

Natalie Warr

FYS 110-01

Rochelle Johnson

08 December, 2021

### The Atlas Moth: Magnificence, Tragedy, and Legacies

When you look at this atlas moth, you see the reason for survival. As I wandered through the Orma J. Smith Natural History Museum, I was nearly overwhelmed by its diversity of specimens: huge mammals, sparkling geodes, preserved sea creatures, historical artifacts. Among all of these, though, I was most drawn to a glass case containing two huge, winged creatures. Their intricately detailed wings had faded to gray, but it was obvious they used to be bright and brilliantly colored. One was smaller than the other, yet it had a wingspan nearly the size of my hand, and both had bodies and antennae that were bigger than any insect I had seen in the wild. I wondered about the life that these atlas moths, as I would soon learn they were called, must have lived before they were posthumously put on display. Surely these huge, grandiose, mildly terrifying animals must have a spectacular story, filled with long distance flights and complex interactions. I soon found that the story of the atlas moth was quite different from my initial thoughts, but it is no less fascinating. The atlas moth makes a powerful statement about how the significance of life can be found in the pursuit of survival and a meaningful legacy.

The atlas moth (*Attacus Atlas*) has a name that is surrounded by a level of mystery, in that its origins have not survived the test of time. The two popular theories are that the name refers to the map-like pattern of its wings (Pavid), or that the moth was named after the Greek titan Atlas due to its large size (Cherry). Speaking of the moth's size, "large" may be an understatement: females have a wingspan of 24 to 25 centimeters, while males are slightly

smaller with a 21-to-23-centimeter wingspan (Bhawane, et al). The atlas moth has the largest wing surface area of any other moth on Earth and has one of the largest wing spans; the white witch moth of Central and South America, with a wingspan of 14 inches (35.6 centimeters), is one of the only moths that can claim to be larger (California Academy of Sciences).

Before it is bestowed with a magnificent pair of wings, the atlas moth begins its quest for survival rather humbly. A larva, or caterpillar, emerges from the egg with only one purpose: to eat in order to survive. The caterpillars mainly eat leaves from cinnamon, citrus, guava, and Jamaican cherry trees (Pavid), all native to the moth's home in southern and southeastern Asia (California Academy of Sciences), and defend themselves against predators such as ants by spraying an irritating secretion (Deml and Dettner). The caterpillars will do little more than eat for 32 to 45 days before forming a cocoon and entering the pupal stage for a similar length of time (Bhawane, et al). Finally, the creature emerges as a moth, with its brilliant and recognizable wings, intricately detailed in brown, yellow, red, purple, and black patterns (Iowa State University) created by many tiny, overlapping scales (California Academy of Sciences).

Of course, the ornate designs of the atlas moth's wings serve a purpose beyond simple beauty; they are a source of protection against life-threatening predators. For one thing, each wing contains two translucent windows known as "eyespot." These windows could not only startle predators, but also divert attention to a part of the moth that, if attacked, would not kill it as opposed to the head or body (California Academy of Sciences). The most obvious and arguably most famous defense mechanism of the atlas moth is that of its snake head wing tips, which resemble the side view of a cobra's head. The moth can even flick its wings in a certain way that resembles the swaying of "a snake about to strike" (Williams). This snake head design

is even the inspiration for the Cantonese name for the moth, which translates to “snake’s head moth” (Iowa State University).

Despite the species' millennia-long survival, there seems to be a rather discouraging futility and irony to the life of the atlas moth. After all, its adult stage of life only lasts about ten days, in which the moth’s one main purpose is to reproduce. Female moths will release pheromones; these can travel several kilometers and are sensed by male moths via chemoreceptors on their larger, feathery antennae (Majumder). This pheromone-antenna interaction allows for sophisticated courtship patterns (Gandy, 20). A female atlas moth typically lays between 150 and 300 eggs at a time on a leaf that caterpillars can eat, whether they have been fertilized or not (Herpetological Society of Ireland). The eggs take approximately 6 to 12 days to hatch, beginning the life cycle again (Bhawane, et al); the payoff of the moth’s effort for survival.

Ten days seems like not enough time for such a majestic animal to live, particularly when that short survival is spent rather underwhelmingly. This fleeting life can be attributed to the fact that the atlas moth isn’t able to eat once it has left its caterpillar stage. The atlas moth’s proboscis, which many species of butterflies and moths use to drink nectar, is nonfunctional. The moth must live off the fat it built up as a caterpillar (Pavid), which emphasizes the importance of the large amounts of food that the caterpillars consume. Additionally, their severely limited energy supply prevents the atlas moth from flying often; they are nocturnal, remaining relatively dormant during the day and only seeking a mate at night (Pavid). Given these facts, one may be initially disappointed by the atlas moth. Someone who knew nothing about it besides its gargantuan size and intriguing appearance would likely hope for a constantly flying, flapping wonder with a lengthy and significant life, an animal that could outlive and devour its tinier

counterparts. However, none of these predictions match reality. One may even begin to wonder if the life of the atlas moth matters at all.

This is, of course, a rather pessimistic take on the atlas moth's existence; it has numerous reasons for survival. For example, the moth contributes in multiple ways to humans, such as through silk production. Atlas moth cocoons don't look like they can create anything particularly beautiful – they are large and made up of brown, broken strands called fagara (Pavid) compared to the smaller white cocoons produced by the more common domestic silk moth. However, studies of the two different silk fibers' compositions, structures, and strengths have found that they are quite similar (Reddy, et al). Therefore, the possibility exists for atlas moth cocoons to be used for silk production on a commercial level. Currently, however, atlas silk is most commonly found in the form of relatively small-scale folk craftwork. Atlas silk is traditionally used to make soft, brightly colored clothing by the Uygur people of China. This tradition dates back over one thousand years, and even today is a lucrative industry that creates profits and stability for the people who still weave atlas silk (Han). It is also common in places such as Taiwan for atlas moth cocoons to be made into purses. During the 1970s, Taiwanese atlas moths were even raised in large numbers to meet the demand for both cocoon purses and decorations in the form of displayed adult moths. This practice declined along with the insect industry in the 1980s, however, and the population was allowed to return to its normal state.

There is a downside to silk production, though; despite it being highly beneficial for humans, the animals who produce the fibers do not survive the process. In mainstream silk production, which uses the domestic silk moth, the cocoons are boiled shortly after formation in order to kill the larvae inside. It is estimated that one pound of silk requires some two to three thousand silkworms to be killed (Egglestone). Human interference in the form of selective

breeding has also led the silk moths that are allowed to reach adulthood for breeding purposes to have shrunken, atrophied wings (Egglestone). Atlas moths are not killed and maimed on nearly as large a scale as the domestic silk moth, though they too are boiled as pupae for the fagara they produce. Only time will tell whether the atlas silk industry will remain as it is or even grow in popularity; as one anonymous writer puts it, “the parallels between [the atlas moth and [the domestic silk moth] foreshadow future complications from human interference with insects” (Rice University). Hopefully, these moths will continue to be allowed to live relatively unscathed by harmful effects of domestication and human encroachment, but silk is not the only reason for which atlas moths suffer.

It is also quite easy to find atlas moths whose lives have been cut short for the purpose of display. A simple online search gives results for dozens of taxidermy atlas moths for sale, preserved in glass cases and shadow boxes. The practice of preserving and displaying insects is nothing new, of course. An early account of atlas moth observation written by Philip Henry Gosse in 1879 describes his preservation of the specimen: “Reluctantly, to preserve its perfect beauty, I now prepared a bed of bruised laurel, in a tight glass vessel, to which I transferred it together with its foot-hold. It stirred no more than before, soon lapsed into perfect quietude, and, as I hope, insensibility, under the powerful narcotic” (Gosse, 7). Today, similar processes are used to kill butterflies and moths for display. Specimens are often trapped in an aptly named “killing jar,” which contains poisonous ethyl acetate, or else a forceful squeeze to the thorax of a specimen while it is immobilized in a net can kill it (Texas A&M). There are several valid arguments for continuing the practice of preserving insect specimens; it can help scientists study insects over time, collect data about their different features, and learn about their relationships and interactions with the environment (Texas A&M). However, there is certainly a case against

this practice as well. Research has shown that certain insects have complex personalities and behaviors: one study found that firebugs had varying “levels” of boldness, sociability, aggressiveness, and explorative nature (Prescott). This suggests that many insects, likely including the atlas moth, are not less valuable or more disposable than any other, more complex animal.

So, while these points consider benefits humans are able to reap from the atlas moth, they are all harmful to the insect. It may seem as though there is nothing else that can come from the life of the atlas moth – that it lives its short life consisting of nothing more than eating and reproducing then dying at the end, if not sooner at the hands of a silk maker or curious collector. One might think that the atlas moth is not the brilliant creature of power it seems like at first glance; rather, a fragile and insignificant animal that can only look forward to tragedy. Even the impressive specimens in the Orma J. Smith Natural History Museum have been preserved in a glass case for over fifty years, their once vibrant colors faded to gray due to temperature stress or UV rays. However, all this considered, the atlas moth cannot be considered obsolete. It possesses a certain strength, as well as a purpose, that encompasses an important reason for survival.

The strength and resilience of the atlas moth is well demonstrated by one of its only representations in popular media. The atlas moth (along with other similar giant silk moths) likely served as inspiration for the Japanese film company Toho Studio’s famous movie monster Mothra (Gandy, 14). Toho Studios is arguably most notable for its creation of the dinosaur-like monster Godzilla, but some may be surprised to discover that Mothra is nearly as popular a character, particularly in the studio’s native Japan and among female fans (Ito). While not the only female kaiju (the Japanese word for Toho’s movie monsters), Mothra is without a doubt the most well-known and revered. This might be because of Mothra’s unique personality and

portrayal: unlike most of the other kaiju, she is always characterized as a benevolent figure. In all 16 of the films Mothra appears in, she is always a hero, fighting to protect Japan, her native island, or even the entire planet from other villainous monsters – she is in this way the antithesis of Toho Studio’s other famous characters. She fights in both her caterpillar and adult form, using a fierce bite and shooting silk streams or the powerful flap of her wings, respectively. It is important to remember though, that Mothra possesses pacifist tendencies and doesn’t kill intentionally (Ito). The most powerful sentiments regarding this character, though, come from Michael Dougherty, the director of a 2019 Godzilla film featuring Mothra. Dougherty is quoted saying, “What makes her so much more interesting than some of the other kaiju is that she sort of represents that endless cycle of life, death, and rebirth... So even though she has this reputation of sacrificing herself in every film, if you really think about it, she never really dies, ever” (Ito).

Obviously, there are differences between Mothra and the atlas moths that inspired her design. In terms of fighting, the atlas moth must play more of a defensive role than an offensive one, and it doesn’t have the ability nor need to defend any being besides itself. However, the atlas moth is rather pacifistic, doing no harm to humans, other animals, or its environment. And, in a slightly indirect way, the existence and characterization of Mothra brings new meaning to the life and apparent purpose of the female atlas moth in particular. A life consisting of eating, remaining stationary until a mate comes along, laying eggs, and dying is rather passive and dry. But this life cycle of reproduction in a way provides an everlasting life to the atlas moth; much like Mothra, the endless cycles of death and “rebirth” means that the life of the moth never truly ends.

Fundamentally, the purpose of the atlas moth is the same as the purpose of humans or any other animal on Earth: to survive. Granted, from a biological perspective, it might be argued that

the purpose of life is to reproduce. In the words of Lawrence Rifkin, “By making babies, we continue life's pageant. In children, we cheat death.” However, Rifkin goes on to argue that child production should not be linked to meaningfulness, as it is a slight to personal choice and independence. Reproduction is only a valid reason for life from an evolutionary genetic view (Rifkin). Marcelo Gleiser of NPR has a similar sentiment, asserting that there is one objective in life more important than reproduction: survival. He states that, “To be alive is to want to remain alive...The essential difference between the living and the non-living is the urge for preservation. Life is a form of material organization that strives to perpetuate itself” (Gleiser). In other words, the drive to keep going, to stay alive, is essentially what describes life. One cannot claim that something is truly living, or that they themselves are living, if there is no desire for self-preservation and continued survival. At the end of the day, life wants nothing more than to be preserved. Living creatures only change if it benefits them, in order to be better adapted to their environment (Gleiser). This can be observed in the atlas moth as well as in humans (whom these authors focused on most). From the moment they hatch from the egg, atlas moth larvae eat as much as possible in order to build enough energy to survive the maximum number of days as adults. The various fascinating defense mechanisms possessed by the moths in all stages of life further prevent their short time alive from being ended prematurely. Overall, meaning is represented in the atlas moth's life partly just from its desire to live.

This is an interesting perspective on survival, as well as one that may seem unsatisfying. It might be discouraging to think that the reason to live is simply to continue living; it is common for humans to believe there is a greater purpose than that. Indeed, the secret to a meaningful life has been pondered for centuries. Iddo Landau, a modern subjectivist philosopher, has a simple yet poignant take on the topic: “A meaningful life is one in which there is a sufficient number of



aspects of sufficient value, and a meaningless life is one in which there is not a sufficient number of aspects of sufficient value” (Livni). In other words, meaning can be derived from possessing an amalgamation of various elements and endeavors. These elements could be tangible subjects like relationships, volunteer work, and creative activities (Livni), or they could be more abstract, such as focusing on the past and future as well as the present, expressing personal identity and the self, and providing for others (Baumeister, et al). Of course, the atlas moth is simply an insect; it does not have the mental capacity (not to mention the physical ability) to reflect on its history and identity or develop deep social relationships, but to reiterate, its desire for survival alone gives it meaning. While humans can embellish their lives with extra valuable assets like careers, complex relationships, and diverse interests to go along with their increased physical and mental complexity, there is no other real separation between the purpose of humans and the purpose of atlas moths.

Ultimately, though, the greatest purpose of the atlas moth, which is more all-encompassing than simply surviving, is to leave behind a legacy. As previously established, the life of the atlas moth leads up to reproduction – conceiving and laying eggs are some of the last things the moth does before it dies. Rather than seeing this action as a negligible side note or an unfortunate finale for the atlas moth, it should instead be viewed as its all-important contribution to the future world. Leaving a legacy is something that holds importance for many people, as it provides the opportunity to have meaning beyond one’s own life and time. In the words of writer and researcher Susan V. Bosak, “Legacy is fundamental to what it is to be human. Research shows that without a sense of working to create a legacy, adults lose meaning in their life. Exploring the idea of legacy offers a glimpse not only into human relationships and building strong communities, but also the human spirit” (Bosak). Reflecting on and building a legacy

allows one to pass on their knowledge, skills, and experiences to others, meaning that what was learned and gained throughout one's life is surely able to be used; it solidifies the meaning of the life one has lived and makes sure it does not go to waste. For humans, a legacy could be many things: a book, a business, a home. And yes, one's legacy could also be the children and grandchildren they leave behind. While this certainly isn't the choice that everyone desires, it can certainly be motivational; knowing the world and life one leaves behind will be inherited by their children can inspire them to make their legacy significant. Understanding that one is part of a larger world community that they can add to enables meaning and allows for an improved future (Bosak). It creates an environment where people care for one another and take care of the world outside of themselves for the greater good.

So, while the legacy of the atlas moth does not have the possibility to be nearly as multi-faceted or complex as a human's, it nevertheless defines the moth's reason for survival. Every atlas moth has a different fate, of course: some become the victims of the silk industry, others live out eternity pinned in a glass case, while still more may live to be a model for a figure of power and heroism. The majority will simply grow, reproduce, and die. This humble path, however, is not insignificant. The atlas moth focuses on its self-preservation above all else, because without an adequate lifespan, the moth's legacy – its eggs – will never be introduced to the world. Without this legacy, the moth would not be remembered, it would cease to exist. It is in this way that we are much like the atlas moth. It is easy to feel as if one's own life is insignificant; we may feel unfulfilled in our careers, our relationships, or our accomplishments. However, a sense of purpose can be achieved through an infinite number of pathways, from a selfless mindset, to caring for those we love, to simply looking forward to living another day. And of course, just like the atlas moth, we can focus on what we will leave behind for future

generations in order to find meaning, because what we leave behind is what ensures we're remembered. Just like the atlas moth, we can establish our place as giants in the world focusing on our most basic reasons for survival.

## Works Cited

- “Atlas Moth Care.” The Herpetological Society of Ireland, The Herpetological Society of Ireland, 20 Aug. 2015, <https://thehsi.org/2015/06/04/atlas-moth-care/>.
- “Atlas Moth.” California Academy of Sciences, California Academy of Sciences, <https://www.calacademy.org/explore-science/atlas-moth>.
- “Atlas Moth.” Reiman Gardens: Iowa State University, Reiman Gardens, <https://www.reimangardens.com/2015/07/atlas-moth/>.
- Baumeister, Roy F, et al. “Some Key Differences between a Happy Life and a Meaningful Life.” Taylor & Francis, Informa UK Limited, 20 Aug. 2013, <https://www.tandfonline.com/doi/full/10.1080/17439760.2013.830764>.
- Bhawane, Ganesh, et al. “Life History of Attacus Atlas Linn. (Saturniidae: Lepidoptera) On Sapium Insegne Benth. From Western Ghats, Maharashtra.” The Bioscan, June 2011, [https://www.researchgate.net/profile/Amol-Mamlayya/publication/261296626\\_LIFE\\_HISTORY\\_OF\\_ATTACUS\\_ATLAS\\_LINN\\_SATURNIIDAE\\_LEPIDOPTERA\\_ON\\_SAPIUM\\_INSEGNE\\_BENTH\\_FROM\\_WESTERN\\_GHATS\\_MAHARASHTRA\\_G\\_P\\_BHAWANE\\_A\\_B\\_MAMLAYYA\\_Y\\_J\\_KOLI\\_Y\\_A\\_PHONDEI\\_S\\_R\\_ALAND\\_AND\\_S\\_M\\_GAIKWAD\\_Department\\_of\\_/links/0deec533d272ece65e000000/LIFE-HISTORY-OF-ATTACUS-ATLAS-LINN-SATURNIIDAE-LEPIDOPTERA-ON-SAPIUM-INSEGNE-BENTH-FROM-WESTERN-GHATS-MAHARASHTRA-G-P-BHAWANE-A-B-MAMLAYYA-Y-J-KOLI-Y-A-PHONDEI-S-R-ALAND-AND-S-M-GAIKWAD-Departmen.pdf](https://www.researchgate.net/profile/Amol-Mamlayya/publication/261296626_LIFE_HISTORY_OF_ATTACUS_ATLAS_LINN_SATURNIIDAE_LEPIDOPTERA_ON_SAPIUM_INSEGNE_BENTH_FROM_WESTERN_GHATS_MAHARASHTRA_G_P_BHAWANE_A_B_MAMLAYYA_Y_J_KOLI_Y_A_PHONDEI_S_R_ALAND_AND_S_M_GAIKWAD_Department_of_/links/0deec533d272ece65e000000/LIFE-HISTORY-OF-ATTACUS-ATLAS-LINN-SATURNIIDAE-LEPIDOPTERA-ON-SAPIUM-INSEGNE-BENTH-FROM-WESTERN-GHATS-MAHARASHTRA-G-P-BHAWANE-A-B-MAMLAYYA-Y-J-KOLI-Y-A-PHONDEI-S-R-ALAND-AND-S-M-GAIKWAD-Departmen.pdf). Accessed 16 Nov. 2021.
- Bosak, Susan V. “What Is Legacy?” Legacy Project, SV Bosak, <https://www.legacyproject.org/guides/whatislegacy.html>.

- Cherry, Ron H. "Insect Names Derived from Greek and Roman Mythology." *American Entomologist*, vol. 43, no. 4, 1997, pp. 212–216., <https://doi.org/10.1093/ae/43.4.212>.
- Deml, Reinhold, and Konrad Dettner. "Attacus Atlas Caterpillars (Lep., Saturniidae) Spray an Irritant Secretion from Defensive Glands." *Journal of Chemical Ecology*, Kluwer Academic Publishers-Plenum Publishers, Aug. 1994, <https://link.springer.com/article/10.1007/BF02066249#citeas>.
- Egglestone, Ryan. "Silk-Making Is an Ancient Practice That Presents an Ethical Dilemma." *Discover Magazine*, 12 Jan. 2021, <https://www.discovermagazine.com/planet-earth/silk-making-is-an-ancient-practice-that-presents-an-ethical-dilemma>.
- Gandy, Matthew. *Moth*. Reaktion Books, 2016.
- Gleiser, Marcelo. "Does Life Have a Purpose?" NPR, NPR, 19 June 2013, <https://www.npr.org/sections/13.7/2013/06/18/193084099/does-life-have-a-purpose>.
- Gosse, Philip Henry, and West, Newman & Co. *The Great Atlas Moth of Asia (Attacus Atlas, Linn.): With a Coloured Plate of Its Transformations: by Philip Henry Gosse*. West, Newman & Co., 1879. *Nineteenth Century Collections Online*, [link.gale.com/apps/doc/CPNTGC270530064/NCCO?u=cald35541&sid=bookmark-NCCO&xid=18354a2c&pg=13](http://link.gale.com/apps/doc/CPNTGC270530064/NCCO?u=cald35541&sid=bookmark-NCCO&xid=18354a2c&pg=13). Accessed 3 Nov. 2021.
- Han, Jie. "Atlas Silk: Ancient Folk Craftwork Still a Hit along New Silk Road." CGTN, CGTN, 2017, [https://news.cgtn.com/news/3d51544d79677a4d/share\\_p.html](https://news.cgtn.com/news/3d51544d79677a4d/share_p.html).
- Ito, Robert. "Mothra: Yin to Godzilla's Yang." *The New York Times*, 29 May 2019, <https://www.nytimes.com/2019/05/29/movies/mothra-godzilla-king-of-the-monsters.html>.

- “It's a Sad, Sad World Atlas Moths Live In.” Rice University Insect Biology Blog, Rice University, 2 Dec. 2013, <http://insectbio.rice.edu/2013/12/02/its-a-sad-sad-world-atlas-moths-live-in/>.
- “Killing Specimens.” Bug Hunter, Texas A&M, <https://bughunter.tamu.edu/preservation/killingspecimens/>.
- Livni, Ephrat. “The Secret to a Meaningful Life Is Simpler than You Think.” Quartz, Quartz, 24 June 2018, <https://qz.com/1310792/the-secret-to-a-meaningful-life-is-simpler-than-you-think/>.
- Majumder, Joydeb. “Attacus Atlas L. (Saturniidae): a New Distribution Recorded from Tripura, Northeast India.” NeBIO, vol. 2, June 2011, [https://www.researchgate.net/profile/Joydeb-Majumder-3/publication/312045309\\_Attacus\\_atlas\\_L\\_Saturniidae\\_a\\_new\\_distribution\\_recorded\\_from\\_Tripura\\_Northeast\\_India/links/586ccc8a08ae8fce4919f445/Attacus-atlas-L-Saturniidae-a-new-distribution-recorded-from-Tripura-Northeast-India.pdf](https://www.researchgate.net/profile/Joydeb-Majumder-3/publication/312045309_Attacus_atlas_L_Saturniidae_a_new_distribution_recorded_from_Tripura_Northeast_India/links/586ccc8a08ae8fce4919f445/Attacus-atlas-L-Saturniidae-a-new-distribution-recorded-from-Tripura-Northeast-India.pdf). Accessed 16 Nov. 2021.
- Pavid, Katie. “Spotlight: The Atlas Moth.” Natural History Museum, The Trustees of The Natural History Museum, London, <https://www.nhm.ac.uk/discover/spotlight-the-atlas-moth.html>.
- Prescott, Megan. “Do Insects Have Personalities? Yes They Do, Says This Researcher.” Ideas.ted.com, TED Conferences, LLC, 13 Apr. 2021, <https://ideas.ted.com/do-insects-have-personalities-says-firebug-researcher/>.
- Reddy, Narendra, et al. “Structure and Properties of Cocoons and Silk Fibers Produced by Attacus Atlas.” Digital Commons, Digital Commons, 2013,

<https://digitalcommons.unl.edu>

[/cgi/viewcontent.cgi?article=1031&context=textiles\\_facpub](https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1031&context=textiles_facpub).

Rifkin, Lawrence. "Is the Meaning of Your Life to Make Babies?" Scientific American Blog Network, Scientific American, 24 Mar. 2013, <https://blogs.scientificamerican.com/guest-blog/is-the-meaning-of-your-life-to-make-babies/>.

"Ten Reasons for Collecting and Preserving Insect Specimens." Bug Hunter, Texas A&M, <https://bughunter.tamu.edu/tenreasons/>.

Williams, Nigel. "Winging It." Current Biology, Cell Press, 12 July 2010, <https://www.sciencedirect.com/science/article/pii/S096098221000792X>.