

Just Passing Through

Anurag Chugh and Divya Sharma

Introduction

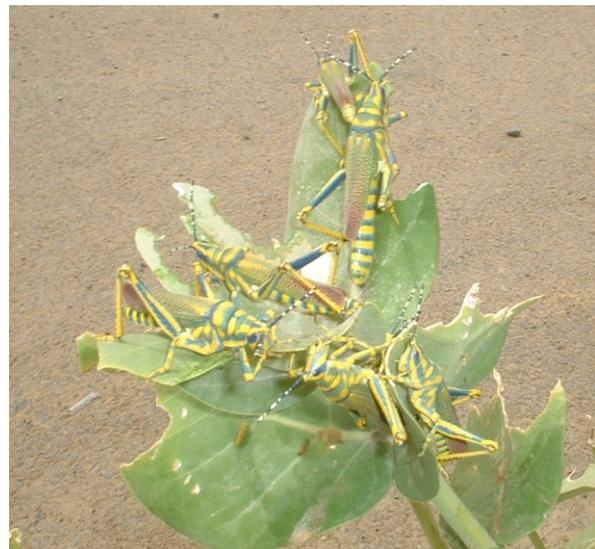
I like to think that most fields of research have a central premise - a discovery/invention/realisation - that they hold sacred. In my mind's eye, I like to imagine each stage of progress in that field as branches and leaves growing outwards from that single kernel. For Civil Engineering and Architecture it was the invention of reinforced concrete - oh! what luck to find that concrete sticks to steel and their combination expands at the same rate avoiding thermal stresses due to the daily heating and cooling. For Molecular Biologists and Genetic Engineers it was the discovery of the Genetic Code - a single recipe for all life on Earth!. For Electronics and Computer Engineers like me it was the invention of the transistor and later on, the internet.

As I begin my amateur waddle into the vast ocean that is the study of insects and microbes, I suspect that the central premise here is the realization that the Earth actually belongs to these tiny creatures and us humans with all our ego and pride are just passerbys. Imagine a marathon where the cheering bystanders exchange Hi-5s with the runners running the marathon - only in our case, we are the bystanders while these tiny creatures who have been here for billions of years and would continue to be here long after we are gone pass us by with their short lives but unbeatable resilience.

My first fascination with things this small, began in 2006. I had just finished graduating from my engineering college and was in Delhi for a project. I saw a bunch of Painted Grasshoppers basking in the Sun on weeds growing next to the footpath. I had just been relieved of the burden of studies and exams and was mentally free to pause and appreciate them. They looked like tiny plastic toys painted with bright colors.

Cameras become pervasive

A month later, I was back at my parent's house in Mumbai. We had just bought a new house in an apartment building surrounded by gardens on three sides and not very far away from the mangroves. We would occasionally be given a visit by some scary centipede or moth with intriguing coloration or the usual praying mantises and dragonfly.



Digital cameras were pervasive by then, and I jumped on each chance to capture a photo of a new creature.

Cut to 2010. My father - a Naval Architect - was posted at the shipyard in Dahej, Gujarat overseeing the construction of a new vessel. The rest of the family (me, mom, brother and grandmother) were



visiting him for a week. There were all sorts of bugs in the compound where we were put up. With lack of internet for entertainment and a brand new DSLR at my disposal, I ventured out to take photos of these insects. I was trying to understand and explore the nuances of photography - aperture, shutter speed, exposure, DOF - as well as learning to be patient - waiting for the right moment to take the shot as these insects moved about their business with great agility. My dad had been into photography since his college time

and I thought I would make him proud by taking the prize shot of a butterfly at the moment when it barely lifts off after sucking the nectar from a flower - proboscis still extended! I came very close - I had spent 2 hours chasing the butterfly. To get a crisp photo, I had to play around with the aperture to maintain the DOF and compensate for the exposure by increasing or decreasing the shutter speed. By evening, the Sun was very close to setting and I could no longer maintain a fast enough shutter speed - The butterfly moves too fast to achieve this goal in anything less than full daylight! I did manage to get some other cool shots. It's amazing how much patience you develop when photographing insects.

The Book Lice Episode

In 2011, I took up a job in Pune. I rented a 1BHK there and used to travel back to Mumbai every weekend to be with my family. During this time my fascination for insects turned to belligerence. I was being harassed by the two of their most pervasive species in two different cities - the book lice in Mumbai and ants in Pune. I could never have imagined that most of my waking hours would be spent worrying about these supposedly inconsequential creatures. During the week I would be researching and experimenting with ways to get rid of the ant infestation in my rented apartments in Pune and on weekends I would reach home in Mumbai to find booklice scurrying around among my painstakingly collected books. Let me talk about the book lice episode.

Over the 4 years of undergrad college and, I had amassed a huge collection of textbooks and for the next 6 years after that, having access to my own finances - I collected an even larger collection of fiction and non-fiction books. I was too attached to my



collection and worried about proper storage, so I designed a wooden bookcase that we got made especially for them. A salesperson dropped a flyer advertising a dehumidifier and my mom suggested that we get one for health reasons. I was all for it because I knew it would help me protect my books from the damaging humidity of Mumbai. And so we got one. I even placed it next to the bookcase. During days of high humidity, we would turn it on at night and shut the door to my room (me and my brother shared the room) for a zero sweat



good night's sleep. In the morning we would turn it off after we woke up.

A few weeks later I started observing small white insects moving around inside the bookcase, on and around the books. At first, I didn't think much of it, but as their numbers grew, I started to get worried. I caught a few of these bugs with cello tape and looked at them under a pocket microscope. They were 1 mm in length but looked scary under 100x magnification. I had photos of these bugs but I didn't know what species they belonged to, or most importantly, how to kill them! I emailed Meenakshi Venkataraman. I had recently purchased her book "A Concise Field Guide to Indian Insects and Arachnids" and thought that maybe she would be able to help me identify them and control them. She replied back informing me that these were "booklice". This was weird! I was using a dehumidifier, wasn't that supposed to deter the book lice?

In any case, I thought maybe the dehumidifier was not enough, so I went to work trying out other strategies - I tried placing neem leaves among the books, camphor, naphthalene and even baking powder + salt mixture to suck out the humidity inside the bookcase. I installed foam tape around the border inside the bookcase trying to make sure the book case sealed well and allowed the desiccants and chemicals that I placed inside to work their magic on the air inside the bookcase. That did not work. I thought that maybe the baking powder + salt mixture was not strong enough and that the air inside the case was still not dry enough to deter their growth. So I got a friend who was returning from the US to get me a pair of gel based mini

dehumidifiers that I could place inside the bookcase. That did not work either.

Every weekend I would spend 2 hours taking out all the books, squishing all the booklice that I could see moving only to repeat the process again the next weekend when I was back in Mumbai. Remember the bookcase was in Mumbai and during the week I was in Pune. I even read that placing the book in a microwave and running it for 90 seconds would cause the water in the bodies of the booklice to boil and kill them. I tried that but some of the books with shiny covers had metallic particles in them which caused damage to the cover when I microwaved.



Then one day, it hit me. The very thing that I purchased to protect my books was responsible for killing them - the dehumidifier. The dehumidifier works on the same principle of refrigeration as a fridge or AC. It cools a surface and places it in the path of force blown air and causes the water vapour to condense out. Like the AC/fridge, the back side of the dehumidifier gave off heat. Throughout the night, it would suck out the humidity from the air inside the room at the cost of increasing the temperature by a few degrees. In the morning, when we turned off the dehumidifier and opened the window, the outside air - full of humidity would rush in and displace the dry air within a few

minutes. But the furniture, walls, bookcase and the book had been absorbing heat all through the night and stayed warm for much longer! The warmth and the inrush of humidity created ideal conditions for the booklice and other microbiota to flourish for a major part of the day as most objects in the room were bad conductors of electricity and cooled down very slowly. I soon found all kinds of mould growing on the underside of the planks of my box bed and also - of all places - on the ceiling. I would find booklice frolicking among the microbiota, perhaps feeding on it?

I discarded the dehumidifier and resigned myself to the fate of cleaning my books, the bed and the ceiling every 2 weeks until the relatively dry days of Mumbai winters. The life cycle of booklice is around 110 days with eggs hatching 2 weeks after laying. The strategy of squishing the booklice every 2 weeks was enough to eradicate them. But the mould and the booklice on the ceiling were more resilient. They got eradicated when we got the house repainted and the furniture polished. I realised that a dehumidifier is only good when used in sealed spaces, kept running for 24 hours and with its heat directed out away from the space it is serving.

The Ant Infestation Episode

While the situation with the booklice was developing in Mumbai, during the week, I had to contend with a new enemy at my rented apartment in Pune. Every night when I returned from work, I would find a line of ants carrying crumbs of food back to their holes. I became careful not to leave food around my house. At the beginning I considered them a minor nuisance, but one day I found thousands of ants migrating

from some crack in the window in the living room and marching to some other point in the kitchen. I killed them all, but they were back the next morning. So, on a particular weekend when I didn't go back to Mumbai, I spent many hours looking for cracks between tiles and on the corners of the floor and sealed each one up with white cement. I was naive to think that that would solve the problem.

So I switched to another strategy. I would



leave Glucon-D around my house and wait for ants to come sniffing for it. Once they had begun transporting the particles back to their colony - which was some crack in the wall or between tiles that I had missed, I would spray some ant insecticide into the crack and seal it with white cement. I



repeated this activity around 20 times, but the ants just wouldn't leave me.

Finally, I discovered a lab in Ahmednagar, who sent me a formulation with ant pheromones mixed with *Beauveria bassiana*. When the bottle arrived, it was puffed, probably due to some gases released by the digestion process that the fungus was undergoing. I opened the bottle and the stuff oozed out from it. I placed it on the floor, the ants got attracted, came over and that was the last time I saw them for the next 1.5 years until I moved to my own flat in December 2012.

Balcony Garden

I got married in 2017. When my wife Divya moved to Pune, we teamed up to explore our shared love for gardening. We have two balconies in our house. We started getting flower pots and new plants every few days. Being a tech geek, I experimented with automating irrigation using a drip system and small pump but the nozzle kept getting clogged with *Spirogyra* or *Algae* so we gave that up and went back to watering using a bucket and a mug. We have many varieties of ornamental flowering plants and some vegetables and herbs.

Cursed Tomatoes



The first thing that we tried to grow was tomatoes. But around the same time that the plants matured to the flowering stage, they

became infested with mealybugs. This was our first time growing a plant and on the very first try they got infested with bugs. By the time we realised what was happening, it was too late and we had to discard the plants.

We tried growing tomatoes again. But the second time they got infected with leaf miners and we had to discard them to prevent the miners from getting onto other plants. But that second time we did get some harvest out of them.



Tired of the leaf miners and mealybugs, we swore not to grow tomatoes again until we had a good handle on preventing infestations of this plant.

For the past 2 years we have seen all kinds of infestations/infections on our plants. None of the remedies that we came across on the internet seemed to work effectively and sometimes would end up damaging the plant (neem oil, soapy water etc etc..). At one point, Divya and I thought of giving up this hobby. But we decided against giving up so easily and persisted. We have a local gardener who runs a small nursery nearby. We call him over once every

three months. He prunes the plants and adds manure and other soil conditioners to each planter. The trimming helped get rid of diseased leaves. From then on, we have started inspecting each plant every 2 days for any signs of infestation and take proactive steps to get rid of them then and there. Our plants are now mostly pest free.

The Praying Mantis Episode

After so much talk of killing, extermination and devouring, let's switch to something different - let's leave it to the reader to decide for themselves if they find the story pleasant or not. Recently, Dviya and I have taken a keen interest in rearing the Common Mormon caterpillars into butterflies. We and two of our friends purchased a flat in the same apartment complex here in Pune back in 2012. All three of us have Curry Leaf Plants on our balcony. Every few months, we wake up on some morning to find the Common Mormon caterpillars on our curry leaf plant. These critters have voracious



diets. While our neighbours get rid of them immediately, we let the ones that appear on our plant to grow to maturity and turn into butterflies and leave. We also have a Kaffir Lime plant which is another favourite of these caterpillars. We in fact got a second “sacrificial” curry leaf plant so that we could let the future caterpillars take turns on alternately feeding on the 2 curry leaf plants and the one Kaffir Lime so that no one of the plant has to bear the brunt of their limitless diets.

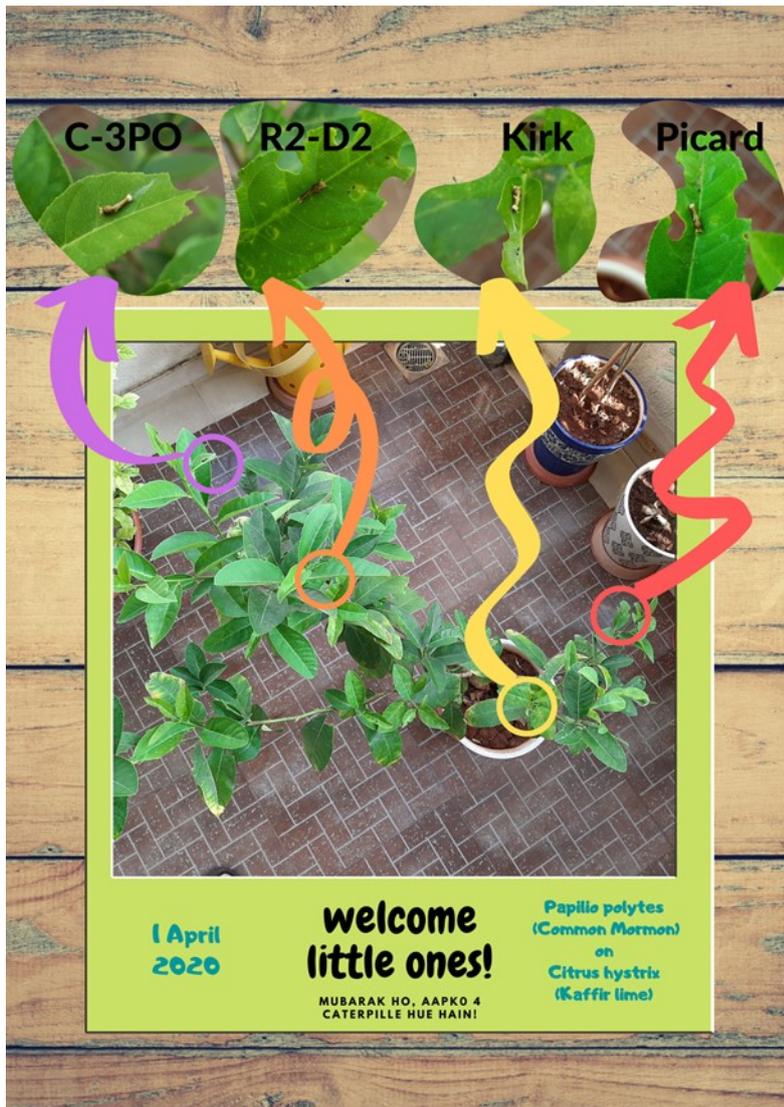
The first time these pretty caterpillars appeared on our plants, we placed them into bottles for two days and then placed them back on the plants so that they may build a cocoon and turn into butterflies. It was fun although we didn’t get to see them emerge from their cocoons. We decided that the next time they appeared, we would make a big deal out of it, look after them and take lots of pictures. The teacher in me awoke and I remembered the 2 years of my Teach For India Fellowship. I thought because the insects have a relatively short lifecycle, it would be practical for 7th and 8th-grade students to study and care for these insects as part of a project during an appropriate time of an academic year. And watching them turn into butterflies would be a reward in itself. So I thought why not try nurturing them ourselves first.

Recently on 1st April 2020, we woke up to find 4 caterpillars on our Kaffir Lime. This was our chance. Divya and I maintain a facebook page (<https://www.facebook.com/DivyaAurAnurag>) where we post comics depicting amusing moments from our daily domestic lives. We would take photos of these caterpillars everyday and post them online. We named the four of them after our favourite sci-fi

characters and started tracking their daily antics. Little did we realise that our project was going to be short-lived. On the first day we also had another guest - a Praying Mantis who sat on the glass pane of the door to the balcony where we kept our Kaffir Lime plant. We were awestruck to have two different insects visit us on the same day. We didn’t give much thought to the praying mantis and Divya took a whimsical photo of me trying to communicate with the Praying Mantis. The next day the Praying Mantis had disappeared.

For the next 4 days, our first task after we woke up would be to take photos of the little caterpillars and post them online. On the 5th day, they were nowhere to be found. We frantically looked all around the Kaffir Lime plant but found no trace of them except for some residue which seemed like shriveled up caterpillars!!!! My first thought was “Did the caterpillar die because of the intense Sun?” - didn’t seem plausible!, The Sun didn’t affect them for the first few days, why would it affect them now? Suddenly Divya made me aware of a movement in the leaves - it was the Praying Mantis! It was camouflaged among the leaves. It whipped out my phone to confirm the worst - the Praying Mantis do feed on caterpillars!. It had probably eaten all 4 of them in a single seating the night before and even pooped out their remains.

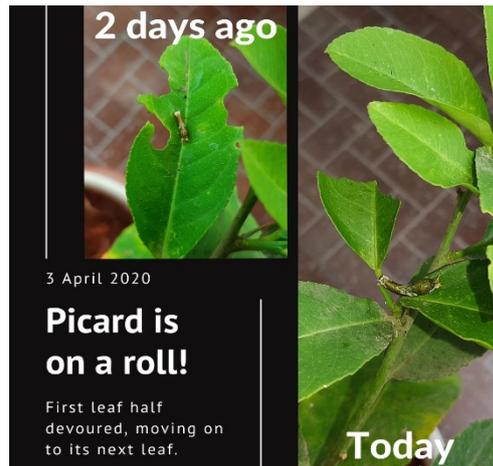
We vow to take care of our caterpillar better the next time. We read more about Praying Mantises. A website said that they serve as good pets. By the time we decided to let go of our grief and redirect our affections instead towards the Mantis, it was gone. Sigh! Perhaps there will be a next time!



Day 1: 1st April 2020 - New Babies!



Also on Day 1 : 1 April 2020



Day 3: Picard is done devouring half of its original leaf, moving on to the next one!



Day 5: 5th April 2020 Praying Mantis ate all 4 caterpillars in a single overnight sitting and pooped them out. Ah! Well! Circle of Life. 🐛🐛

This might be the same Praying Mantis (or should I say PrEying Mantis) that appeared in our balcony on Day 1 when we discovered the new babies on our Kaffir Lime plant. It seems to us that it might have been tracking them, waiting for them to fatten up before devouring them. We didn't know that back then that Praying Mantises could feed on caterpillars.

Closing Thoughts

I and Divya have only just begun to appreciate the world of the tiny living things. There is a lot to learn and understand about them and their life cycle. We have developed fond affection for some of them and would gladly share our homes with them. With regards to others, we wouldn't mind dropping in on them in their natural habitat, but we definitely do not want them in our home. We do realise the naivety of that thought. Once they decide to pay you a visit, it's difficult to keep many of them out of your house. They have been on this plant for much longer than us and will continue to thrive even after we Humans are gone. It's

high time we made peace with them and learnt to co-exist with them, because instead of them passing through our house, it's actually us passing through theirs.

AUTHORS

**Anurag Chugh (Corresponding author)
& Divya Sharma – Engineers and an
insect enthusiast couple from Pune.**

Email: lithiumhead@gmail.com

