If My Mom Were A Platypus: Mammal Babies and their Mothers

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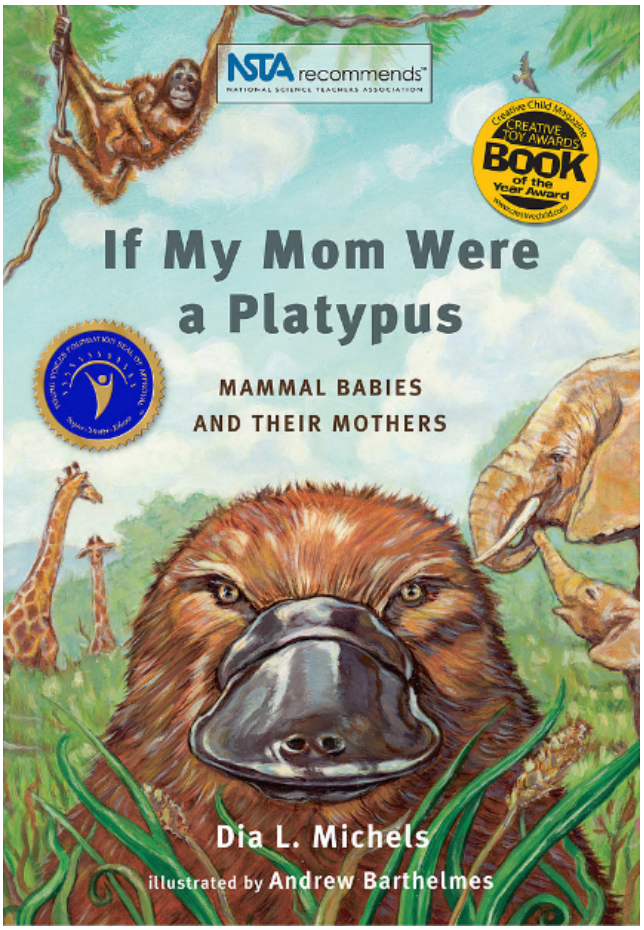
Ages 10-14 | Grades 5-9



All mammal mothers feed, protect, and teach their young, even though these tasks can challenge their own needs for survival. But a mammal baby's journey to maturity varies dramatically depending on whether it is a bear or a bat, a shrew or a seal, a hippopotamus or a human. This fascinating look at life cycles portrays the normalcy of birth and breastfeeding and explores how mothers help 14 different mammals navigate the path from helpless infants to self-sufficient adults.

This book highlights the diversity of mammal life, showing how they reproduce and grow into adults. Students can compare and contrast how these mammals develop and survive into adulthood. They should see how these forms of life are connected to one another and provide evidence for evolution, a unifying theme in the Living Environment.

Articulated to the **National Science Education Standards** and **Next Generation Science Standards, and the Texas Essential Knowledge and Skills for Science Standards**

Science curriculum standards were identified by Joan Wagner.

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Summary and Articulation of National Science Education Standards

The following standards are specifically supported in this book. Since the age group includes both intermediate and elementary levels, both sets of standards for the Living Environment are included. All standards are taken from the National Science Education Standards (NSES) developed by the National Research Council (NRC), first published in 1996.

Content Standards for grades K-4

The Characteristics of Organisms

- Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met. The world has many different environments, and distinct environments support the life of different types of organisms.
- Each plant or animal has different structures that serve different functions in growth, survival, and reproduction. For example, humans have distinct body structures for walking, holding, seeing, and talking.
- The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as a change in the environment). Humans and other organisms have senses that help them detect internal and external cues.

Life Cycles of Organisms

- Plants and animals have life cycles that include being born, developing into adults, reproducing, and eventually dying. The details of this life cycle are different for different organisms.

Organisms and Their Environment

- All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants.

Content Standards for grades 5-8

Reproduction

- Reproduction is a characteristic of all living systems; because no individual organism lives forever, reproduction is essential to the continuation of every species.

Regulation and Behavior

- All organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.
- An organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger is based in the species' evolutionary history.

Diversity and Adaptation of Organisms

- Biological evolution accounts for the diversity of species developed through gradual processes over many generations. Species acquire many of their unique characteristics through biological adaptation, which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

Summary and Articulation of Next Generation Science Standards

This book covers a wide variation in the reproduction of mammals, emphasizing the important standard of unity and diversity in life even among a closely related group.

Grade 3

3-LS3: Heredity: Inheritance and Variation of Traits

S3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information.
- The environment also affects the traits of an organism.

Grade 4

4-LS1: From Molecules to Organisms: Structures and Processes

LS1-1: Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.

LS2.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction.

Middle School Grades 6-8

MS-LS1: From molecules to Organisms: Structures and Processes

LS1-4: Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

LS1.B: Growth and Development of Organisms

- Animals engage in characteristic behaviors that increase the odds of reproduction.

MS-LS2: Heredity: Inheritance and Variation of Traits

LS1.B: Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring.

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Engaging in Arguments from Evidence

Note: this book also strongly supports the Language Arts and Science component of the Common Core State Standards/Reading for Science.

Summary and Articulation of Texas Essential Knowledge and Skills for Science

This book is articulated to standards from a variety of grades covering a variety of topics including life science, organisms, and environments.

§112.11. Science, Kindergarten, Beginning with School Year 2010-2011.

(a) Introduction

(4D) In life science, students recognize the interdependence of organisms in the natural world. They understand that all organisms have basic needs that can be satisfied through interactions with living and nonliving things. Students will investigate the life cycle of plants and identify likenesses between parents and offspring.

(b) Knowledge and skills

(9) Organisms and environments. The student knows that plants and animals have basic needs and depend on the living and nonliving things around them for survival. The student is expected to:

(A) differentiate between living and nonliving things based upon whether they have basic needs and produce offspring; and

(B) examine evidence that living organisms have basic needs such as food, water, and shelter for animals and air, water, nutrients, sunlight, and space for plants.

§112.12. Science, Grade 1, Beginning with School Year 2010-2011.

(a) Introduction.

(4D) In life science, students recognize the interdependence of organisms in the natural world. They understand that all organisms have basic needs that can be satisfied through interactions with living and nonliving things. Students will investigate life cycles of animals and identify likenesses between parents and offspring.

(b) Knowledge and skills.

(9) Organisms and environments. The student knows that the living environment is composed of relationships between organisms and the life cycles that occur. The student is expected to:

(A) sort and classify living and nonliving things based upon whether or not they have basic needs and produce offspring;

(10) Organisms and environments. The student knows that organisms resemble their parents and have structures and processes that help them survive within their environments. The student is expected to:

(A) investigate how the external characteristics of an animal are related to where it lives, how it moves, and what it eats;
(C) compare ways that young animals resemble their parents; and
(D) observe and record life cycles of animals such as a chicken, frog, or fish.

§112.13. Science, Grade 2, Beginning with School Year 2010-2011.

(a) Introduction

(1) Science, as defined by the National Academy of Sciences, is the "use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process."

(2) Recurring themes are pervasive in sciences, mathematics, and technology. These ideas transcend disciplinary boundaries and include patters, cycles, systems, models, and change and constancy.

(3) The study of elementary science includes planning and safely implementing classrooms and outdoor investigations using scientific processes, including inquiry methods, analyzing information, making informed decisions, and using tools to collect and record information, while addressing the major concepts and vocabulary, in the context of physical, earth, and life sciences. Districts are encouraged to facilitate the classroom and outdoor investigations for at least 60% of instructional time.

(4) In Grade 2, careful observation and investigation are used to learn about the natural world and reveal patterns, changes, and cycles. Students should understand that certain types of questions can be answered by using observation and investigations and that the information gathered in these may change as new observations are made. As students participate in investigation, they develop the skills necessary to do science as well as develop new science concepts.

(A) Within the physical environment, students expand their understanding of the properties of objects such as shape, mass, temperature, and flexibility then use those properties to compare, classify, and then combine the objects to do something that they could not do before. Students manipulate objects to demonstrate a change in motion and position.

(B) Within the natural environment, students will observe the properties of earth materials as well as predictable patterns that occur on Earth and in the sky. The students understand that those patterns are used to make choices in clothing, activities, and transportation.

(C) Within the living environment, students explore patters, system, and cycles by investigating characteristics of organisms, life cycles, and interactions among all the components within their habitat. Students

examine how living organisms depend on each other and on their environment.

§112.14. Science, Grade 3, Beginning with School Year 2010-2011.

(a) Introduction

(4C) Students explore patters, systems, and cycles within environments by investigating characteristics of organisms, life cycles, and interactions among all components of the natural environment. Students examine how the environment plays a key role in survival. Students know that when changes in the environment occur, organisms may thrive, become ill, or perish.

(b) Knowledge and skills

(9) Organisms and environments. The students know that organisms have characteristics that help them survive and can describe patterns, cycles, systems, and relationships within the environments. The student is expected to:

(A) observe and describe the physical characteristics of environments and how they support populations and communities within an ecosystem;

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:

(A) explore how structures and functions of plants and animals allow them to survive in a particular environment;

(B) explore that some characteristics of organisms are inherited such as the number of limbs on an animal or flower color and recognize that some behaviors are learned in response to living in a certain environment, such as animals using tools to get food; and

(C) investigate and compare how animals and plants undergo a series of orderly changes in their diverse life cycles such as tomato plants, frogs, and lady bugs.

§112.15. Science, Grade 4, Beginning with School Year 2010-2011.

(a) Introduction

(4B) Within the living environment, students know and understand that living organisms within an ecosystem interact with one another and with their environment. The students will recognize that plants and animals have basic needs, and they are met through a flow of energy known as food webs. Students will explore how all living organisms go though a life cycle and that adaptations enable organisms to survive in their ecosystem.

(b) Knowledge and skills.

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environment. The student is expected to:

(A) explore how adaptations enable organisms to survive in their environment such as comparing birds' beaks and leaves on plants;

(B) demonstrate that some likenesses between parents and offspring are inherited, passed from generation to generation such as eye color in humans or shapes of leaves in plants. Other likenesses are learned such as table manners or reading a book and seals balancing balls on their noses; and

(C) explore, illustrate, and compare life cycles in living organisms such as butterflies, beetles, radishes, or lima beans.

§112.15. Science, Grade 5, Beginning with School Year 2010-2011.

(a) Introduction.

(4C) Within the living environment, students learn that structure and function of organisms can improve the survival of members of a species. Students learn to differentiate between inherited traits and learned behaviors. Students learn that life cycles occur in animals and plants and that the carbon dioxide-oxygen cycle occurs naturally to support the living environment.

(b) Knowledge and skills.

(9) Organisms and environments. The student knows that there are relationships, systems, and cycles within environments. The student is expected to:

(A) observe the way organisms live and survive in their ecosystem by interacting with the living and non-living elements;

(10) Organisms and environments. The student knows that organisms undergo similar life processes and have structures that help them survive within their environments. The student is expected to:

(A) compare the structures and functions of different species that help them live and survive such as hooves on prairie animals or webbed feet in aquatic animals;

§112.19. Science, Grade 7, Beginning with School Year 2010-2011.

(a) Introduction.

(4E) Organisms and environments.

(i) Students will understand the relationship between living organisms and their environment. Different environments support different living organisms that are adapted to that region of Earth. Organisms are living systems that maintain a steady state with that environment and whose balance may be disrupted by internal and external stimuli. External stimuli include human activity or the environment. Successful

organisms can reestablish a balance through different processes such as a feedback mechanism. Ecological succession can be seen on a broad or small scale.

(ii) Students learn that all organisms obtain energy, get rid of wastes, grow, and reproduce. During both sexual and asexual reproduction, traits are passed onto the next generation. These traits are contained in genetic material that is found on genes within a chromosome from the parent. Changes in traits sometimes occur in a population over many generations. One of the ways a change can occur is through the process of natural selection. Students extend their understanding of structures in living systems from a previous focus on external structures to an understanding of internal structures and functions within living things.

(b) Knowledge and kills.

(11) Organisms and environments. The student knows that populations and species demonstrate variation and inherit many of their unique traits through gradual processes over many generations. The student is expected to:

(B) explain variation within a population or species by comparing external features, behaviors, or physiology or organisms that enhance their survival such as migration, hibernation, or storage of food in a bulb; and

(13) Organisms and environments. The student knows that a living organism must be able to maintain balance in stable internal conditions in response to external and internal stimuli. The student is expected to:

(A) investigate how organisms respond to external stimuli found in the environment such as phototropism and fight or flight; and

(B) describe and relate responses in organisms that may result from internal stimuli such as wilting in plants and fever or vomiting in animals that allow them to maintain balance.

(14) Organisms and environments. The student knows that reproduction is a characteristic of living organisms and that the instructions for traits are governed in the genetic material. The student is expected to:

(A) define heredity as the passage of genetic instructions from one generation to the next generation;

(B) compare the results of uniform or diverse offspring from sexual reproduction or asexual reproduction; and

(C) recognize that inherited traits of individuals are governed in the genetic material found in the genes within chromosomes in the nucleus.

§112.20. Science, Grade 8, Beginning with School Year 2010-2011

(a) Introduction.

(4E) Organisms and environments. IN studies of living systems, students explore the interdependence between these systems. Interactions between organisms in ecosystems, including producer/consumer, predator/pretty, and parasite/host relationships, are investigated in aquatic and terrestrial systems. Students describe how biotic and abiotic factors affect the number of organisms and populations present in the ecosystem. In addition, students explore how organisms and their populations respond to short- and long-term environmental changes, including those caused by human activities.

(b) Knowledge and skills.

(11) Organisms and environments. The student knows that interdependence occurs among living systems and the environment and that human activities can affect these systems. The student is expected to:

(B) investigate how organisms and populations in an ecosystem depend on and may compete for biotic and abiotic factors such as quantity of light, water, range of temperatures, or soil composition;

(C) explore how short- and long-term environmental changes affect organisms and traits in subsequent populations;