

Traits of Life: Common Design- DNA Demonstration Study

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THIS IS NOT A DEFINITIVE FINAL REPORT

FORMATIVE evaluation studies like this one often:

- **are conducted quickly**, which may mean
 - small sample sizes
 - expedited analyses
 - brief reports

- **look at an earlier version** of the exhibit/program, which may mean
 - a focus on problems and solutions, rather than successes
 - a change in form or title of the final exhibit/program

Traits.Common Design.#1.Embryos.Interview.Report

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Exhibit Under Evaluation

- Embryos
- Microscope connected to monitor with three examples of living embryos in petri dishes to view individually.
- An exhibit developer was on hand to display and focus on the three different embryos with the microscope.
- No graphics used

Goals of the Evaluation

- To find out what visitors noticed about the embryos
- To find out if visitors were able to identify major common parts (e.g., eyes, hearts) between different types of embryos
- To find out what questions arose after viewing the embryos

Method of Evaluation

- A total of eight interviews were conducted including a total of seventeen visitors. Three interviews were conducted on Thursday, July 15, 1999 between 11:00 AM and 12:30 PM. The remaining seven interviews were conducted on Tuesday, September 21, 1999 between 11:30 AM and 1 PM.
- The interviews were conducted between the Giant Microscope exhibit and the Population Fluctuation exhibit at Bay 6.
- Interviews were conducted by evaluator and any content or exhibit development questions were answered by Sitara Cave, exhibit developer at the end of the interview.
- Seven of the eight interviews were cued. Note: most of the interviews were cued in order to speak with a diverse range of ages.
- Visitors were orientated to the three types of embryos and were told that they were embryos. After this, each embryo was placed under the microscope and a series of four questions were asked about each before moving on to gathering broad observations, questions, and observations.

Interview Demographics

- Female 70% 9-12 (6), 13-17 (1), 18-30 (1), 30s (2), 50s+ (2)
- Male 30% 13-17 (1), 18-30 (1), 30s (2), 50s+ (1)
- Group Adult (4), Adult + children (2), Teen (1), Children (1)
- Interview #: 1- Female, 50s 5- Male, 30s; Female, 30s
2- Male, 50s; Female, 50s 6- Females, 9, 12, 30s
3- Four Females, ~10 7- Male, 13, 30s
4- Female, 15 8- Male, 20s; Female, 20s

Findings of Evaluation

(* Note: Multiple answers were taken into consideration in analyzing the data. Therefore, the total sum of responses is not equal to 100% where noted with an asterisk*)

CHICK EMBRYO

What do you notice about this embryo?*

- *63% of the visitors noticed the blood vessels or blood flow.*
- *37% of the visitors noticed the eye.*
- *25% of the visitors noticed the heartbeat.*
- *18% of the visitors noticed or mentioned the yolk or sac.*

- 1- Looks like lots of capillaries. It looks like brain. It is pulsing. Main artery is firm.
- 2- It's probably a chicken or a goose. Blood vessels.
- 3- It looks like squished peach. Like the inside of an egg because of yolk. It looks like a human.
- 4- Looks older. Looks strong.
- 5- Look at the veins in the eye. What is this black part? It looks like eggs. Looking at certain magnification. Looks like something living.
- 6- It's a baby. It has eyes. Is that the blood stream? It's beating. The yellow stuff is the yolk. It's easier to see under this microscope. The plastic wrap (points)- I can see it under the microscope. I see blood vessels. It's like traffic [points to blood flowing]. Are these guys really going to hatch? There's a blue line [points to hair].
- 7- It kind of looks like an egg. It looks like the yellow part of a chicken's egg.
- 8- I'm noticing the blood flow. The moon shaped sack. The heartbeat.

Can you identify any parts of this embryo?*

- *63% of the visitors identified the heart.*
- *63% of the visitors identified blood vessels, blood flow, or veins as a part.*
- *63% of the visitors noticed some other part, such as the spinal cord, head, or lungs.*
- *50% of the visitors identified the eye.*

- 1- The lighter white part at the top (might be brain) Heavy vessels artery; don't know.
- 2- Blood vessels. Eye spot (looks at dish). Heart. Looks like spinal cord. Maybe lungs.
- 3- Eye. Veins.
- 4- Heartbeat. Head. Veins flow well.
- 5- Looks like a chick in an egg. What is it alive? Is that the heart? Blood flow feeding to fetus. Blood cells flowing. It's cool.
- 6- It looks like that [points to eye] is the eye. You can see part of the heart. There's two different parts in the heart.
- 7- This [points to heart] is the lungs. There [points to eye] is the eye.

8- That's the heart. That looks like skull and vertebrae.

Do you see anything moving?*

- *The heart beating was the first thing that 50% of the visitors noticed.*
- *Eventually, 75% of the total visitors noticed the heart beating in the embryo.*
- *75% of the total visitors noticed the blood flowing through the veins.
25% of the visitors noticed cells moving (blood cells moving through the chick embryo veins).*
- *12% of the visitors noticed that the whole embryo was moving.*

1- The heart, probably. You can see the pulse.

2- Itself. Blood flow in veins. Cells moving. Major veins or arteries. It's marvelous.

3- Heartbeat. Cells moving. Blood.

4- Heartbeat.

5- Heart. Veins with blood cells.

6- The blood. The heart beating.

7- Blood vessels.

8- The blood. The heart beating. (Sitara zooms in on a vessel) Wow. Before you couldn't see the blood flowing in pulses. [the embryo's head moves] The whole thing is moving!

What do you notice about the shape?

- *37% of the visitors referred to the shape of the embryo.*
- *25% of the visitors referred to the blood vessels or veins.*

1- Yellow with big circle of yellow

2- A bean shape because it is curled. [Rotated dish] Looks like cranial of maybe the eye.

3- Like egg breaking it. Thing looks like a ball. Shrimp.

4- Blood vessels. Spread out.

5- Looks like veins in your egg. And egg yolks with blood. Looks like something born [Referring to a fertilized egg they've seen or tried to cook.] No.

6- There's a blacker spot. It's a circle.

7- I don't really know.

8- Trying to figure out what it is. This [points to brain] perplexes me. It looks like an egg. It has the fetal position.

ZEBRAFISH

What do you notice about this embryo?

- *100% of the visitors' first observation was a guess as to what kind of animal the embryo might be. Most common guesses were that it was something aquatic such as a fish, a snake, or a tadpole.*
- *38% of the visitors noticed body parts (e.g., tail, vein, heart)*
- *38% of the visitors commented on the spots and/or coloring.*

1- Wow. What's the magnification? Is it an eel? A frog? It is spotted with coloring.

2- Toad. Tadpole. Oh, it's a frog I bet, or a fish. Maybe it's a snake or a salamander, or a reptile.

3- It looks like a turtle, fish, frogs, snails. Spots. Is it a mammal? A reptile? Is it a snail?

4- Good color. It doesn't look very old. A kind of snake.

5- What kind of fish is it? (It moved) It's alive. I think it's a fish because of the shape. It's definitely something aquatic.

6- It's a baby tadpole It's an egg. It has a tail thing. (Mom asks daughter: Did you see these before?) We used to hatch them in school There's something moving in there. It's so small (pointing to the heart)

7- This looks like a vein. It looks like a worm.

8- It's completely different [from the other one]. It looks like it has two separate pieces (tail and body). It looks like there's two in there. It looks like a snake. Maybe a fish or snake.

Can you identify any parts of this embryo?*

- *63% of the visitors first identified the tail.*
- *Eventually, 88% of the visitors noticed the tail of the embryo.*
- *88% of the visitors identified the head or the eye of the embryo as a secondary observation.*
- *38% of the visitors identified the heart or heartbeat.*

1- A very long tail. The big sac in the middle to feed off of. It has a head. A big eye. Don't really see appendages.

2- The tail. The yolk sac. Eyes. Can't really see much of the spinal cord. Ribs, scales.

3- Tail. Eye. Wings. Heart.

4- Tail. Wonder what that is (eye). Looks like egg (sac).

5- Looks like a head with heart or lungs. It's veins are flowing.

6- The tail and the head. Lines and blood vessels.

7- Looks like eyes. There's the tail.

8- Heartbeat. Body. Tail.

Do you see anything moving?*

(Note: The zebrafish embryo was more active than chick embryo but less active than the snail embryo.)

- *100% of the visitors saw the heart beating.*
- *38% of the visitors saw blood flow and/or cells moving.*
- *38% of the visitors saw the whole embryo moving.*

1- I can see the pulse. (points with fingers) It's springing out something within that area.

2- Heart. Movement. Cells moving. Blood flow.

3- Heart. Looks like a heart pumping (come in this end and not here- points with finger)

4- This is running up. It's beating (heart).

5- This part here (heart/veins). Air bubbles are moving in and out. The creature itself. It's moving like a baby kicks.

6- The blood. A little. The heart. We had some eggs like this in school.

7- The whole thing is moving. (K: any parts?) The heart (points to heart)

8- The blood. It spreads out in the round area. The sac looks totally different, too.

What do you notice about the shape?*

- *75% of the visitors noticed the shape of the embryo*
- *50% of the visitors noticed the circular shape of the embryo casing*

1- The tail effect. The ball in the middle. Two eyes.

2- Circular, crescent shape. Blob in the center- the yolk sac.

3- It is round with a big ball inside.

4- In liquid stuff.

- 5- Round because it's in casing. Looks like a fish, or eel shape.
- 6- Circles. Looks like a big thing of jelly. It looks like frog eggs.
- 7- Looks kind of curly
- 8- Semicircular. It looks like it has some eyes (points to eyes). Looks like a snail.

SNAIL

What do you notice about this embryo?*

- *63% of the visitors took guesses as to what the embryo might be on first observations. Guesses included that the embryos were snakes, jellyfish, snails, squid, slugs, and something fishlike.*
 - *53% - Of the visitors noticed body parts (e.g., heart, eye, etc.)*
- 1- Something is developing. Something is growing as we speak. There is a pulse at the top. It makes me think of a fish.
 - 2- It looks like a colony. Volvox. Snake. Are they jellyfish? Octopus?
 - 3- Looks like a brain. Looks like a kidney. Snails. Squid.
 - 4- Looks like a fish, a slug, or maybe a jellyfish.
 - 5- I don't think it comes from water. It must come from trees. Looks like a snake. (Sitara moves dish) Looks exactly like a snail.
 - 6- It looks like jelly. It's like an egg. I think the egg is the black and brown stuff. Something is moving. I think that's the heart. It's got some hairs at the bottom.
 - 7- This is really different [from the others]. It looks like there's something inside that thing that's beating.
 - 8- It's moving a lot. It's a slow rolling movement. It looks like it has a shell. I see the heartbeat and the antennae.

Can you identify any parts of this embryo?*

- *75% of the visitors noticed the eyes and/or the head.*
 - *50% of the visitors noticed the heart, heartbeat, or pulse.*
 - *Other observed parts included the shell, the mouth, veins, the tail, and antennae.*
- 1- The pulse. I expect it to be a heart. Brain mass, if it has such a thing. Looks like a shell. Maybe it's starting to develop appendages.
 - 2- Eyes. Yolk sac. Head with eyes. Spinal cord. Heart. False eye spots.
 - 3- Eyes. Head. Mouth.
 - 4- Veins. Eyes, tissues are stiff.
 - 5- See eyes. Two dark dots look too big to be an eye. Outside of snail when it crawls. Not sure about that (the shell). The eyes. Two dots.
 - 6- I think I see the head. That's the head (points to head) and that's the tail (points to tail)., These dots- I don't know what they are. It could be an eel.
 - 7- Looks like it has a tail and it looks like it has a body. There's the heart (points to heart).
 - 8- The shell. Heartbeat. Antennae. There's an eye. It may not really be an eye, but it looks like it.

Do you see anything moving?*

(Note: This embryo was much more active than the other two on view.)

- *63% of the visitors noticed that the whole embryo was moving around*
- *63% of the visitors noticed the heartbeat as well.*

- 1- At the bottom. Are they eyes? (points to eyes)
- 2- It's moving around.
- 3- Spinning inside. Heart.
- 4- Coming up and pushing back. There's stuff moving (points toward mouth)
- 5- The whole thing is rotating and retracting. There is the heart. This thing (points close to mouth) irregular movement.
- 6- The whole thing is moving. It's a snail!
- 7- The heart and that thing [points to head]
- 8- The whole thing is moving. You can really see the heartbeat.

What do you notice about the shape?*

- *75% of the visitors noticed the shape of the embryo.*
- *63% of the visitors commented on the circular shape of the embryo casing.*

- 1- Fish shape. Part of it is sort of rounded. Shell shape like a mushroom. Where does it end? (points to the tip of the body.)
- 2- Encased in round egg. Don't seem to get the length of them because they're balled up.
- 3- Looks like a ball. It's see-through
- 4- Clear sac with liquid surrounding it.
- 5- Shape of a snail. Again inside a protective casing. Shape always is round.
- 6- It's kind of curvy. It has a shell.
- 7- The circle
- 8- Semicircular. It looks like it has some eyes. It looks like a snail.

Based on your observations, what did you notice these three embryos have in common?*

- *100% of the visitors mentioned hearts, or a heartbeat to be a commonality between the three embryos.*
- *75% of the total visitors noticed that the three embryos all had eyes or eyespots.*
- *75% of the visitors noticed that all three embryos had veins, blood vessels, or circulatory systems.*
- *38% of the visitors noticed that the embryos all had a protective sac or a yolk surrounding them.*

- 1- Some sort of pulse. Circular. System, especially in chick embryo. Amount of transparency. Wrapped around themselves within shell structure. Eyes. Shape of head. All of them are in fetal position.
- 2- Eyespots. Some kind of circular system. Heart. Two of three had definite yolk sac. All are incased in liquid. They're not all small.
- 3- Heart. See through. Eyes. Had one kind of color. Something moving. Had one kind of color. Veins and cells. Big head. All living.
- 4- Heartbeats. All in liquid base. Soft tissue. [VGL: you mentioned eyes] oh yeah- eyes.

5- All have a heart. Look they all have eyes. All living. All have a kind of protective something. Being fed by veins, air. Have tubes. All have clear protection on the outside. The last ones are in a group.

6- They're all eggs. They all have a heartbeat. And blood vessels. I liked the snail The circles.(There were a number of snail embryos encased in sacs that were circular.)

7- They're all embryos. Inside of them they all have hearts.

8- They're all embryos. They're all active and moving. They all had heartbeats. The blood is moving inside of them. They all appeared to have eyes.

Do you have any questions about this or anything you'd like to find out about?

1- What was the spewing water flowing? (zebra fish) How do you decide which animal to show? How do you decide how many living exhibits to have compared to other exhibits? How are you supported?

2- Would need to have it mediated.

3- No.

4- No. I asked them already.

5- What do they have in common? How do they (snails) feed themselves? How come they're alive? They're out of their habitat aren't they? How long will they survive? (especially the chick) Some eggs don't have veins. But this one does, why? What was that? (chick brain)

6- Will they hatch? When the hens lay the eggs, how do they make it so the chicken will hatch? How did you get the eggs and the embryos? When you zoom into the snail, they look like they're about to hatch.

7- Is that one that's hatched out [points to worm inside of the snail collection]? (SC explains that it's a worm.) Why is there a worm in the snails? (SC explains that sometimes there are other organisms in the water besides snails)

8- What was the moon shaped black part on the first one? (eye). Where are they in their gestation? What's going to happen to them when they hatch? What are we trying to find out? If you were to compare the gestation of a chick embryo and a human fetus, what would that look like in days?

Visitor Comments

5- There's a lot of life. Didn't have color of blood. (sc explains the blood is moving) Very interesting. Nice to see it alive. Better than picture or a video.

6- Have the thing where you lift it up and there's an answer to what it is underneath. Let people pick which one they want to see. Let the visitors decide which part to see. If a microscope is set up, show where to zoom in to a certain part of it. Let them adjust certain things.

7- I don't know. (SC: Would you like to do the parts I did?) That would be good.

8- Compare human and egg gestation. Most kids might like human and chicken comparison.

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