RESEARCH ARTICLE

A Morphological Study of the Evolution of Eight Organisms Through a Morphological Phylogeny

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ABSTRACT

Introduction: In this study, eight different shells from different species were examined by looking at the physical features of the shells. The purpose of the study was to identify evolutionary links between species with shells. From these physical features, a morphological phylogeny was compiled. And from the morphological phylogeny, it was shown that their the family of the shells was the first trait defined specific clades and that each synapomorphic trait after this was a physical feature of the shells.

Results: From the experiment, the following conclusions were discovered: 1) That Scallops and Cockles are the most morphologic clay similar. 2) For taxa A, trait III is an apomorphy because this traits is a single traits that defines this taxa separately form the other taxa. 3) For taxa A, traits I is a plesiomorphy because it is a trait that is ancestral to trait III which defines taxa A.

Conclusions: From the data, these conclusions could introduce a new topic, new ideas, and new information to existing researches. The influx of new ideas would either become helpful, or build off the research of other researchers. This would help the scientific community in increasing its knowledge of the evolutionary background of more species.

Keywords: Phylogenetics, Cladogram, Shells, Mollusk, Gastropod, Evolution

INTRODUCTION

On Earth, there may be more than two million species of organisms. These organisms all share similar characteristics and some share common ancestors. The group that was focused on in this study was organism's with shells. These include the families of Mollusks and Gastropods. The purpose of the study was to identify evolutionary links between species with shells and shell groups that existed in the kingdom of life. The reason for identifying evolutionary links between the evolutionary links between these shelled organisms through phylogenies is that from this basic phylogeny of only a few species, it can be expanded outward to hundreds of other species. Eventually, an all encompassing phylogeny can be made with all living organism in the animal kingdom

METHOD

In this study, eight shells of different species origin and location were brought from the Great Lakes. These shells were then sketched and analyzed. In the analyzation, the physical features of each of the cells were noted and compiled. This became the basis for the data matrix. In the data matrix, each specie with a specific trait was given a "Y" symbol, and each specie without a trait was given a "N" symbol. From the data matrix, the morphological phylogeny was compiled. In the morphological phylogeny, traits in the data matrix would be examined and species with specific traits would be in a clade, while species with other traits would not be placed in the clade. This would continue until every species was in a separate taxon. After the construction of the morphological phylogeny, the taxa and their placement would be analyzed for pattern and themes.

RESULTS

The data used in the construction of this cladogram is based on observation, and drawings of physical features of the shells. These physical features must not be able to be changed by outside forces, like sand and water and can be genetically traced back to a common ancestor. In this paper, a mollusk is a group of animals with soft body, no back bone and usually live in shells, bivalves are shells that have two hinged parts, scallops are a type of bivalve with a fan shaped shell with arches, cockles are a type of bivalve with turned end, conches are a type of mollusk with a spiral shell that may bear long projections and have a flared lip, gastropods is a shell that is univalve (has one hole), patellogastropoda is a group of organisms that live in cone shaped shells, length is when shell is put upright and measuring the right/left sides, body type 1 is a spiral shell, body type 2 is a non-spiral shell, spiral spikes are pieces of shell on top that go around in a spiral pattern, flap is the piece of shell that connects the shell to the outer covering, and incomplete/ complete refers to if the flap covers all of the opening, or just some of it (Fig. 2). The first shell given a Rough Scallop (Kurtz, 1860). It is white, black and gray and is 2.4 inches long (Fig. 3). The second shell given to us was a *trachycardium egmontiana* or Florida Prickly Cockle (Kurtz, 1860). It is 1.5 inches long and is a pearlescent color (Fig. 4). The third shell is a cone shaped shell or a *concolor polygramma* (Kurtz, 1860). It is white, black and gray and is 1 inch in length (Fig. 8). The fourth shell is the moonsnail shell (Kurtz, 1860). This shell is white, is made up of layers and in 1 inch in size (Fig. 5). The fifth shell is the Ribbed Cantharus Tranquebarica (Kurtz, 1860).

Table 1 Data Matrix

	A	B	C	D	E	F	G	H
Hinged Shell:	Y	Y	N	N	N	N	N	N
Non-hinged shell:	N	N	Y	Y	Y	Y	Y	Y
Free Swimming:	Y	Y	N	N	N	N	N	N
Bilaterally Symmetrical:	Y	N	Y	Y	N	N	N	N
Dark Colors:	Y	N	Y	N	N	N	N	N
Light Colors	N	Y	N	Y	Y	Y	Y	Y
Length Above 1 inch:	Y	Y	N	Y	Y	Y	Y	Y
Shell is layered:	N	N	N	Y	Y	N	Y	Y
Smooth surface:	N	N	N	Y	N	Y	Y	Y
Spiral Spikes:	N	N	N	N	N	Y	Y	Y
Extended Piece of shell:	N	N	N	N	N	Y	Y	Y
Broken Piece at bottom:	N	N	N	N	N	Y	Y	Y
Symmetrical: (Line through top to bottom)	Y	N	Y	Y	N	N	N	N
Arches:	Y	N	Y	N	N	N	N	N
True Coelom:	Y	Y	N	N	N	N	N	N
Hole on side:	N	N	N	N	N	N	N	N
Any Cracks:	N	N	N	N	Y	N	N	N
Symmetrical: (Line through top to bottom)	Y	N	Y	Y	N	N	N	N

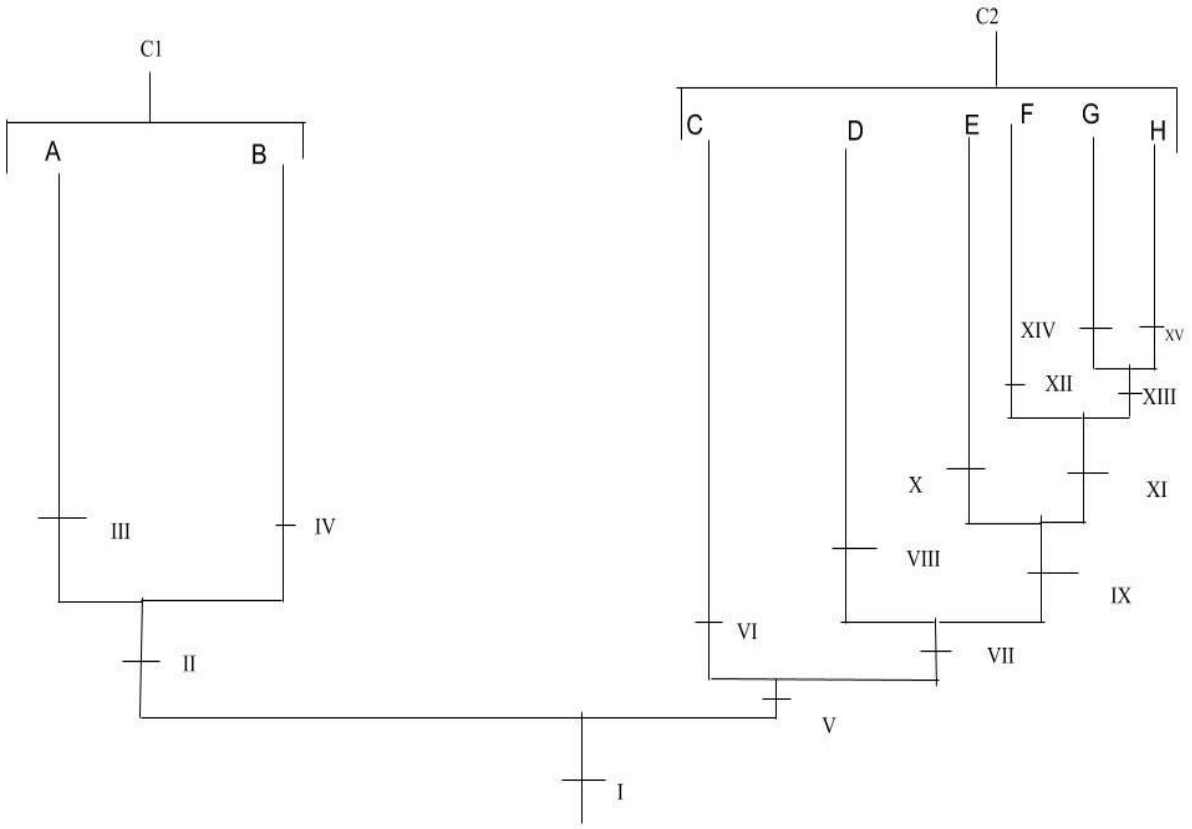

Fig. 1 :

Legend:
I = Animals with soft body, no back bone and usually live in shells
II = Shells that have two hinged parts
III = Type of bivalve with a fan shaped shell with arches
IV = Type of bivalve with turned end
V = Shell that is univalve (has one hole)
VI = Organisms that live in cone shaped shells
VII = Mollusk with a spiral shell that may bear long projections and have a flared lip.
VIII = Body Type 1
IX = Body Type 2
X = Bumpy Surface[1]
XI = Smooth Surface
XII = Spiral Spikes
XIII = No Swirl Flaps
XIV = Incomplete Flap
XV = Complete Flap

Numbers of Top:
C1 = Clade 1
C2 = Clade 2

Shell Pictures:

[1] Note: All of these physical characteristics are through genetics and are not caused by erosion of the shell from natural forces like water and sand.

A = 

Fig. 2

B = 

Fig. 3

C = 

Fig. 4

D = 

Fig. 5

E = 

Fig. 6

F = 

Fig. 7

G = 

Fig. 8

H = 

Fig. 9

This shell is white and brown and has a size of 1.5 inches and is layered with a bumpy surface (Fig. 6). The sixth shell is a Florida fighting conch shell (Kurtz, 1860). It is a yellow and white color, with spiral spikes and is 2.2 inches long (Fig. 7 Shell F). The seventh shell is a conidae, specifically a *Malagasyconus lozet* (Kurtz, 1860). This shell is a white, brown color and is 2 inches in length. The inside is a pink skin color (Fig. 8). The eighth shell is a Lettered Olive (Kurtz, 1860). It is 2 inches long, and is brown and white in appearance (Table 1). The inside of the shell is white.

DISCUSSION

For clade C1, trait II is a synapomorphy of that clade (Fig. 1). The reason is because this clade made up of taxa A and taxa B is defined by the possession on this trait II (Fig. 1). For taxa A and taxa B, trait I is a symplesiomorphy because it is a common ancestral trait to the synapomorphy of trait II that defines both of these taxa. (Fig. 1) For taxa A, trait III is an apomorphy because this trait is a single trait that defines this taxon separately from the other taxa (Fig. 1). For taxa A, trait I is a plesiomorphy because it is a trait that is ancestral to trait III which defines taxa A (Fig. 1). From this set of data, we can that these specific shells started out as a general family of Molluscs and then specialized due to the needed traits to survive in specific locations (Fig. 1). Those that had natural predators that ate them would become spiky and ridged, and those who were living in darker areas became a darker color. And example of this would by the Spiky Florida Cocke or the Spiked Catharus (Table 1). We can also that the main difference between the shells is if they are a bivalve of a gastropod (Fig. 1). The placing of the column was the first difference to divide up the Mollusc family (Fig. 1).

CONCLUSION

In summary, the present data suggests that as time progressed, shells started to gain more tetrapod-like synapomorphies and became larger in size. Also, there was a divergence of becoming symmetrical and radially symmetrical when the Gastropods and the Mollusks became two separate clades. Additional studies concerning the morphological and genetic similarity between fish and shelled organisms might help better understand the link between gastropods, mollusks and fish.

Conflicts of interest: The authors stated that no conflicts of interest.

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