





*PAPA! PAPA!*



*I NEED YOU!*



What is it, little one?





Won't you tell me  
the story again?

What story?

You know...the story of  
how you and **Papa** met?

Ah! That story...

Well young one, I have an idea...

What Papa?



With our patrol of the lake done, why not  
have both of your **Papas** recount their romance?



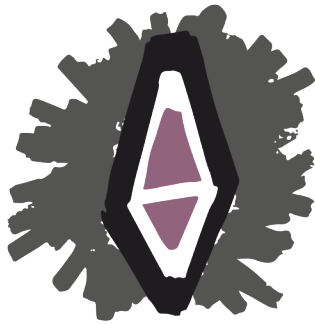
How are the eggs,  
my darling?



Hi Papa!



Should be hatching  
any minute now...



*ENOUGH EGG TALK!  
TELL ME THE STORY!*

Oh, this again...

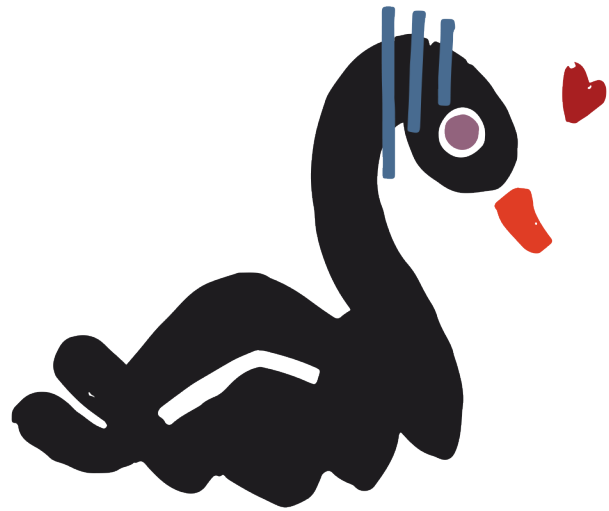


I thought maybe this time,  
we both could tell it!



Hm, could be fun...  
Why not!





Well, when I first laid eyes on your father...  
I was taken aback by how beautifully his feathers curled!

A sign of good health you know!



He had far more than I did at the time and,  
for as silly as it may sound, I was jealous of him



I knew that if I ever wanted  
to capture his heart...

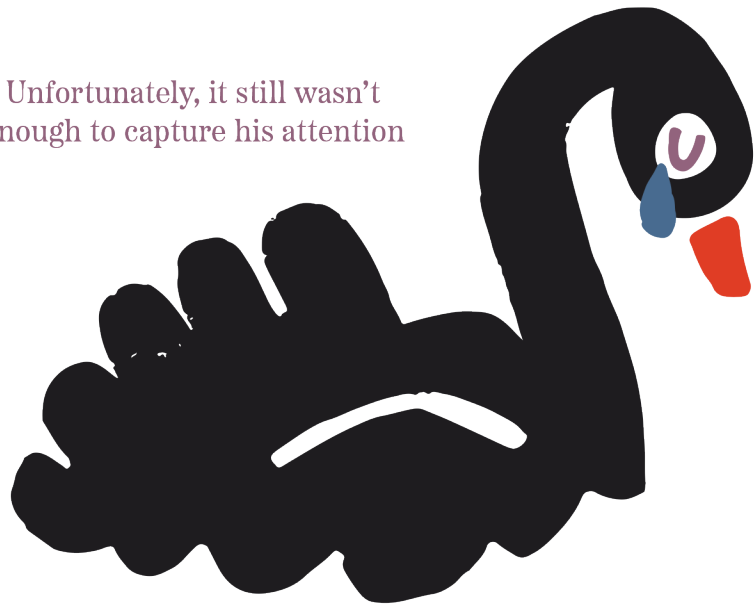


my feathers needed to curl  
just as his did and to do that...

I needed to start eating better  
and sleeping in a better nest!

And that your Papa did!

Unfortunately, it still wasn't  
enough to capture his attention



This is when a dear friend made me  
an offer that would turn my luck around...

If you are set on getting his attention...  
Why not give him the chance to start a family?

What are you saying?

I'm saying you two should raise  
some of my chicks as your own!

I could definitely  
use the help!

I've been known to  
be a bit oblivious



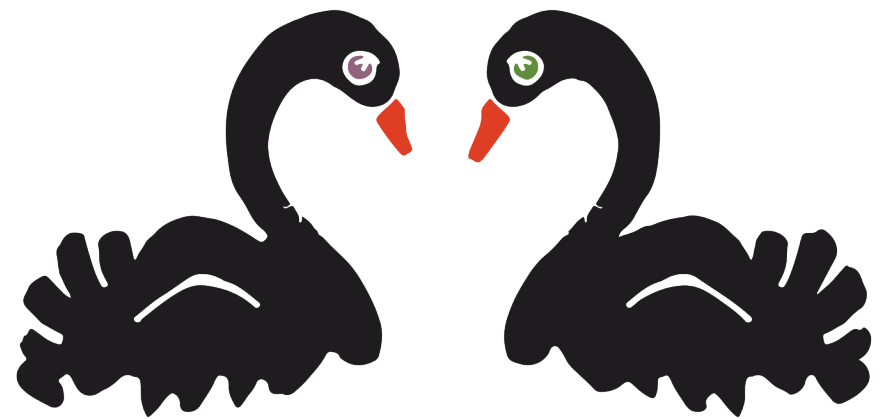
Good thing I don't  
do the patrolling



And so it was settled!  
The next day, I was to approach your Papa,  
curled feathers and eggs in wing, and ask if  
he wanted to join me in the start of a family!

Hi there...

Why hello!

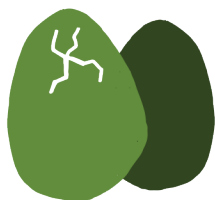


I think you know what happens next little one!

*WOW! JUST AS GOOD  
AS I REMEMBER IT!*



Can you tell it again?  
I wasn't listening



2023  
angel lizardi

# Cygnus Attractus

Angel Lizardi

## Key Scientific Concepts

Male-male reproductive pairing is a favorable adaptation within Australian black swans, or *Cygnus atratus*. Research has shown that male-male pairs are able to produce more viable offspring than male-female pairs in a ratio of 8:3 (Bowker). This advantage is generally attributed to the more equal distributions of reproductive and parental labor observed within male-male pairs (London Natural History Museum). While details of this adaptation—namely how it relates to the species' phylogeny—are unavailable at this time, it has been hypothesized that as one of the few swan species to live and breed in colonies, the Australian black swans' "proclivity" for same-sex coupling is the result of strong competition within and over male members of its populations (Kraaijeveld).

Like other swans, Australian black swans invest a lot of time and energy into partnership and parental care (Kraaijeveld). Coupled male swans of the species are notably called upon to accrue food, maintain nesting areas, and incubate eggs (Kraaijeveld). This remains true regardless of the sex of their partner. However, as previously stated, such tasks and potentially more have been shown to be shared in same-sex pairs. With less to do individually, it is believed that greater amounts of time and energy can be spent ensuring the optimal health and environmental conditions for the individual, their partner, and their cygnets. The benefits of more free time can look like the unexpected acquisition of a unoccupied nesting site with access to consistent, nutrient-rich food that will further the cygnets' survival prospects and simultaneously, help the 'lucky' adult swans maintain the conditions that allowed them to acquire said nesting site to begin with (Kraaijeveld).

Feather ornamentation is an important phenotype that has both social and sexual implications within black swan populations. Curled feathers, a trait exhibited in both sexes yet more often associated with males, is a signal used for social selection within same-sex populations (Kraaijeveld). Male swans capable of maintaining

and improving the curl of their feathers are dominant. That is to say, dominant males are granted access to preferred areas and resources that those without ornamentation resign themselves from (Kraaijeveld). While other species have been known to traits that mimic socially-selected traits, curled feathers remain an honest signal in male black swans due to their correlation with and reflection of an individual's physical condition and competitive ability. (Kraaijeveld) Traits like physical condition and competitive ability are of particular interest to uncoupled female swans looking to increase the survival prospects of their cygnets through means of genetic fitness and through the fitness that can be conferred onto them via social stratification (Kraaijeveld & MacFarlane et al). As the nonsexual and sexual roles of the curled feather phenotype relate back to same-sex pairings, I am acutely interested in possibility that curled feathers do not signal different things to the different sexes. What are the chances that a male swan views the ornamentation of another as the mark of a desirable mate rather than the mark of a competitor?

## Scientific Summary

Unlike other swans, Australian black swans use feather ornamentation, specifically the curling of feathers, as a means of communicating their body condition, competitive ability, pairing status, and so on to other members of their colony (Kraaijeveld). Curled feathers are of particular significance to male swans who frequently engage in social competition over resources (including food, feeding areas, and nesting sites) as a means of survival and, in the case of unpaired swans, as a means of showcasing their potential to prospective mates (Kraaijeveld). Having a large number of curled feathers—or more simply put, being a high-quality male—has actually been found to establish systems of social dominance wherein males with fewer if any curled feathers lose out on access to premier resources (Kraaijeveld). Those privileged enough to have access to premier resources are ostensibly set up to have said privilege indefinitely, granted that they use the allotted resources to sustain their peak condition and ornamentation. With access to greater resources for greater periods of time, it is hypothesized that high-quality male swans are able to maintain their ornamentation better

than female swans who do not typically engage in resource competition and instead spend their time competing for high-quality males and producing resource-rich eggs (Kraaijeveld).

The competition for high-quality males is so intense amongst female swans that it begs the question: what do male swans bring to their pairings and why is their quality of such concern? As parents, male swans are responsible for the incubation of the clutch and the protection of suitable nesting and feeding areas (London Natural History Museum & Kraaijeveld). The latter is important as the survival of cygnets belonging to pairs who maintain specific residences has been shown to be more than two times greater than that of itinerant, or roaming, pairs (Kraaijeveld). It is believed that one factor contributing to this increase is the larger amounts of time spent feeding cygnets of resident pairs which, as established, is more feasible when paired with a high-quality male who has prolonged access to food sources (Kraaijeveld). Pairing up with high-quality males also proves advantageous in high-density colonies where pairs often encounter unknown individuals who must know, by observing their ornamentation alone, not to challenge the pair's claims as it would be an affront to their social standing (Kraaijeveld). Overall, male swans invest a lot of time and energy into the raising of their young and it is the physical and social assets they accrue prior to coupling/mating that directly affect the success of their offspring.

As this all relates back to the consistency and success of same-sex pairings of male Australian black swans, it is observed that male-male pairs distribute the aforementioned duties of incubation and protection more evenly than their male-female counterparts. This is said to better ensure a safe and nurturing environment as the two males are able to leverage/confer the fitness of the other to their and their cygnets' benefit (MacFarlane et al). Hypothetically, individual parents can even find themselves with greater amounts of time and energy to search out alternate, optimal conditions for them and their cygnets. Since curled feathers hold social and sexual significance, it is speculated that unpaired male swans may be drawn to each other as mates for the very same reasons female swans are drawn to them. When it comes to starting

their 'families,' pairs of male swans have been shown to temporarily spend time with female swans willing to provide the established pair with eggs and or steal the eggs of male-female pairs (Bowker & MacFarlane et al).

## Project Summary

Posited against long withstanding scientific and cultural frameworks that consider same-sex sexual behavior to be 'paradoxical' and 'maladaptive,' *Cygnus Attractus*, the children's book I created from the research I conducted, provides insight into what exactly makes male-male pairings in the species of black swan native to Australia, *Cygnus atratus*, a consistent and favorable adaptation. The work recounts the fictional romance between two male swans so as to explore the social and sexual paradigms common to their colonies and the parenting endeavors unique to male-male pairs.

The decision to convey findings of same-sex behavior within male black swans through the medium/format of a children's book comes at a time of increased censorship of LGBTQIA+ people and state-mandated book bans specifically targeting LGBTQIA+ narratives on the basis of supposedly "inappropriate" content. With *Cygnus Attractus*, however, I purposefully avoid ever acknowledging the same-sex nature of the central relationship and intentionally avoid using culturally-specific terminology, namely gay, in reference to the subject matter. This was done for two reasons. For one, as a queer person myself, a book like *Cygnus Attractus* is something I wish I had as a child. Truth be told, books like *Cygnus Attractus* are something I still desire in the sense that I yearn for media that normalizes LGBTQIA+ life without announcing its effort to normalize it.

Secondly, same-sex behavior in swans should have no influence on what we think about human queerness. To be queer is a unique experience to humans brought on by the large-scale societal systems of oppression individuals who express same-sex desires are subject to. As far as we know, there is no culture of oppression faced that effects mated pairs of male swans. I'd go so far to say that the chances male-male pairs even register/categorize their own 'sexual identity' are slim. By 'failing' to acknowledge the obvious, I



want audiences to question the assumption that representation and arguments for the liberation of the LGBTQIA+ can wholly come from science and pointing to other species who exhibit same-sex behaviors. Cultural and legislative shifts are necessary if freedom and equal opportunity are to be achieved.

I want to focus attention on how the narrative begins: we meet a bashful cygnet trailing after one of his two ‘Papas’ as he conducts a routine patrol of the home lake. As the narrative progresses, we meet the second Papa whose seen incubating the remaining eggs. While having the Papas start the story whilst completing different tasks might appear trivial, it is one of a couple storytelling decisions meant to showcase the way labor is more evenly divided amongst male-male pairs (London Natural History Museum). Another moment that is meant to convey the same idea is when one of the Papas expresses his obliviousness and his gratitude that the other Papa is in charge of patrolling. Although this line of dialogue slightly misconstrues the abilities of and expectations put on male swans, it is intended to communicate how well the two work together.

Another creative decision I want to highlight is the framing of curled feathers as something to simultaneously be jealous of and something to find attractive. This choice was informed by the research I conducted on feather ornamentation as an honest signal dictating social and sexual selection (Kraaijeveld). I also wanted to communicate how valuable a mate with curled feathers could be by having the Papa attempt to attain the same level of “privilege” and prove his worth via alternate means.

Lastly, I’d like to acknowledge the style of the book. As I envision it, the simplified, almost abstract rendering of the book works to increase its accessibility and broaden its appeal so that it is more than a children’s book made in 2023. My hope for *Cygnus Attractus* is that the truths behind it reach as many people as possible and that it is one of many upcoming creative endeavors working to normalize, clarify, and push against ideas of same-sex relationships and queerness.

## Annotated Bibliography

Natural History Museum, London. The Successful Story of Homosexual Behaviour in Male Swans | LGBTQ+ Natural History Tour | Stop 9. YouTube, YouTube, 27 May 2022, <https://www.youtube.com/watch?v=Ze7bWewMY3s&t=2s>. Accessed 27 Sept. 2023.

*Homosexual/queer swans can help us question the consistent notion within biology that homosexual behavior is maladaptive.*

*Both male and female swans have been found to show homosexual behavior.*

*Quite persistent within male Australian black swans.*

*Male Australian black swans have been found to form stable, long-lasting relationships with one another and to perform courtship dances.*

*Gay couples will incubate the clutch, hatch the eggs, and then raise the chicks.*

*Pair of males can typically defend a much larger territory than the heterosexual couple.*

*Homosexual pairs will share incubation duties far more evenly.*

Bowker, Devon. “Gay Black Swan Dads Make the Best Parents.” The Wild Life, 7 June 2023, [www.thewildlife.blog/2023/06/07/gay-black-swan-dads-make-the-best-parents/](http://www.thewildlife.blog/2023/06/07/gay-black-swan-dads-make-the-best-parents/).

*Option 1: the two males will temporarily pair up with a female who, after laying the fertilized egg, will simply donate it to the males for caretaking (like surrogacy or egg-donors); Option 2: steal an egg*

*An impressive 80 percent of young raised by Male-Male pairs successfully fledge (grow up and leave the nest), surpassing the 30 percent success rate of straight couples. The secret lies in their cooperative approach to parenting. These couples have figured out the secret to prime real estate in the avian world. By sharing the workload equally, male-male parents gain access to superior nesting sites and territories. It’s the perfect recipe for a dream home, ensuring a safe and nurturing environment for their cherished offspring.*

Kraaijeveld, K. “Mutual ornamentation, sexual selection, and social dominance in the Black Swan.” Behavioral Ecology, vol. 15, no. 3, 2004, pp. 380–389, <https://doi.org/10.1093/beheco/arh023>.

*The same signals that are used in competition over access to mates may be used in competition over access to other resources, and there is therefore no need to assume that such signals will be selected by different selection processes...*

*Signal selection and social selection refer to the same process and can be defined as “the selective force that arises when a signal influences the fitness of signallers or both the fitness of signallers and receivers.”*

*We found that the degree of feather elaboration (measured as the number of curled feathers) correlated with pairing status, social dominance, and, indirectly, reproductive*



success. Ornamented individuals thus are socially dominant and may be preferred as mating partners.

Paired individuals of both sexes had significantly more curled feathers than unpaired individuals, suggesting that this ornament may play a role in mutual mate choice. Our finding that the number of curled feathers is correlated between the members of a social pair further strengthens this view. Little is known about courtship and the process of pair formation in this species.

In the black swan, males are more active in competition over feeding areas, which is an important part of the parental effort. Males also provide most of the incubation effort... Competition among females over high-quality males might thus be more intense than competition among males over females...

Our finding that individuals with many curled feathers are dominant over same-sex individuals with fewer curled feathers in agonistic interactions suggests that the curled feathers play a role in social competition over resources. In addition to potential mates, such resources may include food and nesting space. In our swan population, prolonged access to suitable feeding habitat for the cygnets ("residency") is clearly an important resource that directly affects the survival prospects of cygnets.

Resident pairs had significantly more curled feathers than itinerant pairs, probably because curled feathers signal competitive ability and thus improve an individual's chances of gaining access to preferred areas and maintaining tenancy of these areas for a prolonged period. Competitive ability may depend on several factors, including body size, body condition, age, breeding experience, and motivation. We found a correlation between the number of curled feathers and body condition in males, suggesting possible condition dependence of the ornament.

Males are more active than females in social competition over resources other than mates. The role of social competition over nonsexual resources in the maintenance of the curled feather ornament may therefore be stronger in males than in females.

Status signaling may be particularly advantageous in high population densities, where individuals frequently encounter unfamiliar individuals...It is interesting to note in this respect that the black swan is both the only species in its genus with a feather ornament and also the only species that regularly breeds in colonies...

Cygnets survival of pairs that are able to maintain residency in a patch of habitat on the lake foreshore was more than twice as high as that of itinerant pairs. One likely factor contributing to this improved survival is our finding that cygnets of resident pairs spent more time feeding than those of itinerant pairs.

The prominence of the ornament in agonistic displays, the correlation between within-sex social dominance and ornamentation, and the association between ornamentation and residency status all suggest that the display feathers function as a badge of status. Such signals allow dominant individuals access to resources, while minimizing their

aggressive interactions with subordinate individuals...

Individuals benefit from pairing with a socially dominant partner, and the curled feathers therefore play a role in mate choice. The evolution and maintenance of the ornament is therefore not simply the consequence of sexual selection but should be considered in the broader context of social selection.

MacFarlane, Geoff R., et al. "Same-sex sexual behavior in birds: Expression is related to social mating system and state of development at Hatching." *Behavioral Ecology*, vol. 18, no. 1, 2006, pp. 21-33, <https://doi.org/10.1093/beheco/arl065>.

In the black swan, *C. atratus*, males may temporarily associate with a female, mate, and then break the bond once the eggs have been laid or they may usurp nests or steal eggs from MF clutches. These male pairs perform parenting duties, including incubation and caring for cygnets.

In some cases, same-sex sexual behavior may serve social and/or sexual functions not necessarily related to reproduction, confer indirect fitness benefits, and/or be adaptively neutral, co-occurring within the context of reproductive opportunity.