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Final Project Summary

Different species have different forms of parental care. From no parental care to a whole group caring for the offspring and everything in between, nature has examples of each. In most societies there is the idea that two parents, a mother and father, is the "norm" and the way it should always be. This "norm" that society imprinted on me made it hard for me, as I was growing up, to understand that not only that some people parent differently, but also that other species have different forms of parenting. It is unfortunate that society shapes understanding so much and limits our ideas of the possibilities of variation.

My project is to make a children's book that describes different forms of parental care to introduce the idea of variation. This would serve an educational purpose and open people up to the idea of differences from an early age, and also could comfort a child in a situation not the "norm" or someone growing up who does not feel like they fit the "norm". For my book I chose species that practice different forms of parental care; meerkats, black swans, northern elephant seals, robins, rabbits, seahorses, goldfish and worker honey bees. The variation found in the different species is due to different needs and environments of the species as well as the benefits and investments for an individual to provide parental care. Through illustrations and writing I explored these elements for each species, discussed below, simplifying them for a younger audience in the book.

The environment meerkats live in is dangerous. There are many predators, such as hawks. Meerkats also must learn which food is okay to eat, for example, some scorpions are good for meerkats to eat and some poisonous. Both being aware of predators and of what food to eat needs to be taught to the young meerkats. In addition meerkat babies need a lot of attention, born both eyes and ears closed, and need to be nursed. With so much attention needed for each offspring the male and female parents would have a hard time successfully raising the offspring on their own. Other meerkats in the group act as helpers and help raise the offspring. Helpers benefit not only because they may receive the favor in return but also because more members of the group increase the chances of the group being successful. [5]

Two male black swans often pair up to raise offspring. They get offspring by either taking offspring from another nest or by fertilizing a female's eggs and then chasing her away. Territory is important to black swans, partners each claiming their own to raise their offspring in. Because of dimorphism in the species males are much bigger than females and are able to maintain more and better territory. [1] Two males are also better at protecting their offspring from predators, such as golden-bellied water rats, than a male and female couple. For these reasons male partners are often more successful at raising more offspring than other black swan partners. [8]

Northern elephant seals live in areas of female crowding and tidal changes. These conditions lead to many pups and mothers getting separated, resulting in pups without parental care as well as mother elephant seals ready to be mothers who then lost their pup. In these conditions there are many opportunities for adoption. [11] Two elephant seal females without pups or who lost their pup often pair up and adopt lost pups together. It is also common for a mother who lost her pup to pair up with a mother still with pups and help her. [1]

Robin young, like many birds, require both their male and female parent. I included this

example because while the "norm" in our society I felt not including it declares it the "norm" and defeats the purpose of this book. Robin offspring require much parental care since not only are offspring born altricial, blind and featherless, but they also require gathered food since robins don't nurse. One parent, usually the father, must fly back and forth getting food. The other robin, usually the female, stays by the nest, protecting the offspring from predators. [3] If either parent leaves the chance of successful offspring drops significantly, either because of starvation or predation. It is the shared interest of spreading their genes and successfully raising young that keeps the robin pair together.

In most mammals, such as the rabbit, the mother invests more into her offspring than the father, both before and after birth. After the male fertilizes the female rabbit's eggs the female continues nurturing the offspring both during about 31 days of gestation and after birth. [10] After birth the offspring must be nursed by the female, the offspring's only source of nutrition, until weaned. [2] This need for lactation reinforces the necessity for maternal care in order for the offspring to survive. Because the mother invests more she has more to lose if the offspring don't survive. During the female's time of caring for the offspring the male can continue to mate with other females, continuing to spread genes. The mother would not spread any of her genes if she abandoned her offspring since they need her after birth.

In many species a female mates with multiple males, causing sperm competition. A male can then not be certain that the female will give birth to his offspring or another male, the paternity is unknown. [13] A seahorse male is certain it is the parent however, and therefore certain its genes are getting successfully passed on. Instead of mating with a female by ejaculating sperm, the male seahorse takes in the female's egg and fertilizes the egg with its sperm. The male then carries the fertilized egg, pregnant over a few weeks, and gives birth instead of the female. [4]

Goldfish do not invest much time or energy into individual offspring. Many eggs are fertilized and laid among the ground. [6] The amount of offspring likely to survive without any parental care is high enough that goldfish can continue laying more eggs to create more offspring rather than providing parental care. If goldfish provided parental care they would not be able to continue reproducing during that time, limiting the amount of offspring they have. [9]

Worker honey bees do not have offspring. I included this example because while not an example of parental care directly, it explores the option of not having offspring. With much work to be done, guarding, gathering food, building the hive and providing for the queen and drones of the group, worker bees are busy making the colony succeed. They are not able to reproduce, allowing them to focus on all the other tasks needed for the colony to survive. [7] By helping the queen reproduce and helping offspring closer related to them the worker indirectly spreads some of its genes. [12]

I used the examples above and reasoning for the variations to guide each page of my book.

## Bibliography

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This source covers a range of facts on black swans including their territories and predators.

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This source discusses the idea of benefit and investment particularly among fish, as well as the probability of offspring survival if not cared for, as considerations for providing parental care or not.

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This source discusses the conditions northern elephant seals live in, causing there to be high numbers of lost pups allowing for adoption.

12. Winston, Mark L. *The Biology of the Honey Bee*. Cambridge, MA: Harvard UP, 1987. Print.

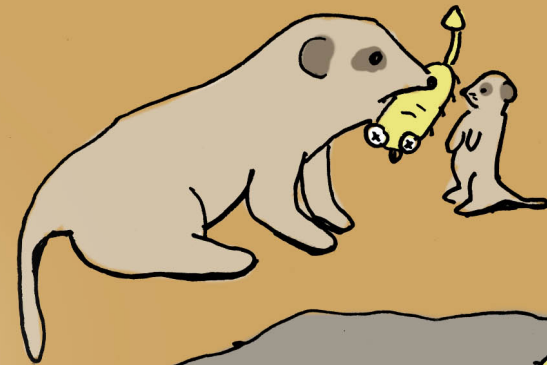
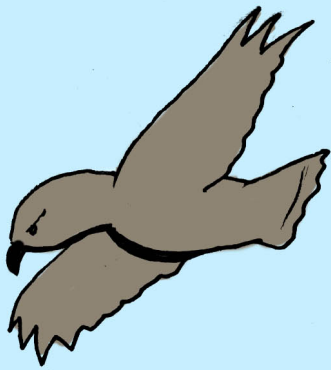
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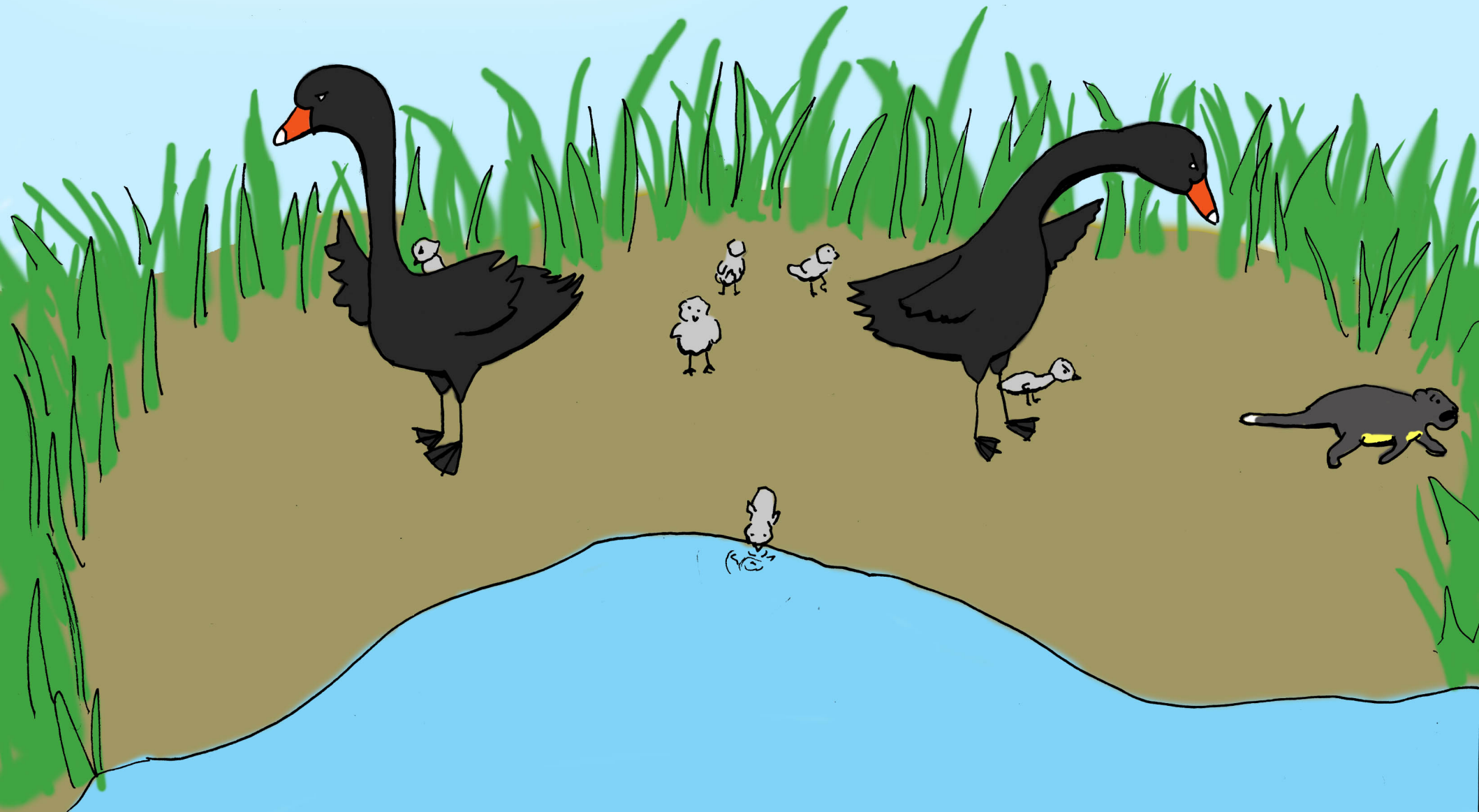
variety

works

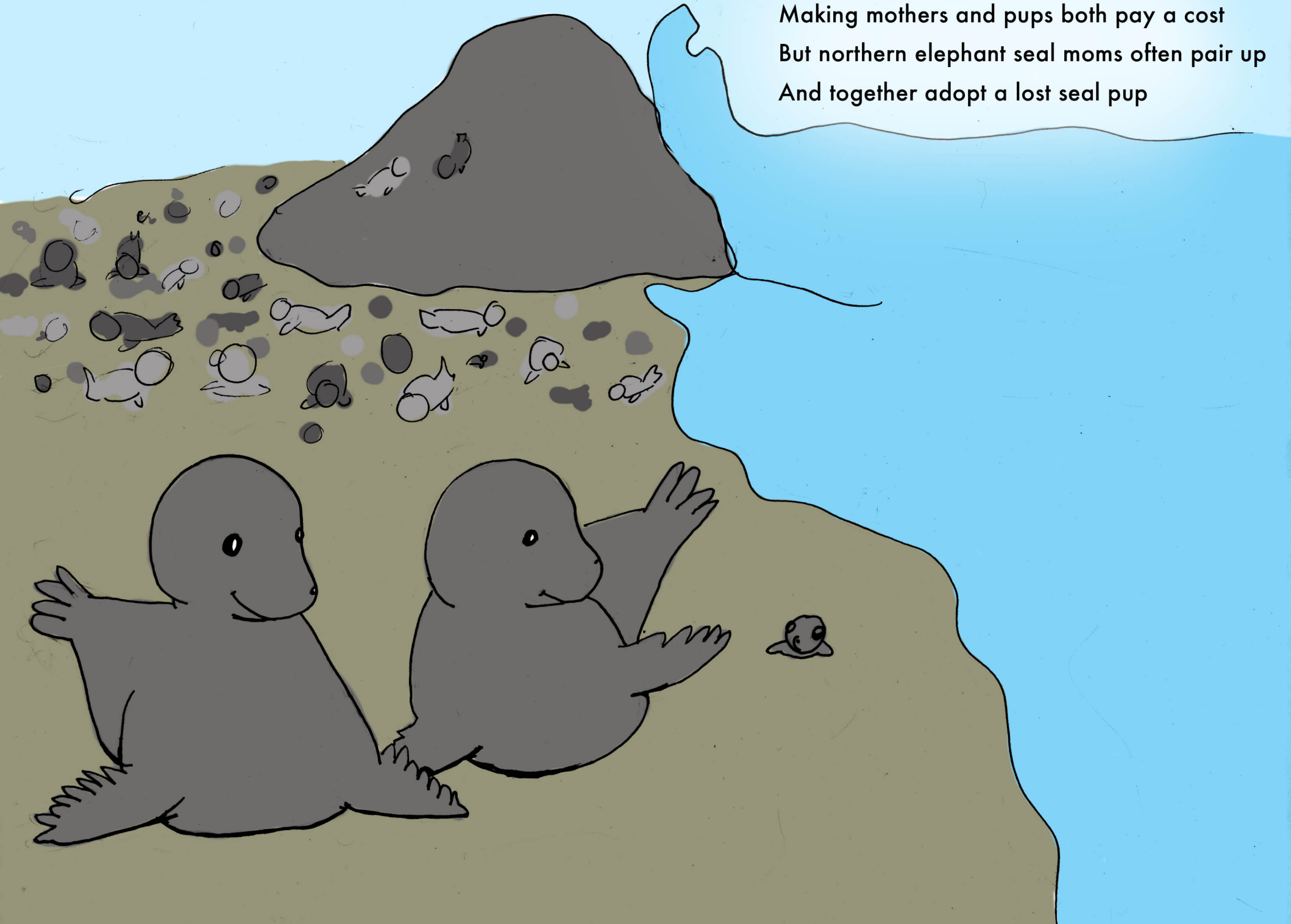


Baby meerkats must learn a lot  
About prey and which scorpion should be caught  
A hard feat for even two parents, they get cut some slack  
Helpers help raise the additions to the pack

Guarding and making sure predators are gone  
Is easier for two father black swans  
Larger than the females, the males better protect  
Raising more offspring together as an effect



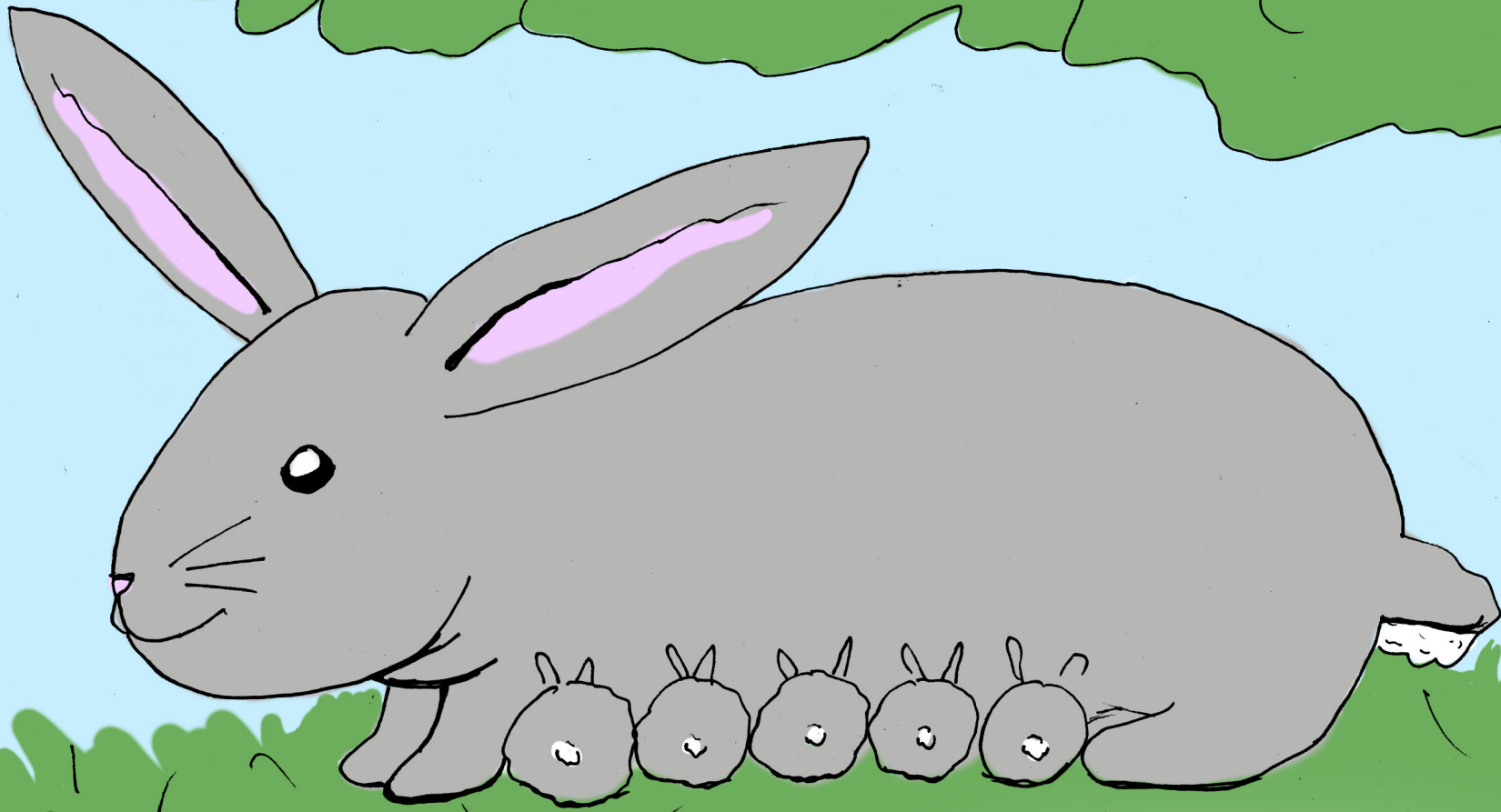
In tides and crowds pups can become lost.  
Making mothers and pups both pay a cost  
But northern elephant seal moms often pair up  
And together adopt a lost seal pup



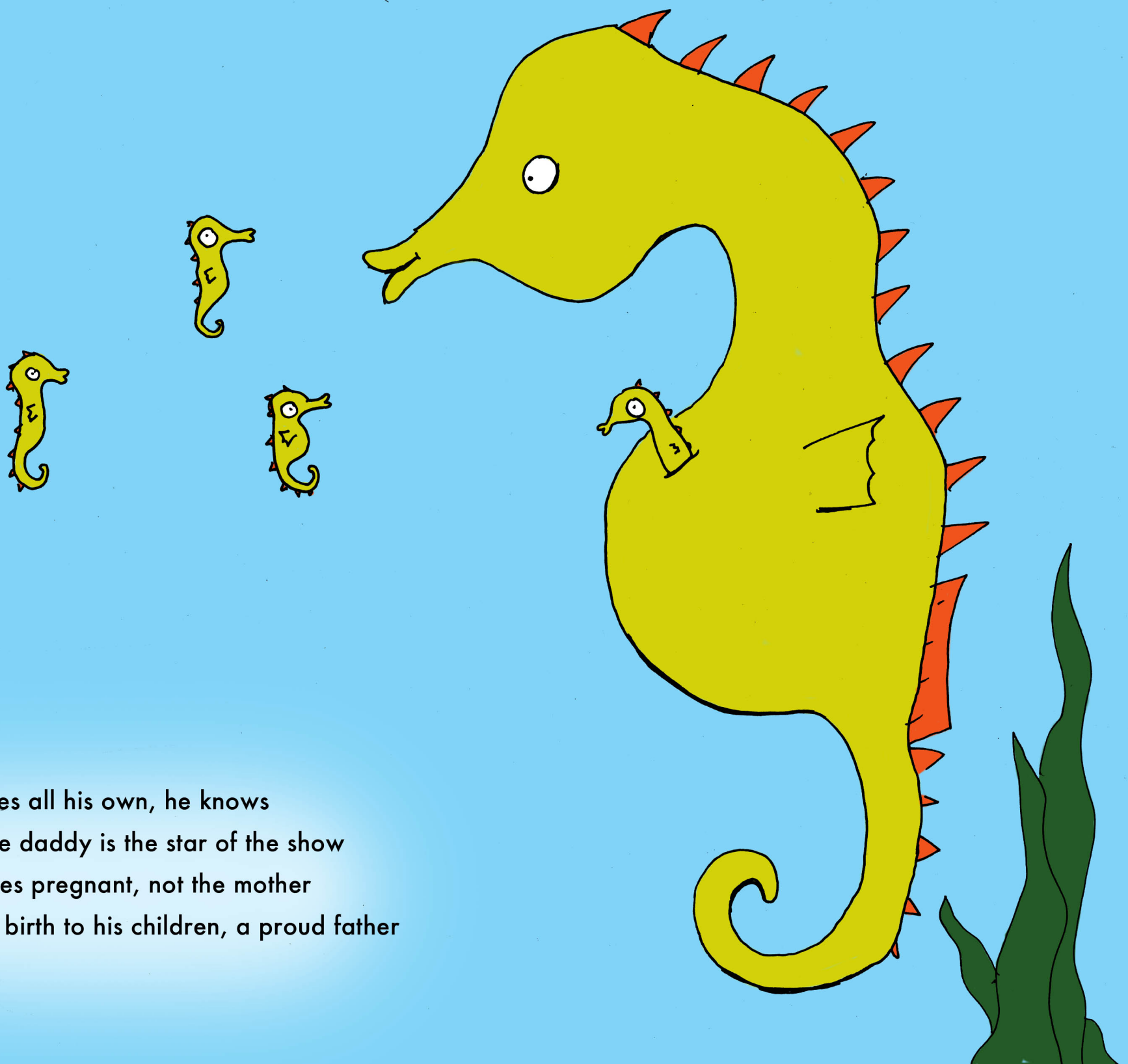


Baby robins need a lot of care  
Which is why the parents stay in a pair  
One parent stands guard while the other brings food  
Because if either one leaves they both will loose



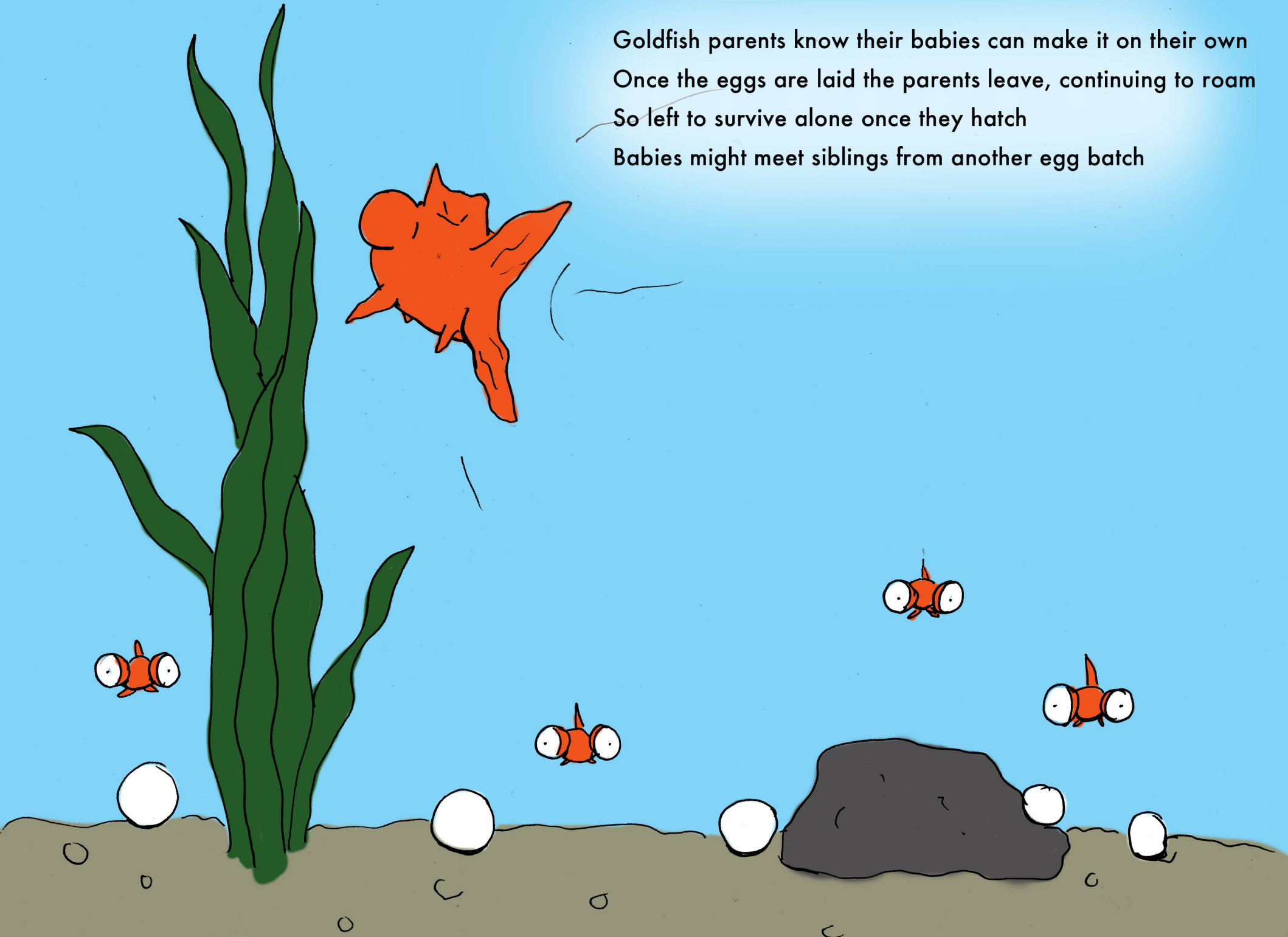


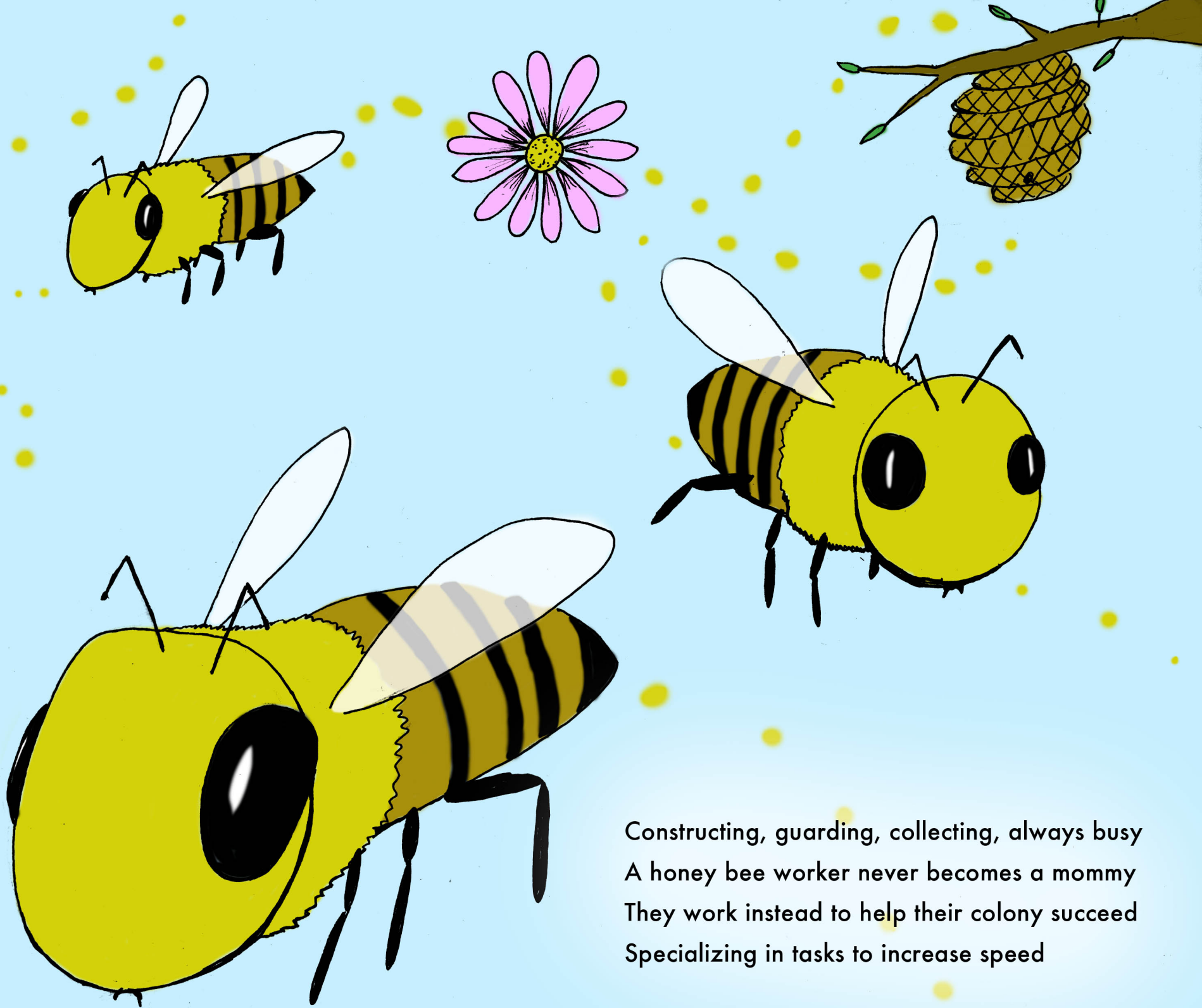
With the daddy always on a mission for more  
The rabbit mother has all the chores ^  
From pregnancy to nursing she invests a lot  
And she gives the babies a fair shot |



With babies all his own, he knows  
A seahorse daddy is the star of the show  
He becomes pregnant, not the mother  
And gives birth to his children, a proud father

Goldfish parents know their babies can make it on their own  
Once the eggs are laid the parents leave, continuing to roam  
So left to survive alone once they hatch  
Babies might meet siblings from another egg batch





Constructing, guarding, collecting, always busy  
A honey bee worker never becomes a mommy  
They work instead to help their colony succeed  
Specializing in tasks to increase speed