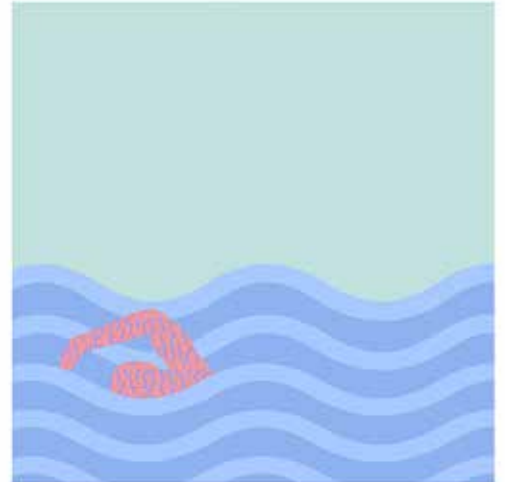
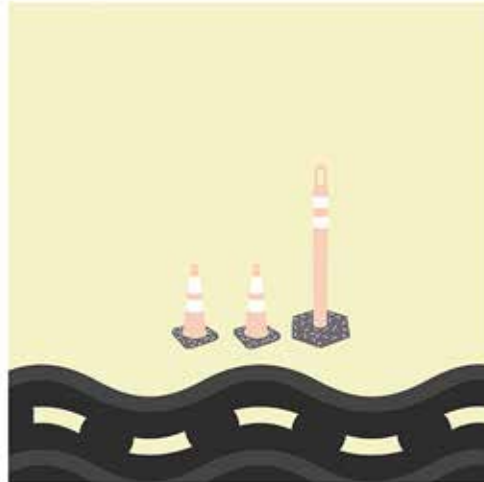
It's not for about a half-hour that we return to our desks when Bukowski pipes up. "Hey, wasn't Niles a nurse? Shouldn't he have known? Didn't he start cooking her breakfast?"

"I know what you are thinking, but the butler didn't kill her,

Bukowski." I say, but suddenly I'm not sure I believe that.

"Well, consciously or not, he tried to. Being a nurse, he probably knew just what to do. He volunteered to make her breakfast, when he *hated* her, yeah?" He broke into his best snooty English accent, "Extra cheese on those eggs, madam? Extra sausage this morning? You have to eat up! And how about some coffee?" He grins at me like he's won the argument. "She wants to be at her best at the interview this morning and so she decides she'll have some. Probably popped a few extra Zolofit too. Remember, he taught her how to make coffee – probably extra strong coffee just to make sure."

"Ok, Bukowski," I allow, "The butler did it." *Damn it, I think, maybe he did.* ■



## Sestina for Dora Maar

LISA ANDREINI

If Dora Maar had been forced into housekeeping  
instead of living out a domestic drama  
with an industrious and mercurial Spaniard,  
she would not have become Picasso's "weeping woman."  
She would have been trapped in a soap bubble,  
not immortalized as an artist.

Before she met Picasso she was a famous artist.  
Looking with gimlet eyes at the housekeeping,  
her untidy world, reflected in a bubble  
of gritty brown, amplified the drama.  
In her new context, she was a sterile woman,  
toiling under the hypnotic gaze of the Spaniard.

Under the intolerable scrutiny of the Spaniard,  
negative and positive space belonged to the artist,  
but photography supported her status as a woman.  
The dust bunnies summed up the housekeeping.  
The battle over accomplishments dwelled in the drama  
of the jilted one who resided inside the bubble.

Her depressed world was encapsulated in a bubble  
reflected in the slashing eyes of the Spaniard  
who cultivated magic, envy, and drama  
not just in Dora, but in every artist.  
The constant slog of housekeeping  
propelled Pablo to Marie-Thérèse, the pregnant woman.

Dora didn't feel she was less of a woman.  
She hoped that closing the blinds on the bubble  
would obscure the new housekeeping  
arrangements Marie-Thérèse had made with the Spaniard.  
She could never forget that she was an artist  
as well as an actor in the drama.

There was no clear path out of the drama.  
One day Maya, daughter of Marie-Thérèse, will be a woman.  
If she's lucky she'll be an artist  
floating and dipping on a thought bubble  
while the new mistress and the Spaniard  
find a fresh place to set up housekeeping.

Dora was a fervent artist tethered to a bubble  
wrapped up in the drama of the weeping woman  
with an egotistic Spaniard pursuing women to set up housekeeping.



# A Letter to Injustice

CODY BUSTOS

I often wonder...

I wonder about everything from my bad luck to black holes  
sometimes I wonder if these two are synonymous  
I wonder about the existence of a God, or lack thereof  
other times, I wonder where I may find my next kiss  
I wonder if I'll ever get to meet Bob Dylan or Richard Dawkins  
and even though it's too late for Johnny Cash and Christopher Hitchens

still, I wonder

As a child I once wondered if we were the lost civilization of Atlantis, and  
the blue sky above us were the oceans and the clouds were the  
crashing of waves.

I wonder if I'm the first person to realize that if Albert Einstein had a son  
named Frank

Then his name would be Frank Einstein!

I wonder when the next time I'll laugh so hard I'll wipe tears from my  
eyes

but sometimes, I wonder about the many who have cried so hard they've  
wiped the hope from theirs

I wonder when the free world will wake up and smell neither the roses nor  
the napalm, but the toxic smell of hot plastic as the minds of many  
are molded into one

I wonder if it's possible to carve that silver lining from around even the  
blackest of clouds and melt it down into a single round as I set my  
mark on the mechanical heart and fire

I wonder if the gears would slip and the springs would fall free  
like confetti thrown down from one thousand story buildings over the  
motorcades, as the voices of a species rejoice in parade  
relishing in the return of justice from a war nobody thought would end  
and in my wondrous state of thought my wonders now wonder...

If I'll ever cry for anything this beautiful again

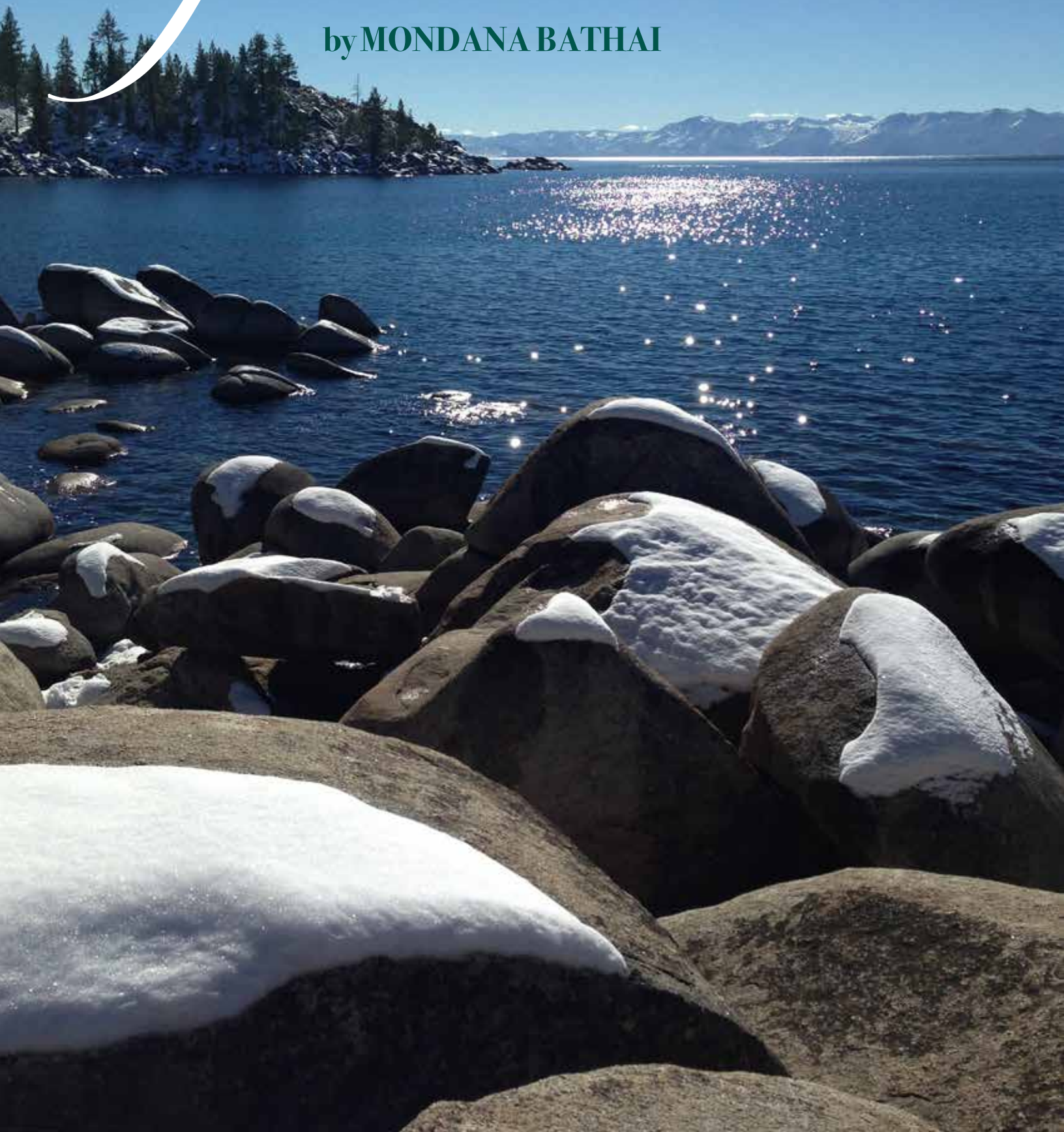
so let's put down our victory gin aged 30 years to perfection  
yes I know 1984 was a good year, but according to the surgeon general,  
it's the leading cause of mind control.

instead I propose we raise our glasses and  
drown ourselves... in wonder.

*Lake Tahoe*  
CESAR GUERRERO

# Genesis

by **MONDANA BATHAI**



# Chapter Two from the novel *Genesis*

## *One Year Later*

"You're dead." Eric Cauldman said. The young woman in the driver's seat of his vehicle considered his words.

"Well, I'm not alive." Her voice was beautiful. His gaze darted around, taking in the passing streets, the locked door, and her face.

"Am I dead?" he wondered aloud.

"Not yet. And while you're still here, I'd like your assistance on a very private matter." She applied more pressure to the accelerator and Cauldman could feel his palms sweat. "I trust I have your discretion?"

"For God's sake, woman! You've taken me hostage in my own car." He clutched the chicken strap as they weaved through traffic. She increased their speed and barely avoided sideswiping several cars. "Alright, damn you. Just don't hurt Bess," Cauldman said through gritted teeth, one hand smoothing over the assortment of controls between their seats. He pressed one of the buttons, and a cool current immediately filtered into the car. The scent of old leather and car freshener covered the smell of his own sweat, and he wiped his hands down the front of his pants.

It had been a year since Cauldman had seen his coworker Jude. After very silently turning in his resignation, Jude had just as quietly cleared out his office and moved. He'd left messages with his friends and family, assuring them all that he was better off leaving, but no one could say where he'd gone to. Most speculated that Jude had been wooed away by a rival conglomerate interested in android



*Untitled* FRANK McSHEA

He cleared his throat as she slowed Bess to a normal speed. "What do you want, Esther?" His eyes narrowed. "And how are you alive? I went to your funeral three years ago. Do you know what it did to Jude when you died?"

"Better than you know." She pulled into a familiar neighborhood, where larger houses lined the streets, and the blooming lawns were trim and tidy. Cauldman eyed an older woman weeding her garden, wondering if he could signal his distress to her.

"What do you want, Esther?" he asked again. His career was at a standstill, his divorce had been finalized, and his balding was getting worse by the day. Now he was trapped in a car with his missing friend's dead wife. This was too much. "And where the hell is Jude?"

They pulled up in front of one of the family

She was beautiful, with her dark hair and green eyes. Even though their features were similar, he couldn't remember if Esther had looked quite like this. There was something almost frightening about her. Too perfect.

"All right," he said. "You have until the count of five to tell me what the hell is going on before I call armed forces." Bess might have been an old car, but she was riddled with new tech. He'd never been able to resist upgrading his mechanics.

"You don't want to do that." the woman who was not Esther said, calmly. He couldn't read her face, but she seemed to be studying him.

"One."

"You're going to step out of this car and walk into Jude's house."

"Two."

"You won't enjoy the alternative."

"Three." He pressed one of the smaller buttons between their seats. A dinging noise sounded from the car's surround sound system. Any second now, he'd be connected to the conglomerate's forces.

A sad tune began to pour into the car. A young girl's voice came on as the music continued to play in the background.

"Remember that time I told you I'd reprogram Bess if you missed another of my dance recitals, and you told me it wasn't doable because Bess' mechanics are too complex for an eight year old? Well, guess what? I did it! And now you know. Your child is a genius. Not sure what this button was for, but I bet you won't forget my next recital. Oh, and mom says drop dead. Love you!"

Cauldman looked at not-Esther, and she looked back at him with a raised brow.

He scrambled for his phone and her hand came up to wrap around his throat. The last thing he was aware of was the strength of her grip.

When Cauldman came to, he was slumped on over in a chair. His head felt as though someone was taking a hammer to it.

---

THERE WAS  
SOMETHING ALMOST  
**F R I G H T E N I N G**  
ABOUT HER.  
TOO PERFECT.

---

development.

Losing a genius is a hard blow for any business. When your company belongs to the city-state rule of one of the most powerful conglomerates on the continent, then it's a crime.

Cauldman doubted Jude would willingly leave in the middle of a project as big as the one they had, but what did he know?

Staring at Jude's dead wife, Eric found he had a couple more questions for the absent genius.

sized houses. Cauldman remembered all the parties he'd been to at this house, all the celebrations and overnight work sessions. He also remembered all of the times over the past year he'd driven by or knocked on the door, only to hear the electronic house answering service. No one had been home.

"First thing you need to know," the woman said as she parked Bess and turned to face Cauldman. "I'm not Esther."

Cauldman studied her expressionless face.

“As soon as you’re able, we’ll get started.”  
That blasted woman’s voice!

He was surrounded with lab equipment, similar to the things found at his work, but these had a homemade quality to them. Diagnostics computers and complex tools were scattered everywhere. The room was extremely well lit, and the walls were a glowing white. He remembered this place.

Almost every major engineer had their own at home lab. It was necessary both for work and for the sake of sanity. Cauldman had his own lab, which he’d proudly built and put together himself, but he’d remembered the awe and intellectual jealousy he’d experienced the first time he’d seen Jude’s lab.

“You knocked me unconscious,” he said in disbelief.

The woman who’d kidnapped him was watching him from the far side of the room. She’d turned on some of the machinery and was in the process of placing electrode patches on her temples.

“I told you you wouldn’t enjoy the alternative. Perhaps you’ll listen next time.”

Cauldman jerked to his feet, one hand on his head to keep it from falling off. “No next time. I’m getting the hell away from you, you lunatic!”

He didn’t see her move, but she was suddenly standing right in front of him.

“Stop,” she said. “I won’t hurt you unless you make me.” Her expression tightened for a moment. When she spoke again there was some kind of emotion in her voice. “I need your help.”

Cauldman was still frozen from her sudden teleportation. How had she moved so fast? He studied her, her words beginning to register. “For the last time, where is Jude? And you better tell me what’s going on this time.”

She stepped away from him and went back to the machinery. At a very slow and measured pace, Cauldman noted. Picking up a small computer, she began to enter something into the screen.

“When Esther died, Jude went mad,” she finally said.

“Yeah, we all saw it. He wasn’t all there at work. Corporate bent over backward to get him to take some time off.” He shook his head. “Genius boy.”

“He spent a lot of time here, in his lab,” she continued, turning to press a few buttons on one of the larger diagnostic computers. “And during all of that time, he completed Project Genesis.”

Cauldman stood straighter. “Completed? That’s not possible. Genesis was a failed concept. We couldn’t manage full functionality in any of our advanced models.”

She sighed. “He did.”

A chill crept up Cauldman’s spine at her words, and he regarded her carefully. “And where is this android?”

She looked at him.

He swallowed hard. “And where is Jude?”

Her face twisted into the first emotion he’d seen from her.

Cauldman cleared his throat and looked her over. She was perfect. Envy and elation warred in him, mixed with a good bit of fear. Jude, what the hell have you done?

“So what do you want with me?” He stared hard at her face.

She stared back, cool and composed once more. “Jude was in process of giving me a new set of upgrades before he disappeared. I need you to finish running those upgrades.”

Cauldman eyed her skeptically. “You look fine to me. Are these upgrades necessary?”

Her jaw clenched, and a small tool in her hand broke. She set it aside before answering. “The downloading process was interrupted.”

“I still don’t know why this is my problem.”

She glared at him.

“Jude tried to shut me off during an upgrade. He knows better than that.

When I recovered, he was gone.”

“Jude’s been gone for a year now.”

Cauldman shook his head and shifted towards the door. “It’s taken you that long to grow concerned?”

She scowled at him and placed her palms flat on the table in front of her. “His being gone from your life wasn’t a concern to me. We decided it would be best to leave this city, and anyone who might have been able to recognize me as Esther.” She picked up a controller and continued speaking, staring down at the screen. “He went missing from our farmhouse a few weeks ago.”

She didn’t seem to be doing anything with the small controller, just staring at it. Cauldman cleared his throat and took a step toward the table. He looked over all the instruments and machinery with new eyes. “So Jude ran away. Maybe he needed to get away from you.” He reached out to run his fingers over the buttons on one of Jude’s custom monitors. “Why does this matter to me?”

“Because I’m malfunctioning,” she said tightly. “And if you don’t help me fix my programming, the people you care about may suffer the consequences.”

“Are you threatening my family?” he said in equal parts anger and disbelief. She watched him from across the table, silent and still. He could feel



*Untitled* MICHELLE CHAN

the hair on the back of his neck stand on end. This thing was not human.

“Fix my programming, and you’re free to go,” she said. “Refuse, and your daughter might not make it to that next recital.”

Hot, helpless fury rose in him. He stared into her assessing gaze and felt a cold certainty take hold.

“Show me Jude’s notes,” he said grimly. ■

# Creative Writing Contest

Congratulations! James Hall's "Luck of the Draw" was selected by Labyrinth editorial staff for his response to our prompt: **"The asteroid was hurtling straight for Earth..."**

## Luck of the Draw

by JAMES HALL

I've never considered myself a lucky person. I've never won anything or been picked for anything in life: No raffles, no lotteries—not even a scratcher. So it really came as a surprise that my number, one amongst several hundred million, got selected. Once having accepted that I was ready to die, I found new hope that I could survive this . . . nightmare. Parked on the side of the road in a car that looked like it had reached its limit on usability, drained of the adrenaline rush that had coursed through me, I thought about how not a few hours before I found out that there was an asteroid hurtling straight for Earth.

### Day One

The service was terrible, the people were rude, and the air smelled of garbage; it was any generic diner you could find in Staten Island. I was playing with one of the small creamer cups when the news flashed on with those gut-dropping siren sounds. A man whom I had never seen on the news was being broadcasted, but he didn't look or act like a normal news anchor. He was very close to the camera, holding a small sheet of paper in his hand.

"I have been instructed to read this to you, the general public, before this broadcast will be shut down forever. I will read off one-hundred Social Security Numbers. If you are watching this, and your number is read, please report to Cape Canaveral Air Force Station in Florida within the next seventy-two hours. The first number is: two-five-seven..."

I didn't understand what was going on. It was completely unusual for this type of broadcast, and the way in which the news anchor spoke was unnerving. The numbers quickly began to sound very chant-like. I also noticed that the numbers were scrolling at the bottom as he read them off, but something else was bothering me more than what the news anchor was saying. I could see parts of the sets that were usually not in shots, such as other cameras and prompters. Whatever was happening right now was something that was

not supposed to be happening under any normal circumstances. I started to grab my coat and make my way to the door when nine numbers, spoken just in the right order—like a combination to a lock—stopped me in my tracks. I turned around and saw the numbers scrolling across the bottom of the screen: They were *my numbers*. I blanked for a moment, only to be jostled by a passing customer who was too impatient to ask me to move. I corrected myself and made my way to the door. As I exited, the last thing I heard the news anchor say was, "Get to Cape Canaveral and Godspeed."

I was just about to get into my car, when the loudest sound imaginable went off through the air, startling me and causing me to drop my keys. The New York City Raid Sirens blared loudly, repeating its message three times: "Please find underground shelter. This is not a test." I reached for my keys, hopped in my car and began to drive to Goethals Bridge, which was the fastest way to get to I-95—the fastest route to Florida. Having only a few more hours of sunlight, I had to get the lead out if I wanted to make it in time.

It was around midnight when I got to Washington DC. It was very easy to see it in the night sky, as most of it was on fire. I kept my distance from the main buildings by driving on the outskirts through the suburban areas. I turned on my radio, which was previously not picking up any stations, hoping I could make sense of what was happening. Nothing. When I looked up from the radio, my heart stopped and I slammed on my brakes. Hanging from the stoplight at the intersection up ahead was a body. I sat for a few seconds before I began to pull up closer to see if it was real. It was a man in a business suit, but there was a large piece of wood hanging looped through the noose that strung him up with writing on it: *Lucky #74 gets a front-row seat for the asteroid extravaganza! Doomed - 1, CT - 0*. It must have been one of the hundred people from the drawing. I guessed two people from each state were selected to go down. What was this asteroid spoken of? There was movement in the corner of my eye. A large man started to walk towards my car, armed with a large baseball bat. I turned off the radio static just in time to catch what he was yelling.

"Do we have another winner of the lottery? Well, isn't it just our lucky day? We've got plenty of rope and more than enough room for you next to Connecticut here. Do you think you will really be saved from that asteroid they say is heading for us? Think again! Now, which state are you from—"

*A Collection of Vegetables* JH



Giving no time for him to close the distance between us, I stomped on the accelerator and pulled forward, only to be stopped immediately, slamming my head on the steering wheel.

“Did you think we would let you go that easily? My boys got you chained down, and you ain’t going anywhere!”

I looked up in my rear-view mirror and saw two guys standing a few feet behind my car, next to a large tow truck. Trying to think quickly, despite what my throbbing head wanted, I popped the car into reverse and accelerated backwards towards his goons. The car kicked up as a corresponding scream came from my left side. The car stopped with a loud thud as I smashed into the truck. I popped it back into drive, and accelerated over the guy, this time with no vocal response. There was a loud tearing sound followed by a loud pop as the bumper ripped off the car.

Speeding down the dark suburban streets, a bright light flooded my car from behind. The guy with the bat and his other goon were in the truck behind me, and they were closing the distance very quickly. Trying my best to lose him, I made sharp turns down streets that all seemed identical. Not being able to turn as sharply, they crashed into parked cars, allowing me to gain some distance from them. When I got enough distance, I turned off my headlights and turned quickly down another identical street. I parked in an unoccupied driveway space on the corner, hoping that with them trying not to smash into more parked cars that they would not spot me. As they side-swiped a black SUV, they accelerated forward—their red taillights fading out as they drove out of eyeshot. I backed out, turned onto a road going the opposite direction, and made my way towards the freeway.

Most gas stations along the way were unoccupied. Since I’d worked at one for most of my early twenties, I knew how to override fuel lock-outs, allowing me to fill up my tank, plus two five-gallon containers that I threw in the mostly destroyed trunk which I managed to fasten down with some rope. I was running on fumes, physically, at this point, so I decided to find a nice secluded place to rest up. Holly Hill, SC, or so the town sign said, seemed like



*Untitled* LESLIE LOPEZ



*Dismantled Songbirds* JACKI RUST

a place where not much would happen while I slept. I pulled onto the side of the road out of sight, and slept. *Six more hours of driving, and I’ll be where I need to be.*

• • •

As I pulled up to the gates of Camp Canaveral, my stomach dropped. There was a large plume of black smoke not too far off in the distance. I drove up to what seemed to be the headquarters of the place; I could not believe what I saw. Spray painted in large red letters read: *We All Survive, Or We All DIE!* It was only then that I got a good look around me. There were bodies littered everywhere. I hoped someone was alive to tell me what was happening. I went inside, hoping something would draw my attention. I found some official looking offices off in one of the wings of the building. I didn’t know where to begin, so I just started from the top: Director of NASA: Charles Bolden. As I opened the door, I noticed how his office had remained untouched. Maybe security systems were still up when the riots happened. My eyes were drawn to a piece of paper that was atop a map of California. The paper read: *34.7208, -120.552 (PLAN B). Vandenberg Air Force Base.* I knew where I had to go next. To survive. ■

# ACADEMIC

The Rebirth of Science Fiction **p.17**



Cellular Mechanism for Counteracting Protein Misfolding **p.19**

*Día de los Muertos* Project by the students of Skyline College **p.22**

## Road Movies of the 1970s

by ANDREW JITTASAAD

In my humble opinion, the road movie is simply one of the best genres of film to ever capture the essence of the American Dream. In his book *Driving Visions: Exploring the Road Movie*, David Laderman describes the road as “an essential element of American society and history, but also a universal symbol of the course of life, the movement of desire, and the lore of both freedom and destiny” (2). After all, the essence of the American Dream is freedom, and there is no better way to gain freedom than to roam free on the road where social boundaries cannot be found and everything is possible. But at the same time, road movies also reveal the harsh reality behind the dreams by vividly showing the aimlessness of life on the road and the despair of its alienated characters as they are away from society, struggling to find a better future elsewhere. In that sense, the road movie is a genre that represents both

the beginning and the end of the rebellious, yet romantic and downright naive fantasy that is the American Dream. In this essay, I am going to explore the road movies of the 1970s by analyzing three classic films of the genre: Dennis Hopper’s *Easy Rider* (1969), Monte Hellman’s *Two-Lane Blacktop* (1971), and Terrence Malick’s *Badlands* (1973).

Even though it was made in 1969, few would deny that *Easy Rider*, alongside *Bonnie and Clyde* (Penn 1967), was one of the seminal films that kick started the road movie genre as well as the American New Wave movement of the 1970’s New Hollywood. Shooting on the road with a budget of only \$360,000, the film became a smash hit due to its massive popularity among the countercultures of the ‘60s, making \$40 million in the box office. It is a hyper-stylized, yet authentic look at ‘60s America through the eyes of its two hippie protagonists played by Dennis Hopper (who was only thirty-two when he directed and acted in the film) and Peter Fonda. With its now-legendary rock soundtrack, *Easy Rider* was a film by and for the young that broke free from pretty much every conventional rule of the old Hollywood (Schneider 497). The film conveys the thrill of being on the road and experiencing the

*Pretty Cloud* PARVIN FALAHPOUR



15 “sex, drugs, and rock ‘n’ roll” lifestyle firsthand, while also portraying the journey of its two protagonists as a reflective, spiritual search as they set out to find America on their journey to New Orleans (Laderman 69).

Ironically enough, *Easy Rider*, one of the key films that gave birth to the New Hollywood, is essentially a film about the end of the American Dream. George Hanson (Jack Nicholson, in his first Oscar-nominated role), a lawyer friend of the two protagonists of the film at one point said, “You know, this used to be a helluva good country. I can’t understand what’s gone wrong with it.” In the end, *Easy Rider* is a film about the failure of the youth movement to change the world and the two protagonists’ inability to find an alternate utopia. Throughout the film, the audience sees how the two protagonists of the film are being rejected by society, from simply being ignored by the hotel manager during the beginning of the film to getting blown off their motorcycles by some rednecks with a shotgun in the film’s shock ending. As explained by Laderman, the message of *Easy Rider* is about how America used to be a great country, but the people have become scared of freedom, so they fear the two protagonists of the film who symbolize freedom through their counterculture lifestyle (Laderman 74). The theme about the end of an era in *Easy Rider* also shares a lot in common with how Revisionist Westerns of the ‘60s such as *Butch Cassidy and the Sundance Kid* (Hill 1969) and *The Wild Bunch* (Peckinpah 1969) lament the end of the old West, which makes a lot of sense since Peter Fonda originally intended the story of *Easy Rider* to be a modern Western about “two cats just riding across the country... When a couple of duck poachers in a truck rip them off ‘cause they don’t like the way they look” (Biskind 42). Around the same time that *Easy Rider* was released, the tragedy at Altamont had proven that the dream of peace, love, and understanding of the Woodstock-era was nothing but dead and gone. From that point on, *Easy Rider* became not only an iconic rock ‘n’ roll road movie, but also a time capsule of the late 1960s with an emphasis on the countercultural lifestyle and its eventual downfall.

Similar to *Easy Rider*, *Two-Lane Blacktop* is a road movie that can be seen as a time capsule of its era. Unlike *Easy Rider*, however, the road trip in *Two-Lane Blacktop* is neither a thrill-seeking drive nor a journey of self-discovery. Rather, it is simply an aimless journey toward nowhere. Even though the film starred two famous ‘70s rock stars (singer-songwriter James Taylor and the Beach Boys’ Dennis Wilson) in the lead roles, *Two-Lane Blacktop* is certainly not in the same category as rock ‘n’ roll road movies like *Easy Rider* or *Vanishing Point* (Sarafian 1971). Director Monte Hellman strips away the allure of the open road as well as the rock star persona of his two leads. The result is a film that authentically captures both the emptiness of the road and the loneliness of living on the road with its extreme minimalist narrative, which bear a similarity to the cinematic style of influential European directors such as Jean-Pierre Melville and Michelangelo Antonioni. Kent Jones wrote in his essay about the film that, “[*Two-Lane Blacktop*] is a movie about loneliness, and the attempts made by people to connect with one another and maintain their solitude at the same time – an impossible task, an elusive dream.” The film only uses its “plot” about the cross-country race to Washington between its main characters to explore their unique personalities and their complex relationship to the open road. The Driver (Taylor) and The Mechanic (Wilson) are two laconic youths with no greater ambition or purpose in life than to keep driving forward. The Girl (Laurie Bird) is a free spirit who lives life as it comes and G.T.O. (Warren Oates, in one of his most sympathetic performances) is a man completely out of time. To a certain extent, *Two-Lane Blacktop* is a depiction of America as a cultural wasteland – an aftermath of a failed revolution of the last decade – and its cast of loners symbolize those who lived in it.

Of all the post-*Bonnie and Clyde* “lovers on the run” movies, *Badlands* is undeniably the most poetic and beautiful. In his directorial debut, Terrence Malick turns the 1950s real-life killing spree of Charles Starkweather and Caril Ann Fugate into a tale of lost youthful innocence, painted with the American landscape. Thanks to the gorgeous cinematography, dreamlike score, and Malick’s delicate touch, *Badlands* is a feast for the eyes. Rarely does the open road look and feel as spellbinding as it is here. Martin Sheen bursts onto the big screen as a charismatic, James Dean look-alike killer named Kit, while the twenty-four year old Sissy Spacek is equally enigmatic and convincing as Kit’s fifteen-year-old girlfriend, Holly (Biskind 554). Regardless of the fact that the

two of them are wanted criminals, the film tends to portray Kit and Holly as a couple of lost souls. They embrace each other, they build a house in the woods, and they dance to Nat King Cole’s “A Blossom Fell” while on the run. The way Spacek’s Holly narrated everything that happened in the film with her childlike voice-over also adds to the film’s dreamy, fairytale-like atmosphere. According to Laderman, “the nature of [Kit and Holly’s] journey (and, in many ways, the road movie’s generic journey): going without going anywhere, going to be going. The mise-en-scène too emphasizes this road movie theme, portraying an empty, disorienting landscape with no landmarks or sense of direction” (121). In many ways, Kit and Holly are no different from Billy and Wyatt from *Easy Rider* or *The Driver* and The Mechanic from *Two-Lane Blacktop* – young misfits who got lost in the wilderness of the open road with no hope or direction in life. The “lovers on the run” film is an interesting sub-genre of the road movie because of how thrillingly (and dangerously) appealing it is. The idea of a rebellious couple who challenges the authority and then tries to get away with their crime is indeed very American – or very rock ‘n’ roll, to be more precise – in its individualistic, if also self-destructive, nature. Although it is much more subtle and less erotic than most films of its kind, *Badlands* remains one of the most influential “lovers on the run” movies ever made, and its influence can be felt in many subsequent films in the genre.

To quote River Phoenix’s famous last line from Gus Van Sant’s *My Own Private Idaho* (1991), “I’m a connoisseur of roads. I’ve been tasting roads my whole life. This road will never end. It probably goes all around the world.” The ‘60s and the ‘70s are long gone, and the American Dream is no longer as pure and innocent as it used to be in the ever-growing materialized world. Time changes, but the open road remains the same: adventurous, fascinating, and rich with possibility. It is still there, waiting for older and newer filmmakers alike to explore it or to lose themselves in it some more. *Paris, Texas* (Wenders 1981), *Thelma & Louise* (Scott 1991), *Little Miss Sunshine* (Dayton 2006), *Into the Wild* (Penn 2007), *Nebraska* (Payne 2013); the list of great post-1970s road movies goes on and on, just like the road itself. And somewhere in them, the spirit of those glorious 1970s road movies – the ones that explored the endless road of America and literally broke new ground in the first place – lives on. ■

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*Untitled* LESLIE LOPEZ

# THE REBIRTH OF SCIENCE FICTION

An exploration of how Postmodernism and the New Wave writers revitalized the art of Science Fiction.

by DIVYASHISH KUMAR

The 1960's science fiction writers, also known as the new wave writers, imagined the destruction of the planet, the annihilation of the human race and other post-apocalyptic inspired visions. The new wave movement did not define itself as a development of science fiction, which came before it, but rather reacted against it.

The new wave represents a productive experiment in fantasy fiction. The new wave of the 1960s and 1970s arguably embodied science fiction's claim to literary 'seriousness.' This desire for seriousness is not snobbery, as sometimes suggested by folks who overemphasize the entertainment function of speculative fiction; it's about recognition of the vast possibilities within the field. (Darja Malcolm-Clarke, 59)

Informed by postmodern literature, the new wave writers focused on stylistic experimentation as well as literary quality instead of scientific accuracy. Their stories told of destructive events, touching upon by the likeliness that these events may occur in the not too distant future. Such writers include J.G. Ballard, Philip José Farmer, Pamela Zane and many more whose major themes were destruction and devastation, with underlying themes that represented a rising epidemic in society, most of which center on a social commentary of their time. In this essay, I will explore how J.G Ballard and John Brunner examined social anxieties about new technologies. After summarizing postmodernism and its relationship to science fiction literature, I will analyze two key works, *The Drowned World* and *Crash* by J.G Ballard, as well as *The Jagged Orbit* by John Brunner.

## *New Wave Science Fiction Writers*

During the postmodernist movement, a profound transformation swept through the genre of science fiction. A new generation of science fiction authors surfaced in Britain and the United States and established a profound literary and experimental style of science fiction writing. These authors, who became known as the new wave of science fiction, pushed their creative imagining towards stylistic experimentation, valuing literary excellence over scientific accuracy. The term "New Wave" is borrowed from the French film movement known as the *nouvelle vague*. A wide variety of authors were part of the new wave movement, authors including J. G. Ballard, Samuel R. Delany, Ursula K. Le Guin, Joanna Russ, and Philip K. Dick. These authors have attained critical attention in the literary mainstream. The rise of the new wave writers was understood as an intentional cessation of the traditional science fiction, also known as pulp science fiction, which many of the new writers thought to be unrelated and lacking ambition. One of the most distinctive differences that the new wave/postmodern science fiction had from traditional/

pulp science fiction was that, the new wave writers sought to challenge the pulp genre conventions that they felt had dominated science fiction since the Golden Age; therefore, they began to focus more on the "soft science" rather than the "hard science." In the last half-century, the term hard science fiction has been used to describe works in which writers provide a significant amount of attention to accurate scientific theories, and technological applications, for example *Gravity*, directed by Alfonso Cuarón in 2013. In other words, it is a work of science fiction that bears some relationship to science, pure or applied. Conversely, soft science fiction is science fiction writing that mainly focuses on sciences such as the philosophy, psychology etc; for example, *The Atrocity Exhibition* by J.G Ballard. As J.G Ballard, one of the forefathers of the new wave science fiction writers, states in his essay "Which Way To The Inner World," "The biggest developments of the immediate future will take place, not on the Moon or Mars, but on Earth, and it is *inner space*, not outer, that needs to be explored. The only truly alien planet is Earth. In the past the scientific bias of science fiction has been towards the physical sciences – rocketry, electronics, cybernetics – and the emphasis should switch to the biological sciences." In this assertion, Ballard is attempting to convey the idea that in order for us to develop a deeper anticipation of our future, we need to invest our attention towards our planet rather than exploring the deep abyss of outer space.

## *J.G Ballard*

Ballard, along with many other new wave science fiction writers, believed that science fiction should be taken seriously as a form of literature. In order to fulfill this belief the new wave science fiction writers began experimenting with language and their style of writing, creating "cognitive estrangement", a literary technique referring to the idea that by imagining peculiar worlds we learn to see our own world in a new perspective. Cognitive estrangement indicated a kind of alienation or de-familiarization effect that new wave writers used to separate postmodern/new wave science fiction from traditional/pulp science fiction. Ballard, among many others, is considered one of the forefathers that helped develop the New wave movement into what we know of it today. Ballard was born in Shanghai in 1930, where he spent the first fifteen years of his profound life. At the age of sixteen, Ballard was interned at a Japanese camp during World War II and was deported to England. He attended Cambridge University and obtained his degree in medicine and a few years later he sold his first story to *New Worlds*, a renowned science fiction magazine, in 1956. He is the author of numerous novels and short story collections, including *Crash*, *Empire of the Sun* and *The Atrocity Exhibition*. Ballard stepped into the realm of the

*New Worlds* (1936)





*Yin and Yang (Man and Woman)* JH

new wave movement early in his career with apocalyptic/post apocalyptic novels such as *The Burning World* (1964), *The Crystal World* (1966) and many others. Ballard was a writer who challenged easy categorization: even his most speculative books cannot be fitted neatly with a genre label, and his more mainstream works contain fantastical and speculative elements.

#### *John Brunner*

John Kilian Houston Brunner was another renowned new wave writer who focused on examining prejudice, social fragmentation, advance weaponry, and existentialism in a dystopian setting. During the 1960's there was a significant amount of social tension and conflict within the United States. Along with unpopular feuds being fought on foreign soil, blood was also being shed on American streets as ethnic, gender, and counter-culture anxieties often turned to violence. As a result of these social issues, the new wave science fiction movement shifted the genre's emphasis, moving away from extra-terrestrials and instead focusing on Earth-side concerns. John Brunner, an ingenious author, made the shift highly successful and began integrating these concerns directly into his works. Brunner was one of the most prolific and influential new wave science fiction authors of the late twentieth century. According to Donald

H. Tuck, a science fiction bibliographer, Brunner was born at Preston Crowmarsh, near Wallingford in Oxfordshire, and went to school at St Andrew's Prep School, Pangbourne, and Cheltenham. He wrote his first novel, *Galactic Storm*, at the age of 17, which he published under the name of Gill Hunt, however he did not write full-time until 1958 (Tuck). During his career, the British author wrote with a fortitude that could only be matched by a few other great science fiction writers. Through his writing style, he incorporated modernist techniques into his novels and probed every major theme of his generation, varying from robotics and racism up to technological warfare, and space exploration.

#### *Conclusion*

In conclusion, postmodernism is a critical phenomena that originated in the early 60s and continues hold influence to this day. Diverging from the traditional conventions of pulp science fiction, postmodernism allows authors to create their own reality and explore ideas that are ahead of their time. Furthermore, the postmodern movement was instrumental in the emergence of new wave science fiction writers, who revolutionized literature, generating a genre all their own. New wave science fiction, as a genre, provided authors and their audiences an outlet

to reflect on contentious social issues without being antagonized by the established order. In addition, it also attracted a larger audience that would otherwise pay little attention to social issues that are imperative yet typically go unnoticed. As seen in all the novels investigated above, the authors are attempting to emphasize the notion that if society were to depend solely on technology, it would result in catastrophe. Expanding further, both Ballard and Brunner introduce a troubling issue that exists in society and extrapolate that societal degradation will occur if the issue at hand goes unaddressed. If new wave science fiction has taught us anything, it's that authors of this form of literature have either accurately predicted, or significantly influenced, the trajectory of technological advancement. It is reasonable to speculate, then, that contemporary science fiction writers may offer readers a glimpse of a future reality, perhaps even influencing the technological trends of tomorrow. ■

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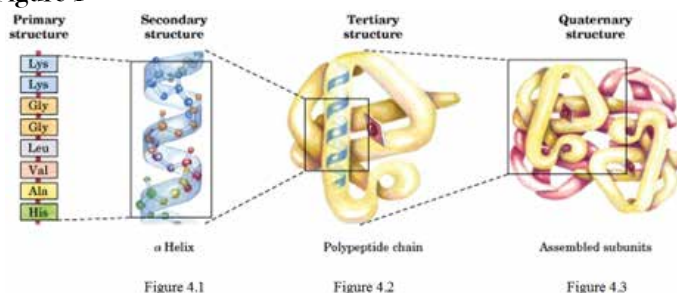
# Cellular Mechanism for Counteracting Protein Misfolding: Ssa, Ssb Chaperone and [PSI<sup>+</sup>] Prion

by ERIC WONG

Proteins are polypeptide molecules responsible for many life-dependent cellular functions, which include: (1) enzymatic catalysis, where proteins, called enzymes, facilitate biochemical reactions (Cooper, 2000); (2) structural support to connect cells and tissues together along with maintaining the shape of the cell (Egging, 2001); (3) storage of metals and amino acids (Herman, & Larkins, 1999); (4) transportation of molecules within the cytoplasm and across membranes (André, 1995); (5) immune defense from antigens by specialized proteins called antibodies (Mayer, 2009); and (6) hormonal messaging, responsible for maintaining cellular activities (Nurse, 1990). All proteins are made up of many smaller molecules called amino acids, which form peptide bonds with each other to form chains that can range from a few amino acids to tens of thousands of amino acids.

In some cases, factors such as, (1) crowding of other molecules, (2) increase in environmental temperature, causing heat shock, (3) or genetic mutation, can cause proteins to fold incorrectly. When proteins fold incorrectly they reduce protein function and can often produce large

Figure 4



#### Chaperone System in Yeast

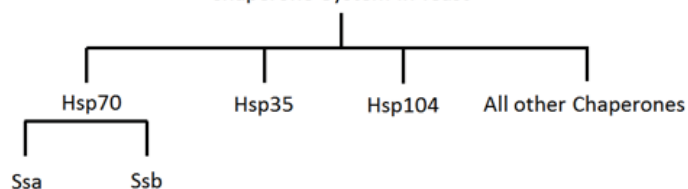


Figure 5

aggregates that may be harmful to cells. When a misfolded proteins causes a disease, they are called prions. Prions are proteins that have switched from a native shape to a non-native (alternate) shape.

A single change in the amino acid sequence can cause prion formation. Prions are counteracted by an innate protein repair mechanism called the chaperone system. The chaperone system assists in protein folding and provides the cells with mechanisms to assist protein disaggregation, protein degradation, protein transport, and refolding of proteins that have lost their shape under stress. It exists in the cells of all living things, from animals to plants to microbes.

#### Research Focus: [PSI<sup>+</sup>] Prion & Ssa, Ssb Chaperones

Ssa Hsp70 and Ssb Hsp70 are chaperones found in the yeast called *Saccharomyces cerevisiae*, specifically Ssa Hsp70 and Ssb Hsp70 chaperone [Figure 5]. The Ssa and Ssb chaperones interact with a prion in yeast called [PSI<sup>+</sup>], a yeast protein synthesis related molecule. [PSI<sup>+</sup>] prion is a functionally defective form of a protein called Sup35. Sup35 is a transcription release factor, a protein that is involved in the process of ending protein



**Figure 6**

translation by catalyzing the release of newly formed polypeptides when a ribosome encounters a stop codon. Since [PSI+] is functionally defective, it does not stop translation of proteins, but instead allows ribosomes to add additional amino acids to the ends of the polypeptide chains in a process referred to as nonsense suppression or translational read-through. Nonsense suppression is devastating to native protein structures because the additional amino acids interact and form three-dimensional shapes that inhibit the native protein function. This can cause potential damage to protein function, which is why it is important to study and understand them.

This has led me to the topic of “what factors affect the level of [PSI+] prion present in cells”. There are many factors that affect the levels of [PSI+], but discussed here are two— Hsp70 Ssa, Hsp70 Ssb. I will discuss how Ssa chaperone and Ssb chaperone affect the levels of [PSI+] prion, based on research from scientific literature. Understanding the effects of Ssa and Ssb on counteracting [PSI+] prions may help us on the understanding of prions that cause disease in other organisms.

The Hsp70 Ssa and Hsp70 Ssb chaperone systems in yeast are intricately intertwined and highly complex. Ssa, induced by heat shock, refolds proteins that are partially denatured due to increased environmental temperatures. In contrast to Ssa, Ssb, non-induced by heat shock, only counteracts prion formation as it catalyzes refolding of misfolded Sup35 proteins back to their native state [Figure 6] or targets them for degradation (Allen et al. 2005). These conflicting chaperone machineries balance the promotion and inhibition of [PSI+], which suggests that Ssa and Ssb have a regulatory function to control amounts of [PSI+] present in the yeast cell.

#### *Hypothesis & Discussion*

Based on the definition of chaperones being a repair mechanism for proteins, it would make sense that the yeast Ssa chaperone system would counteract the [PSI+] prion aggregation by breaking up the protein clumps and degrading the proteins, but in fact this is not the case; in yeast, overexpression of their Hsp70 Ssa chaperone promotes prion aggregation. Obviously, there is a larger picture behind what we know and the chaperone system may serve cells in a way we do not yet understand. When humans have prions in their cells, they normally cause or are related to a disease. But why is it that yeast do not develop any debilitating diseases from prions like we do? Why is it that yeast retains the [PSI+] prion in its population over time without dying off? This led me to hypothesize that, beyond the negative effects of the [PSI+] prion, it must provide an evolutionary advantage; for if [PSI+] does not provide any evolutionary advantage, by natural selection it would likely not exist.

I found out that yeast cells spontaneously switch from [PSI-] and [PSI+] states with a rate varying from 1 in 105 to 1 in 107 (True et al. 2000), likely by the regulatory mechanisms that affect [PSI+], such as Ssa and Ssb. Under severely adverse conditions, the induction or overexpression of Ssa promotes the formation of [PSI+] while Ssb, a consistent [PSI+] antagonist, is down-regulated, which may further facilitate [PSI+] formation (Shorter et al. 2008). Therefore, [PSI+] affects gene expression by reading through stop codons, generating many types of C-terminally added sequences of the polypeptide resulting in new phenotypes for the cell [Figure 7].

Under stress conditions, it is likely advantageous for a subset of individuals to produce genetic variation, referred to as phenotypic plasticity, through [PSI+] and test new phenotypes that might promote survival (True & Lindquist, 2000; Shorter et al. 2005; True et al. 2004). If any of the newly translated, extended C-terminal sequences offered an advantage, over time

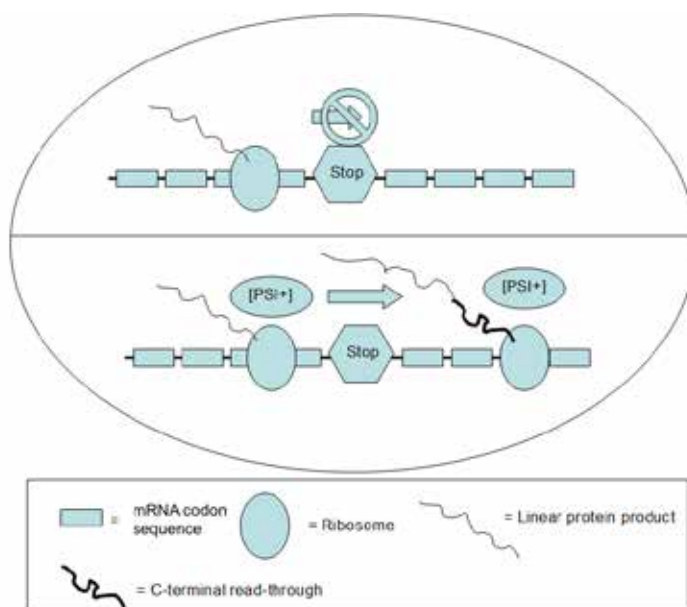
this advantage could become independent of [PSI+]. Assimilation of traits that offer advantages could occur by genetic reassortment through mating or by mutation of stop codons into sense codons (True et al. 2004). Subsequently, the cell could revert to [PSI-] without losing the novel adaptation, while losing other C-terminally extended proteins that may be deleterious to normal cell functions. The advantage of this [PSI+] mechanism is that yeast has the capacity to preferentially switch to [PSI+] under severely adverse conditions, producing genetic variations, which increases the likelihood of producing a variant that provides an advantage to survive. Any phenotypic trait that provides survivability to the yeast is more likely to reproduce and spread its new phenotype in future generations.

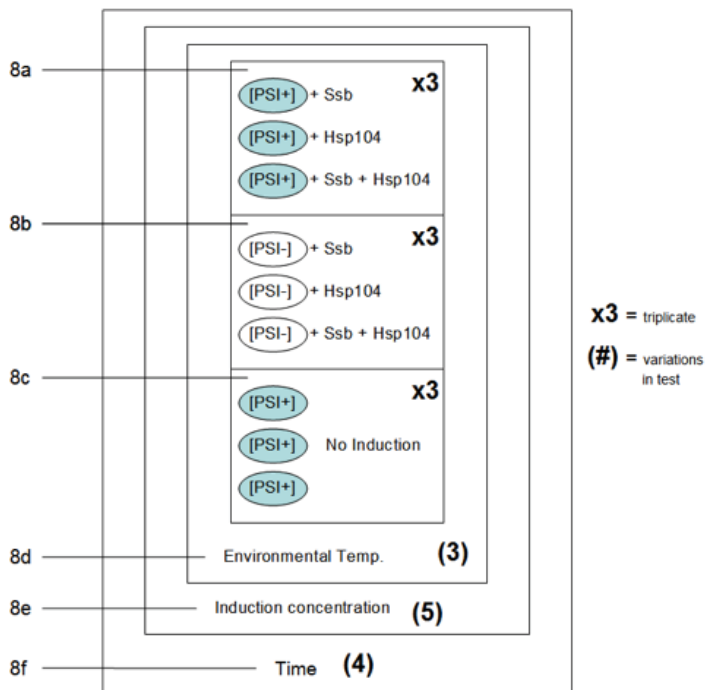
An alternative argument to my hypothesis is that [PSI+] cannot provide an evolutionary advantage to yeast because its presence in the cell is more detrimental than helpful - that although phenotypic variations may be produced by C-terminally extended proteins, the cell would still die due to loss of its normal proteins functions. There are at least two responses to this alternate argument. Firstly, [PSI+] does not necessarily affect all protein production in the cell, but rather it is more specific. Secondly, [PSI+] does not exist in all the population of yeast, but rather only a small subset of individuals. Yeast cells spontaneously switch from [PSI-] and [PSI+] states with a normal rate varying from 1 in 105 to 1 in 107 (True et al. 2000). Thus, the loss of cells that produce nonfunctional proteins due to [PSI+] has a minimal impact to the overall population. The potential for yeast to develop advantageous traits through the [PSI+] translational read-through mechanism outweighs the cost of such a negligible proportion of cells with respect to the survival of the yeast population as a whole (True et al. 2004). If advantageous phenotypes arise among a growing population, there is a chance for mutations that eliminate stop codons for the phenotype to become independent of [PSI+] read-through; This would “fix” the trait, where cells would retain the phenotype upon reversion to the [PSI-] state. The reverting of [PSI+] state to [PSI-] state after assimilating genetic changes that provide survival advantages is shown to be possible; loss of [PSI+] is accompanied by a return in functional Sup35 which means protein transcription starts working properly again (Shorter et al. 2005).

#### *Experiment*

The basis of my hypothesis relies on the assumption that [PSI+] state yeast can revert back to [PSI-] state. In an experiment [Figure 8] to test whether this process occurs, I would isolate populations of [PSI+] state yeast and induce factors that are [PSI+] antagonists such as Ssb, and another chaperone called Hsp104, previously shown to have [PSI+] antagonistic

**Figure 7**





**Figure 8**

effects (Parsell et al. 1994; Chernoff et al. 1995; Newnam et al. 1999). In triplicate, [Figure 8a] separate isolated populations of [PSI+] will be induced with: (1) [PSI+] + Ssb; (2) [PSI+] + Hsp104; (3) [PSI+] + Ssb + Hsp104. As a control, in triplicate, separate isolated populations of [PSI+] will not be induced with any antagonistic factors [Figure 8b]. This control will provide a baseline comparison when analyzing data.

Following the same treatment of induction as [PSI+], in triplicate, I will also have separate isolated populations of [PSI-], induced with: (1) [PSI-] + Ssb; (2) [PSI-] + Hsp104; (3) [PSI-] + Ssb + Hsp104 [Figure 8c]. This will act as a baseline for comparison of my results from the [PSI+] treatments of induced antagonistic factors.

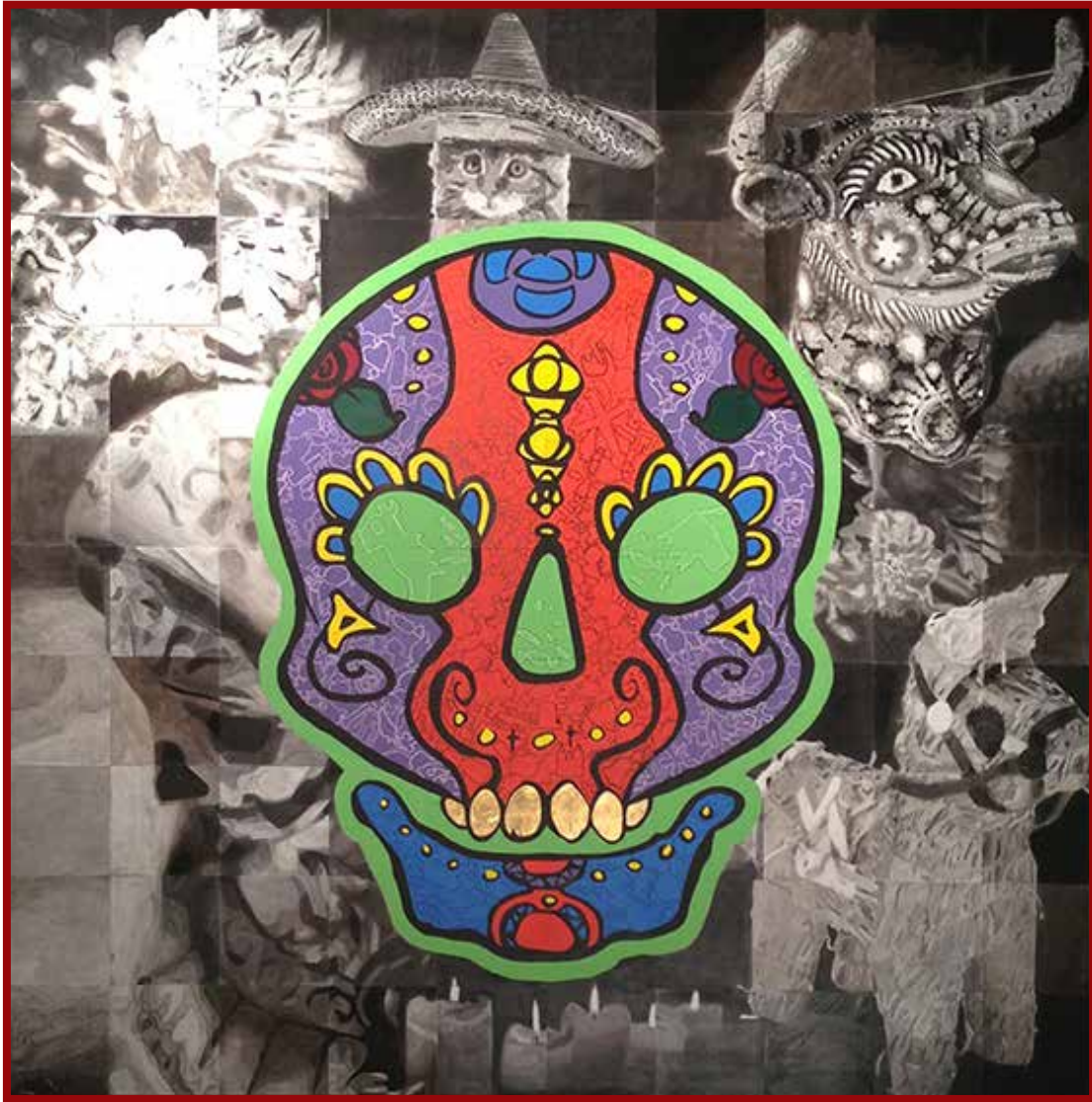
There are 3 variables to be considered in this experiment: (1) environmental temperature, which affects growth conditions and possibly [PSI+] reversion (2) amount of Ssb and Hsp104 chaperone induced – low levels may be insufficient for reversion and high levels may have toxic effects; (3) time of exposure to antagonistic factors, from several hours to days or weeks. Testing all these variables will have a compound affect to my experiment.

To test the first variable, environmental temperature [Figure 8d], I will place [PSI+] treatments, [PSI-] treatments, and [PSI+] without treatments in 3 different environmental temperatures. The three environmental temperatures will be: (1) above ideal for growth; (2) at ideal for growth; (3) below ideal for growth. This variable is important to consider because [PSI+] reversion may depend on the growth of yeast.

To test the second variable, amount of Ssb and Hsp104 induced [Figure 8e], I will place each of the environmental temperature treatments under 5 different induction levels; induction levels are to be determined under further knowledge. I chose 5 induction levels to try to ensure upper and lower plateaus of line graphs, each plateau with 2 plot points, when data is analyzed. To test the third variable, exposure time [Figure 8f], I will place each of the separate induction level treatments in 4 time periods: (1) 8 hours; (2) 16 hours; (3) 24 hours; (4) 72 hours. I do not know the rate of reversion under the different induction levels of [PSI+] antagonists, so testing this variable is to account for it. ■

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