Manduca sexta growth log

Tyler Stank

Supplemented with observations from

Kelly Abplanalp, Joseph Pendleton, and Matthew Schmitz

8 Sept 0535Z

One of the eggs hatched around an hour ago. The short caterpillar seemed still for a while, but is now moving around, atop one mound of eggs, and swinging to and fro in what appears to be a search for food.

9 Sept 1513Z

More eggs have hatched. The first caterpillar has found the food brick.

10 Sept 2103Z

The first caterpillar shows noticeable growth. They do not move much, but occasionally shake around as if in some sort of dance. They have taken on a color very similar to the food brick's.

Week 1 updates

Kelly

All four of my caterpillar eggs hatched this week: two on day 4, and two on day 6. I noticed their eggs turning white as they became ready to hatch. They are about 5mm long, light yellowish, with a big horn on their rear ends. They ate their own egg shells, except for the one whose shell got stuck on its horn (which is now crooked).

Matthew

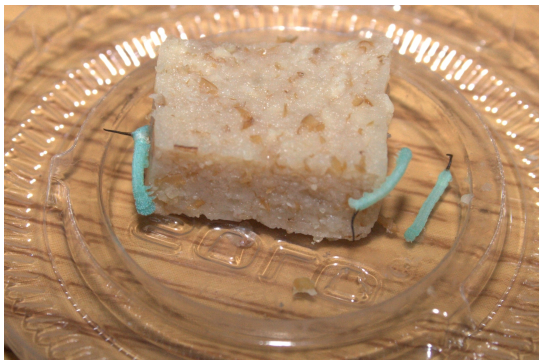
Five caterpillars have emerged. They all have three pairs of legs and five pairs of distinct prolegs.

Joseph

I have three caterpillars after some initial trouble finding a stable environment to grow them in. All of them started out pencil lead small and a cream color with a brown spike on their rear.

13 Sept 1920Z

All eggs have hatched; two have died, but seven are still alive. Insects appear to be over 1cm, but I have not measured them. The horns are quite large. They are all a healthy looking green color. They usually show no movement.



14 Sept 1904Z

One of the caterpillars appears to have grown massively overnight. I now see the diagonal striping characteristic of M. sexta beginning to appear on the largest caterpillars, now approaching 2cm length. They still show a disturbing amount of lack of movement except when I move their container.

15 Sept 2225Z

Little has changed since my last observation. The caterpillars are getting slightly larger, but not as quickly as between the last two observations.

18 Sept 0222Z

Again, the largest has grown significantly. There is now more detail visible in the color schemes; black in addition to the white stripes. The colors are beginning to look more blue.

Week 2 updates

Kelly

The caterpillars are bright bluish green now, and are beginning to show slight stripes on their sides. They love their diet and eat it all day long! They have entered their second instar.The caterpillars are bright bluish green now, and are beginning to show slight stripes on their sides. They love their diet and eat it all day long! They have entered their second instar.

Matthew

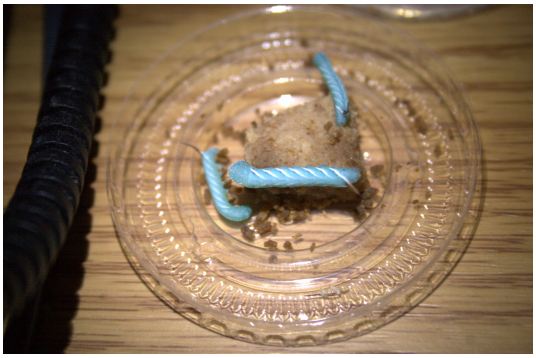
The caterpillars no have interesting coloration and are getting fat. Approximately 13mm in length. One of the five has been laying motionless for 36 hours now. Each has been put in its own container.

Joseph

Three more caterpillars have hatched. All have grown steadily and transformed to an acidic green color. To prevent cannibalism, I have separated the larvae into three containers containing two larva each.

20 Sept 0243Z

The two largest Manduca are currently roughly the same size, and show no significant growth since yesterday. They show the stripes and very prominent horn characteristic of the species, and are about 2cm in length.



22 Sept 2320Z

The two largest Manduca are starting to eat noticeable chunks out of the corners of the food cube. They all seem to enjoy resting against the side of the container. The largest are quite large; I would estimate 3cm, including the horn.

Week 3 updates

Kelly

The caterpillars are now in their third and fourth instars. They are eating even more diet, and their stripes are bright white. I fed them some tomato leaves, and their color gradually became a bit greener. The largest caterpillar is about two inches long.

Matthew

Caterpillars have been still for two days, but can be seen to be molting.

Joseph

The larvae have grown extremely rapidly. Due to container constraints I froze 4 of the larva. The two remainders of the six have grown to about the size of my little finger. They also have started to show distinct white streaks with black accents, and their tracheas are clearly visible on their abdomen. They spend most of their time eating the diet.

29 Sept 0304Z

The largest M sexta now stretches the diametre of its larger container. The thing is huge and eats a ton. Features are all well-defined: spiracles, stripes, eyes, legs, and the horn.

30 Sept 1303Z

Things are largely unchanged since the last observation. The M sexta are large and like to eat.

Week 4 updates

Kelly

This week I took my Manduca sexta on a road trip to Grand Forks, ND. They have grown immensely and are about three inches long. They got to hang out in a hotel room with the Wisconsin Flying Team, and I took the biggest one for a ride in an airplane. She didn't seem to notice.

Matthew

The largest caterpillar is mashing food and making a terrible mess. Its heart line is strong and it is audibly chewing on its container. It will be placed in its mansion soon. It has a silky goo on its posterior.

Joseph

Both caterpillars have grown to about the size of my middle finger. I put them in the manduca mansion on Thursday and Friday, and each successfully buried itself within two hours. I knew it was time to make the switch because their hearts were clearly visible on their dorsal sides and both had absolutely destroyed their food blocks. Once each caterpillar buried itself I was no longer able to observe them for the rest of the week

6 Oct 1214Z

One of the specimens was placed in the mansion by my roommates while I was gone. Another looks unwell and has been placed in emergency housing. A third appears it will be ready for the mansion soon.

7 Oct 2212Z

The last surviving M sexta has been placed in the mansion. I am making a time-lapse of the burrowing, which should be entertaining to watch if nothing else. If I ever manage to turn it into a video it will be at

`http://pages.cs.wisc.edu/~stank/videos/manduca.zip`

No later than 14 January 2015.

Week 5 updates

Kelly

Early this week two of my caterpillars stopped eating, and their dorsal vein was dark and pulsating. They both dug down into their pupation chambers! The younger two followed suit a few days later.

Matthew

The largest oozes and smells pungent and acidic. It has been moved to emergency housing.

Joseph

Larvae remain under the soil, they are not near the edge so I cannot observe what is occurring.

Whole week (10—16 Oct.)

No change. Caterpillars still underground.

Week 6 updates

Kelly

No change

Matthew

No change

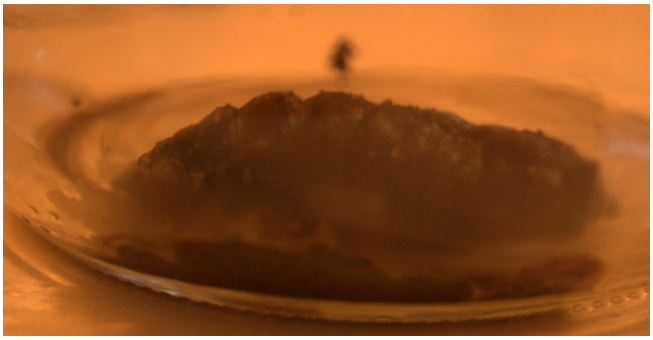
Joseph

I dug up both pupae today. Both were a reddish tan color. The abdomen, wings, eyes, and proboscis are clearly visible. When they were moved their abdomen moved around violently which was a surprise because their exoskeleton seems to be very rigid.

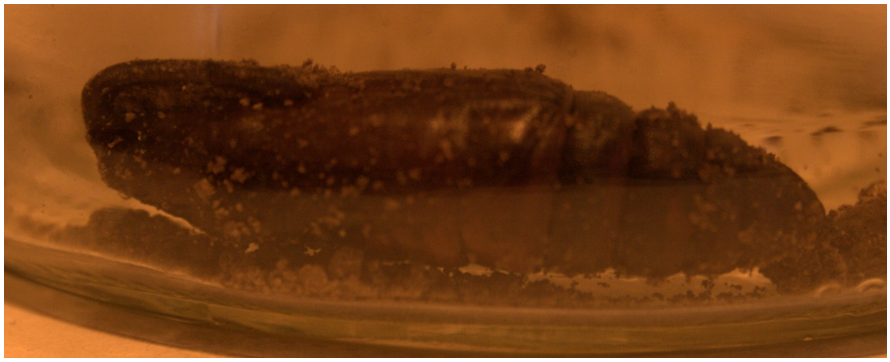
21 Oct. 2103Z

I removed all of my pupas from their respective mansions today. The one placed in emergency housing is quite brown and somewhat deformed, but it wiggles when handled; the other two look similar to one another, and are darker and thinner than the emergency-housed pupa. One looks considerably healthier than the other, though; I fear the third may not have made it.

The deformed pupa from emergency housing



The unhealthy looking pupa



The healthy-looking pupa

Week 7 updates

Kelly

No change

Matthew

No change

Joseph

No change in pupae

Whole week (24-30 Oct.)

The unhealthy pupa has started releasing a rather unhealthy-looking black fluid into its container and smells quite terrible. These are sure signs of death.

Week 8 updates

Kelly

I dug up all four pupae this week. Two are significantly larger than the others. They are dark brown and move strongly when disturbed.

Matthew

No change

Joseph

No change in pupae

Whole week (31 Oct.—6 Nov.)

No change

Week 9 updates

Kelly

The larger two pupae are darkening in color.

Matthew

All have been removed from housing. Quite a few have deformities.

Joseph

One of my pupae has become nearly black and its exoskeleton appears to have become more brittle. I believe the moth will emerge with in the next week. The other pupa remains the same.

14 Nov. 2014

I took advantage today of the opportunity to have my pupae inspected and checked for diapause; none are currently in diapause, but the one that was in emergency housing seemed to deformed and was exchanged for a healthy pupa.

Week 10 updates

Kelly

The first moth emerged today late at night. I heard rustling sounds and saw the moth climbing up the stick. Its wings looked very small and curled, but by morning time there were fully expanded. It has bright orange spots on its back and is surprisingly furry. It left a mysterious puddle of orangish liquid.

Matthew

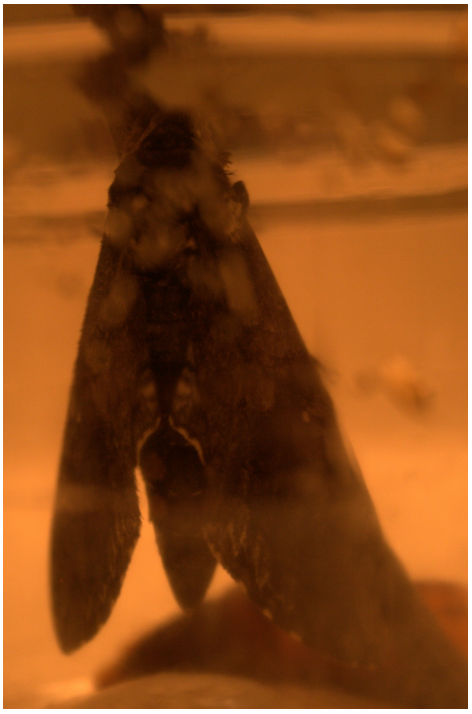
No change

Joseph

My moth emerged. It is about two inches long and would have a wing span of about three inches. It is surprisingly very hairy and its wings although fully developed seem small compared to its large thorax and abdomen. It has the characteristic pairs of six spots along its abdomen. I was not able to see it emerge and it is oddly inactive. Either way I plan to freeze both the pupa and the moth this week and turn them in.

19 Nov. 2034Z

The first moth finally emerged! It's a bit hard to get photos in its current container. It's brown and a bit furry, and quite large. It's also surprisingly sedentary for an insect having just emerged from a pupa in a peanut butter jar.



Week 11 updates

Kelly

The remaining three moths emerged this week. They enjoy sipping sugar water off of sticks. When extended, their proboscises are longer than their bodies.

Matthew

The largest has finally emerged from its cocoon! It left quite a bit of liquid spillage, which even wicks up the paper towel stick! The moth was terminated by being released outdoors, then turned in to class.

Joseph

No observation.

Whole week (21—28 Nov.)

The two remaining M sexta have yet to emerge; I doubt they ever will. Having turned in one already, I will be terminating the others shortly.

Summary

I rather enjoyed the experience of raising these moths. It quite surprised me how much they ate and how quickly they grew. The evolutionary programming of such behaviors as metamorphosis is rather astounding; it is amazing how the insects simply know when it is time to metamorphose, stop eating, and search for a place to bury themselves so they can become adults. Seeing the results of metamorphosis firsthand was also quite an experience; it astounds me that these insects can form a cocoon, show little to no change on the outside, and go from being a green caterpillar to a brown furry moth. Another takeaway from this was just how fragile insect life is (and life in general, for that matter); I started with nine eggs, and only had one moth emerge, and the only deaths I can attribute to known factors are the pupa my roommates put in its mansion too early and the one they never put in its mansion when it belonged there.