Unless otherwise specified, "descriptions" referenced in the evidence statements could include but are not limited to written, oral, pictorial, and kinesthetic descriptions.

MS-LS4-3 Biological Evolution: Unity and Diversity

Students who demonstrate understanding can:

MS-LS4-3. **Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.** [Clarification Statement: Emphasis is on inferring general patterns of relatedness among embryos of different organisms by comparing the macroscopic appearance of diagrams or pictures.] [Assessment Boundary: Assessment of comparisons is limited to gross appearance of anatomical structures in embryological development.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze displays of data to identify linear and nonlinear relationships.

Disciplinary Core Ideas

LS4.A: Evidence of Common Ancestry and Diversity

- Comparison of the embryological development of different species also reveals similarities that show relationships not evident in the fully-formed anatomy.

Crosscutting Concepts

Patterns

- Graphs, charts, and images can be used to identify patterns in data.

Observable features of the student performance by the end of the course:

1	Organizing data	
	a	Students organize the given displays of pictorial data of embryos by developmental stage and by organism (e.g., early, middle, just prior to birth) to allow for the identification, analysis, and interpretation of relationships in the data.
2	Identifying relationships	
	a	Students analyze their organized pictorial displays to identify linear and nonlinear relationships, including:
		i. Patterns of similarities in embryos across species (e.g., early mammal embryos and early fish embryos both contain gill slits, whale embryos and the embryos of land animals — even some snakes — have hind limbs).
		ii. Patterns of changes as embryos develop (e.g., mammal embryos lose their gill slits, but the gill slits develop into gills in fish).
3	Interpreting data	
	a	Students use patterns of similarities and changes in embryo development to describe* evidence for relatedness among apparently diverse species, including similarities that are not evident in the fully formed anatomy (e.g., mammals and fish are more closely related than they appear to be based on their adult features, whales are related to land animals).