

# **On the Origin of Phyla:**

## **Interviews with James W. Valentine**

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### **Video Study Insert**

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# On the Origin of Phyla: Interviews with James W. Valentine

## **Interview 1: 1993 (00:00 - 25:50)**

1. Why can't Darwin's Origin of Species account for the origin of phyla? (00:42-01:29)
2. How long did it take the major body plans to appear? (01:30-02:01)
3. How many phyla have arisen since the Cambrian explosion?(02:02-02:20)
4. What has prevented the evolution of new phyla since the Cambrian? (02:21-03:28)
5. Are you saying that Darwinian competition prevents major new body plans from arising after the Cambrian? (03:29-04:15)
6. Why can't microevolution be extrapolated to account for major evolutionary change? (04:16-05:31)
7. Can paleontologists trace the animal phyla back to a common ancestor? (05:32-09:09)
8. Does the Cambrian explosion represent a sudden and dramatic increase in both disparity and complexity? (09:10-11:47)
9. How is the number of cell types in organisms relevant to the Cambrian explosion? (11:48-14:42)

10. Is the punctuated equilibrium model of Eldredge and Gould sufficient to account for the origin of the higher taxa? (14:43-17:59)
11. Do we need theories of stasis in order to fully explain the natural history of life on earth? (18:00-19:11)
12. How long did it take to produce the disparity of the phyla? How much diversity existed within each phylum in the Cambrian? (19:12-21:38)
13. Darwin believed that the increasing diversity of species would gradually lead to the disparity of the higher taxa. The fossil record appears to contradict Darwinian theory. Disparity precedes diversity. Could you comment on this problem? (21:39-24:34)
14. Do you have some examples of your latest research findings? (24:35-25:50)

## **Interview 2: 1994 (26:12 - 1:15:05)**

### ***Personal background:***

1. What first interested you in the subject of paleontology? (26:12-27:21)
2. Who has had the most significant influence upon your career? (27:22-28:23)
3. What have been the most rewarding aspects of your work? (28:24-29:13)

### ***The Origin of the Phyla:***

4. The focus of your research has been origins of animals and of the major animal groups, the

phyla. What are some of the major problems?  
(29:14-30:49)

5. What are the earliest animals like? (30:50-33:50)
6. What was life on earth like in the early Cambrian? (33:51-37:00)
7. Do these numerous Cambrian groups represent major increases in complexity over the simpler late Precambrian forms? (37:01-43:21)
8. What were the ancestors of the early Cambrian forms like? (43:22-51:11)
9. What happened to all of the 135-140 Orders that became extinct? (51:12-58:04)
10. What are the fundamental predictions of Darwinian theory as it relates to paleontology? Are these fundamental predictions met by the fossil evidence? (58:05-59:22)
11. Is Darwinian gradualism consistent with the fossil record and the origin of the phyla? (59:23-1:01:42)
12. Because of the lack of fossil evidence for gradual evolution, Darwin devoted an entire chapter in his Origin of Species to the "Imperfection of the Geological Record". How incomplete is the record? (1:01:43-1:03:35)
13. Are ancestral fossil series leading to any of the major phyla known in the fossil record? (1:03:36-1:04:29)

14. Eldredge and Gould have claimed that the two key features of the fossil record are sudden appearance and stasis. Does the hypothesis of punctuated equilibrium adequately explain the origin of the higher taxa? (1:04:30-1:06:38)
15. Can punctuated equilibrium be extrapolated to account for the origin of the phyla? (1:06:39-1:09:25)
16. Why is the cell-type hypothesis a better explanation for the origin of the phyla than competing ideas? (1:09:26-1:11:51)
17. What major problems remain to be solved with regard to the origin of the phyla? (1:11:52-1:14:46)
18. What would you most like to be remembered for? (1:14:47-1:15:05)

### **Interview 3: 1997 (1:15:17 - 1:34:43)**

1. What was the general view of natural history prior to 1859? (1:15:39-1:16:23)
2. What was so revolutionary about Darwin's Origin of Species? (1:16:24-1:17:00)
3. What pervasive pattern did Darwin expect to find in the fossil record? (1:17:01-1:17:56)
4. Darwinian theory predicts a bottom-to-top pattern of geological succession. As species diversify, new genera, families, orders, classes, and ultimately new phyla should be generated. Does the fossil record confirm or contradict this bottom-to-top pattern? (1:17:57-1:19:14)

5. How did Darwin reconcile his theory with the fossil record? (1:19:15-1:20:55)
6. Have research efforts since 1859 helped to reconcile the conflicts between Darwinian theory and paleontology? (1:20:56-1:21:57)
7. Have these new discoveries solved the problem of the origin of phyla? (1:21:58-1:23:24)
8. What did the early members of the phyla look like? (1:23:25-1:24:43)
9. Can the origin of the major phyla in the Cambrian explosion be explained on the basis of punctuated equilibrium? (1:24:44-1:26:56)
10. From what we see in the fossil record, natural history looks more like a forest than a tree of life. How can the theory of universal common ancestry be reconciled with the fossil evidence? (1:26:57-1:28:56)
11. Do the disparate body plans represented by the phyla represent disparate genomes? (1:28:57-1:31:51)
12. Could you describe your “cell-type” hypothesis and how it relates to the origin of phyla? (1:31:52-1:34:43)

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