



Make a Splash: The Legacy of the Sitting Ducks

Matthew Williams

“Please tell me inner tube water polo is a real thing and that it’s as hilarious to watch as it sounds.”

“Oh it’s definitely real and exactly as ridiculous and glorious as it sounds.”

Those were the first words I ever shared with my partner Mattea when we matched on Bumble almost two years ago. I brought her to a game on our fifth date, and she’s been cheering us on ever since. As silly as it sounds, inner tube water polo has been a huge part of my life and, along with Mattea, helped me through the last year of my PhD. Writing my dissertation in the office was miserable most days, but being able to take breaks to strategize the next game with other grads kept me going.

If you’ve never seen a game before, it plays out like water polo, except all the players sit in inner tubes, and that one change makes the game so much more accessible and absurd. For graduate students in the math department at Colorado State University, inner tube water polo has been a staple for more than a decade, spanning 21 teams and 67 players, including students, alumni, partners, and friends of the department.



Tatum Rask (left) looks to pass around a defender to Seth Ireland (right) for the Fall 2023 Sitting Ducks.

Ever since I heard about the department team it was always the “Sitting Ducks,” but when I asked around, no one knew where the name came from or how the team got started. Before I retire and hang up the

tube for the last time, here’s everything I’ve uncovered about the Sitting Ducks, the splashing soul of the math department.

Before the First Quack (2008-2011)

The Sitting Ducks can trace their lineage back before they ever used the name, to when math major and future Sitting Ducks captain Rachel Neville first jumped into a tube in 2008.

“I started because it looked ridiculous. I stayed because it was so fun,” said Rachel, now an assistant professor at Northern Arizona University. “I’m not super athletic and to be fair, only a few people I played with were, but we were able to put up a really good fight with teamwork.”

The earliest team name Rachel can remember is the Inflatogatrz in Spring 2010, playing with friends she made on her dorm floor in Summit Hall. The league only began official record keeping in Fall 2010, where her squad swam under the name Tacobellum.

Those early teams were mostly non-math players, including Spanish major Amy Kozlarek, who was Rachel’s roommate and now works as a career counselor and instructor at CSU. Amy remembers living a 30-second walk from Taco Bell, inspiring the name, and also thinks “bellum” (Latin for war) may have been a playful twist.

In Spring 2011 Rachel, Amy, and two other Tacobellum players rebranded as the Sitting Ducks, creating what would become the longest running team name in the league. Neither Rachel nor Amy remembers exactly where the Sitting Ducks name came from or why it stuck, but Spring 2011 marks the first official quack in the Ducks’ storied history.



Amy Kozlarek (left) and Rachel Neville (right) camping in 2012, still best friends to this day.

Into the Math Department (2014-2020)

When Rachel Neville started her PhD in 2013, she brought her love for inner tube water polo with her and put together a new Sitting Ducks roster in her second year. Vance Blankers, her office-mate at the time, calls Fall 2014 the “revival year,” when the team became mostly math grad students, plus a few partners and friends. The Ducks were in the math department now, and they were here to stay.

The vibe in those years was exactly the distraction they needed from grad school. “Super fun, not super competitive ever,” Rachel told me. Or as Vance described it, “we tried hard but weren’t try-hards.” They were still able to pull off the occasional upset, like a 17-15 win over Water YOLO in Fall 2014, a team full of undergraduates. These were Rachel’s favorite games, winning against more athletic teams because they knew how to pass the ball. Whether they won or lost, they always went to The Crown Pub after for pomme frites and beer, a ritual they both remember as a highlight of grad school.

Rachel kept playing all the way through her PhD, sometimes as the Sitting Ducks and other times using math-inspired names like the Tesselators (Fall 2015) or Turbulent Tori (Fall 2016). Eventually Vance would take over the team, bringing back the Sitting Ducks moniker in Fall 2017, and recruiting new cohorts to keep the team alive.

“Vance approached me as he figured I’d be excited and he was 100% right,”

said Brittany Story, now a research mathematician for the U.S. Army. “I also felt honored that the team had asked me, as I was just a baby first year at the time. I still laugh about how everyone made fun of me for kicking instead of using my arms, but hey, it worked.”



The Fall 2017 Sitting Ducks with their tradition of a post-game trip to The Crown Pub. Front (from left): Naomi Fahrner, Jessica (Gehrtz) Sencindiver, Ellen Pugleasa, Brittany Story, Sam Pine, Karleigh Pine. Back (from left): Benjamin Sencindiver, Vance Blankers (captain), Derek Handwerk.

By Spring 2019 Brittany was captaining the Lady Sitting Ducks, the first women’s Ducks team since 2011, and that same year she took over the coed team after Vance left. The sport became popular enough that they often fielded two teams. While Brittany led the ladies in Spring 2020, the men’s team was run by Justin O’Connor, who remembers joining the Ducks because the sport felt “entirely insane” but welcoming, a low-stakes way to be a part of the math grad community.

Unfortunately, Spring 2020 was the last Sitting Ducks season for two years, as the COVID-19 pandemic shut down all university activities, including inner tube water polo.

Back in the Water (2022-2023)

When the pools finally reopened in Spring 2022, first-time player Tatum Rask joined the roster. She joined the CSU math graduate program at the height of COVID restrictions in Fall 2020, when it was incredibly difficult to make new friends.

“Socially it was definitely pretty hard,” said Tatum, now a 6th-year math PhD student at Colorado State University.

“That first Ducks team was super impactful. We would play our games, then go try different breweries around town. I really got to know the older grad students and what the grad student culture was, and even got to know Fort Collins better.”



The Spring 2022 Sitting Ducks celebrating at CooperSmith’s Pub. Front: Brittany Story. Back (from left): Kyle Salois, Wei-Yu Hsu, Tatum Rask, Harley Meade (captain), Kelly O’Connor, Justin O’Connor.

The break in the action brought a new wave of players, including co-captain duo Kyle Salois and Erin Dawson, who went on to run three teams together starting in Spring 2023. “I didn’t take my captain duties too seriously,” said Kyle, now a visiting instructor at St. Olaf College. “I wasn’t giving the team advice on how to play or anything, but I brought a positive vibe.”

One of those Kyle-and-Erin squads played as the Standing Geese when there was already a Sitting Ducks math squad in the league, and in other seasons there was even a Clubbing Penguins team. The Ducks slowly improved over these seasons, measuring their progress against the league’s longtime powerhouse, the Floating Kegs. “The first time we didn’t get mercy-ruled by them, we felt incredible,” said Kyle.



Co-Captain Kyle Salois lines up a shot for the Spring 2023 Standing Geese in an 8-15 loss to Fishbowl.

Shifting Tides (2023-2025)

Although the team had occasional winning seasons, the Sitting Ducks always prioritized fun over everything else, and in-depth strategy was never part of the conversation. That changed in Fall 2023, when Seth Ireland captained for the first time.

“My goal in creating that team was in part to keep my friend group really close and to hang out with them more,” said Seth, now a business intelligence analyst at Mesa Power Solutions. “But I also wanted to be a little bit more competitive, a little bit more serious. We had the skill, we had the talent, we had the potential, and I just wanted to weaponize that.”

Other players noticed the shift as well. “On some of those earlier teams we were just in it to have a silly, goofy time,” Tatum said. “We struggled to play as a cohesive unit. Now we have an awesome squad, we’ve learned how each other plays, and sometimes it feels like we communicate without words. The fun is still there, but it’s been cool to see us rise in talent and skill level.”



Seth Ireland strategizes with the Fall 2023 Sitting Ducks in a 9-6 win vs the River Pumpkins (also a pic I used for Bumble). From left: Kyle Salois, Erin Dawson, Seth Ireland (captain), Tatum Rask, Matthew Williams.

The team had a thrilling competitive energy. From Fall 2023 to Spring 2025 we put together two 3–1 finishes and one 4–0 season, built around a core of Seth, Tatum, Kyle, Erin, Joe Geisz, and me, with captain duties shifting among us. We could never quite make the playoff push that matched our expectations, but we were swimming closer to that goal each season.

Spring 2025 looked promising, with our only regular-season loss being a 15-19

nailbiter against the Floating Kegs. Our playoff hopes were quickly dashed in round one though when we gave up a goal in the last two seconds to lose the lead and get knocked out. Going from finals hopefuls to out in an instant was devastating, but that's the price you pay for passion. The more you care, the more it hurts. But that same passion makes everything so much more exciting, and to me it is always worth pursuing, whether in life or a silly sports league.

Going for Gold (Today)

Despite last season's heartbreak, we knew we had to get back together and go for it all one more time. This season may give us our best chance yet, with a roster that went 4-0 for only the second time in franchise history: Seth Ireland (Forward, co-captain), Ian Jorquera (Forward), Tatum Rask (Defense), Joe Geisz (Defense), Madelyn Geisz (Defense), Matthew Williams (Goalie, co-captain), Parker Montfort (Alternate), and Chris Liu (Alternate).



The Sitting Ducks against the Buoyant Boys in Week 2 of Fall 2025, a game we won 30-5. From left (blue tubes): Tatum Rask, Madelyn Geisz, Joe Geisz, Seth Ireland (co-captain).

The highlight of the regular season was a Week 3 game against the reigning champs, Fat & Furious Tube Drift, who older alumni will remember as the Floating Kegs. Their players have been in the league since before time existed and, as their name implies, are in a different weight class from the rest of the teams. They can push opponents around with ease, but they're also slow and tire quickly, so after taking a 10-9 lead we played keepaway for the last ten minutes. They lived up to their name, with several players hurling insults as the clock ran down, furious that we had flipped the game on its head by ignoring the goals. It ended with their goalie so frustrated he refused to

play, leaving an open net and handing us a 14-9 win. When all was said and done, the rest of their players were good sports, and we look forward to facing them in the playoffs.

Of the 30 teams who entered the league, only the top 16 advanced to the single-elimination playoff bracket. The Sitting Ducks entered the playoffs as the #1 seed and opened their run in the Sweet 16 against #16 Soggy Bottoms. On paper they were a tough draw: seven undergraduates who went 2-1 in the regular season and would likely have landed a 6-8 seed if their last game had not been cancelled, which made them a dangerous first-round opponent.

We were also missing Tatum and Joe for this one, so our fiercest supporter, Parker Montfort, got the call to give us a full 5v5 in the water. Despite having not been in a tube in over a year, Parker played excellent lockdown defense alongside Madelyn, and we held the Soggy Bottoms to 10 points, the fewest they had scored all season. On the other end of the pool, Seth and Ian quickly dismantled the opposition, putting up 15 points in the first half, including two penalty shots from illegal contact. From there we coasted to a 21-10 win, and the only drama in the second half came from a goal that kept falling over and stopping play.



The Sitting Ducks and supporters, all smiles after their Sweet 16 victory against the Soggy Bottoms. Front (from left): Madelyn Geisz, Ian Jorquera, Seth Ireland (co-captain), Parker Montfort. Back (from left): Matthew Williams (co-captain), Mattea Mobley, Kylie Schnoor, Michael Moy, Fernando Herrera Valverde.

We're into the Elite Eight now, and our next opponents are The Multiple Scores, who came very close to beating Fat &

Furious Tube Drift this season and won their Sweet 16 game with only four players. Come by Moby Pool and cheer us on!

- Sweet 16: W 21-10 vs. Soggy Bottoms
- Elite Eight: Sunday, 12/7, 5:30 p.m. vs. The Multiple Scores
- Final Four: Monday, 12/8, 7:00 p.m.
- Championship Game: Wednesday, 12/10, 7:30 p.m.

The Future of the Sitting Ducks

Whatever happens in the playoffs, this will be my final season as captain. I'll be moving out of Fort Collins and into the next chapter of my life. Longtime vets Seth and Tatum will be around for at least another season, but they won't be captaining as they look to pass on the tubes to the next generation of Ducks.

"It's been one of my favorite things about grad school," Seth said. "Some of my best friends have been on the team, and those connections have been strengthened by playing inner tube water polo. I hope that the Sitting Ducks continue to have a lot of success and a long legacy."

Former captain Justin O'Connor described why the team keeps coming back. Inner tube water polo, he said, was a culmination of the math grad culture: collaborative, maximum effort, with families and loved ones cheering in the stands, and post game celebrations no matter the result. "It was the kind of unimportant thing where we got to celebrate what is really important."

So we turn to you: what kind of Sitting Ducks team do you want next? Maybe you keep the ultra-competitive vibe and chase a title, or maybe you dial it back and just have fun. Maybe you preserve the Sitting Ducks name, resurrect the Standing Geese, or go full retro with Tacobellum. Whatever path you take, remember that at its core, this team is about bringing the math department grads together. Graduate school will be one of the most brutally exhausting experiences of your life, and you need distractions like inner tube water polo to get through it. So don't isolate yourself. Get out there and make a splash.

December PotM

Provided by Sandra Nair

Let $Q(n)$ denote the sum of digits of n (in base 10). For any positive integer k , show that there is a multiple n of k such that $Q(n) = Q(n^2)$.

Principia Musica?

Eamon Gannon

The music theorist is a close cousin of the mathematician, sharing a predisposition for pedantry and abstruse nonsense. Holding dual speciership, Guerino Mazzola, a free jazz pianist and professor of music at the University of Minnesota, writes treatises for those philosopher-kings who are as comfortable in the key of G as they are with the χ of \mathbb{G} . He is perhaps most well known for his "The Topos of Music", a four-volume epic which seeks to answer the question: "What if Grothendieck went to Juilliard?". Lacking the time, fortitude, and wherewithal to endure 1,200 pages of Bourbachi, we record our thoughts on a cursory overview, and ask a modest question.

It is often difficult to understand Dr. Mazzola's reinvention of common musical concepts; even among mathematical writing, the notation is arcane and the concepts are shamelessly syncretic, freely mixing notions from psychology, philosophy, and (perhaps most troubling of all) computer science. One should hope, bearing this, that something as musically vulgar as counterpoint would ply to ordinary reason. One often hopes for too much. Mazzola writes that "alterations of tone in pitch ... are interpreted as tangent objects". Tangent objects, of course, to local compositions, which are themselves types of Denotators (haven't you heard?) which are themselves composed of Forms, which in turn hinge on a certain specialized type of contravariant functor $\text{Mod} \rightarrow \text{Set}$. Okay, perhaps we're cherrypicking. How about chords? A glance at the chapter on

harmony reveals little about inversions, extensions, or proper voice leading. However, if one had a mind to learn about representation theory, they would be pleasantly surprised. Of course, it does not end here. One only has to glance at the appendices, which, among other things, contain a discussion on topoi, Grothendieck topologies, and what seem to be a condensed version of the first half of Mac Lane.

We admit that this review smacks of a certain refusal to engage with the text on its own terms, but Mazzola's terms are prohibit in excess. Not only does one need to possess advanced facility in weapons-grade mathematics (and

psychology, and philosophy, and computer science, and did we mention music?), but he all but demands that the reader deign to the idea that such a conceptual framework produces music that, at the end of the day, sounds good. There's no accounting for taste, but there's a reason Mazzola's preferred muse is Cecil Taylor. Wearily, we must ask ourselves: must everything be mathematized? Shall we endure a type-theoretic literary criticism next? Even the physicists become mildly annoyed with us over territorial disputes. One might reasonably ask: "And I'm supposed to pay Springer \$120 for this?" "Hey," replies the Master, "at least the jazz is free."

Sports News



In other sports news:

- The CSU curling team, composed of mainly math graduate students, took second place against Yale at the Broomstones college curling event. They will be going to western regionals next year!
- The Icosahedrons (the math grad soccer team) played their final game on Monday.

In Defense of Paper

Fernando Herrera Valverde

With the creation of tablets and other personal computing devices, the last two decades have changed the way we work in most fields, mathematics is no exception. Where mathematicians once hunched over notebooks, they now tap on tablets. The transition feels inevitable—why wouldn't we want searchable notes, infinite paper, and the ability to reorganize our thoughts with a swipe?

But I've started to wonder if we're losing something in the exchange.

This shift is part of a broader trend in technology: the move toward multipurpose tools. Consider the smartphone—a single device that serves as phone, camera, flashlight, wallet, and a thousand other things. It's undeniably convenient. Yet professional photographers don't rely on their phone's camera, and search-and-rescue teams don't use phone flashlights when looking for people lost in a forest. They use tools designed for the job.

Single-purpose tools usually excel at what they do because they've been optimized for one task, without compromise. This isn't to say that multipurpose tools don't have their place—a car with an integrated audio system beats lugging speakers around. But we should recognize the tradeoffs. Multipurpose tools always compromise something.

What about math? I'd argue that paper is the single-purpose tool some of us need to use more. It does one thing and does it well: it helps us focus. Yes, it's less "efficient" than a tablet. You can't search your notes. You can't rearrange ideas with a tap. But maybe that slowness and friction aren't bugs—maybe they're features.

When you work on paper, you think differently. You can't easily delete or reorganize, so you commit more carefully to each line. You can't just open a tab and look for a Stack Exchange post, you need to pull from your memory. It's a slower mode

of thought, but sometimes, slow might be exactly what we need.

And paper protects you in another way: it can't distract you. A tablet is never just a tablet—it's also email, news, messages from friends. Even with good intentions, you're one swipe away from breaking concentration.

For some people this isn't a problem, but some of us need a Ulysses pact—deliberately limiting access to computers during thinking time, like Ulysses binding himself to the mast to resist the sirens' song. Paper is exceptional at this. It doesn't send notifications, doesn't need to be charged; it just sits there, patient and dumb, waiting for you to think.

But here's a deeper question: do our tools guide the mathematics we produce? A friend recently pointed out something interesting—maybe if we didn't have computers, we would have developed totally different methods for doing calculations. If we had a machine that could factor numbers instantly, number theory might look completely different today. So as we transition from paper to tablets, how does that change the math we do? I don't know, but I find it interesting to think about. Our tools don't just help us solve problems—they might quietly shape which problems we choose to tackle and how we think about them.

This isn't an argument for avoiding computers. Mathematics needs them; they have opened entire fields and made possible work that was previously impossible. But maybe we need to ask ourselves: which tool serves us best for the problem at hand? The answer will vary by person and by problem. For some of us, it's often the old way—pen scratching across paper, with all its limitations.

Mathematics for Neanderthals Responses

In the last edition of The Torus, Andrew and Tatum put forward a challenge to describe your research using monosyllabic words.

- How do bird fly as one? - Joe Geisz
- Which more best to learn, ring or group first? - Alice Mehalek
- Two curves meet at points in the shade. - Jake Kettinger
- What curve of curve on curve do? - Chloe Stewart
- I help make thing by count shape in spot by count new shape. - Page Wilson
- Ring of small space of big space of joined curves. - Brendan Polo
- What care for in math job and how change in part? - Sarah Lutz
- I use cloud shapes from space to see storms. - Kristina Moen
- How much lines can fit with gaps wide and same? - Ian Jorquera
- I first look at some cool graphs where each edge has more than two nodes. I take graph, I make field (or ring) box, I run Lie stuff, I look at mess, I see what more can be said. - Amaury Minino
- Box. - Nate Collins

November PotM solution

For the Novemeber Problem of the month we present two different solutions. The first solution is written by Maria Gillespie and can be found on her blog at mathematicalgemstones.com. We present the second solution below

We consider the even and odd cases of n separately.

Case 1: n is even

Observe that the vertices A_i and $A_{i+\frac{n}{2}}$ are antipodal to each other for $1 \leq i \leq \frac{n}{2}$. Connect them by chords. These chords are diameters of the circle, each of length $2r$. By Pythagoras' theorem, $(XA_i)^2 + (XA_{i+\frac{n}{2}})^2 = (2r)^2$ for each pair of antipodal points $(A_i, A_{i+\frac{n}{2}})$, and there are $\frac{n}{2}$ such pairs. Thus,

$$\begin{aligned} \sum_{j=1}^n (XA_j)^2 &= \sum_{i=1}^{\frac{n}{2}} \{(XA_i)^2 + (XA_{i+\frac{n}{2}})^2\} \\ &= \frac{n}{2} (2r)^2 = 2nr^2 \end{aligned}$$

Case 2: n is odd (ghost construction suggested by Makenna Greenwalt)

For every vertex A_i , construct a "ghost antipode" B_i , and join them by a chord. Each chord is a diameter of length $2r$. Construct a phantom n -gon from the ghostly B_i 's. Also construct a zombie $2n$ -gon, whose vertices include both the corporeal A_i 's and the phantom B_i 's. For the zombie $2n$ -gon, we are back to the even case mentioned above. Let Z_j be a label for each vertex of the zombie $2n$ -gon.

Then:

$$\begin{aligned} 2(2n)r^2 &= 4nr^2 = \underbrace{\sum_{j=1}^{2n} (XZ_j)^2}_{\text{undead zombie sum}} \\ &= \sum_{i=1}^n \{(XA_i)^2 + (XB_i)^2\} \\ &= \underbrace{\sum_{i=1}^n (XA_i)^2}_{\text{corporeal sum}} + \underbrace{\sum_{i=1}^n (XB_i)^2}_{\text{phantom sum}} \end{aligned}$$

Since X is a random point, it is equally random with respect to the corporeal and the phantom n -gons:

$$\sum_{i=1}^n (XA_i)^2 = \sum_{i=1}^n (XB_i)^2$$

It follows that

$$4nr^2 = 2 \sum_{i=1}^n (XA_i)^2 \implies \sum_{i=1}^n (XA_i)^2 = 2nr^2$$

NEW: Question of the Month

From the Editorial Board of the Torus

This month we are introducing the 'Question of the Month'. At the bottom of this page you will see the question of the month. Fill in your answer, cut the question out, and submit your answer to the official Colorado State Torus locker, found near the upstairs graduate student offices. If you prefer you can also email your answer to our email address `MATH_ColoradoStateTorus@mail.colostate.edu`. Result will be shared in the next edition. Thanks to Felix High for facilitating the QOTM!

We hope you have enjoyed the Seventh edition of The Colorado State Torus! This edition was longer than normal as our next addition won't be until February. The success of the Torus requires article submissions from our readers, do you have an idea for an article or comic but just haven't had the time to write it? We hope you take the chance to do something creative over winter break and submit a contribution for a future article: You can email your submission to our email address `MATH_ColoradoStateTorus@mail.colostate.edu`. The deadline to submit your work for the February addition is January 30th. We also want to remind our fellow graduate students that participation in the newsletter is required for graduation, this is a threat.

Love from your editors,
Ian, Joe and Page

..... ✂ ✂ ✂

December Question of the Month

Please answer and cut out this question and drop it in locker #7 near the upstairs graduate offices. Check back next month to see the results!

Do the natural numbers start with 0 or with 1?

- (A) 0
- (B) 1

Optional: What do you consider to be your primary field of research?

Classifieds

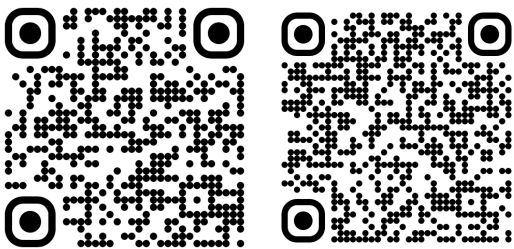
Seeking new tea time team members

If somebody doesn't step up to run tea time next semester, Brendan might go ballistic. Please for the love of Euler please somebody help with tea time. Especially if you haven't done it before. Contact Brendan at Brendan.Polocolostate.edu

Seeking Greenslopes Organizers

Are you interested in running Greenslopes in the spring? Contact Donovan at d.leybacolostate.edu.

Dance Class with Ignacio



Plan for dance classes next semester! Scan the left QR code to share your availability for next semester's dance classes. There'll be three independent sections: one on Saturdays and two during the week. You only need to attend the section(s) you register for!

***Worried About Costs?** The CSU Recquity Fund can cover the full cost of your session. Scan the right QR code to visit the Gymtimidation website. Scroll down to find details about the Recquity Fund.*

December '25 Crossword

- ACROSS

1 Ski race

7 Exchange

11 "___, ergo sum"

12 Pin down

13 "Aladdin" setting

14 Aware of

15 Emeritus: Abbr.

16 Cause for student celebration, in December

18 Sounds of relaxation

20 Branch

21 "Knives Out" detective Benoit

23 Material for some planes

27 Away

29 Takes home

30 Stir fry vegetable, in December

34 MLB team from MA

35 "Unless my memory is wrong", in text

36 Capital of South Dakota

38 Org. for university sports

39 Figures of speech

40 [Uh-oh!]

41 Breakfast food chain
- 4 Campus place: Abbr.

5 Singer Redding

6 2016 Disney heroine

7 Place for a top hat, in December

8 Wizard's tool

9 Subreddit where posters ask if they were in the wrong: Abbr.

10 Trick

17 Sphere

19 Mountain topper, in December

22 Baking measure

24 NBA star James

25 Dark and ___: rum-based cocktail

26 Evaluate

28 Lukewarm

30 Belt

31 Where RNs treat infants

32 Spoken

33 Helper

37 Chemical suffix

1	2	3	4	5	6		7	8	9	10
11							12			
13							14			
15				16		17				
18			19		20					
21				22		23		24	25	26
			27		28		29			
30	31	32				33		34		
35					36		37			
38					39					
40					41					

- DOWN

1 Beetle

2 Cosmetics giant

3 "___ All Along" (Marvel miniseries)

November Solutions

1	2	3				4	5	6		
A	B	C				H	A	T		
7	B	O	O	T		9	D	E	P	O
11	E	X	P	O	12	N	E	N	T	I
				14	W	A	S		15	L
			16	C	H	A	M	17	E	L
		19	C	H	O	C	O	L	A	T
20	C	H	A	M	P	I	O	N	S	
21	U	A	L			22	N	R	A	
23	B	O	U	R	G	E	O	I	S	I
	29	S	P	I	N	S		30	S	O
		31	A	B	U			32	B	Y