Birzeit University

**Biology and Biochemistry Department**

**BIOL 244**

**Cell Biology lab**

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**Titles: Scientific investigation.**

**Objective: Difference between allometric and isometric growth and give examples support them.**

**Introduction: Growth and reproduction are two of the most fundamental processes in the relative growth rates of different body. When describing the changing relative rates of growth we used two concepts "allometry and allometric growth". Allometry is the quantitative relationship between growth and allocation, Traits are said to exhibit allometric variation when they do not scale isometrically to some measure of size (Certain parts of living things develop at different rates), which might result from the different developmental processes but when two parts grow at the same pace (at the same rate) it becomes isometric growth. Allometric growth occur when some part of the organism grows at a rate different from the rest of the organism during development. For example, if a human's arms and legs grow isometrically, their lengths relative to the body will be the same in a newborn as in an adult.**

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**Material: meter**

**Procedure: 1- we divided student into groups.**

 **2- Each group measure the body parts such as “length, head, hand, span, total leg, rump length, foot length.**

 **3- We calculated average, adult ratio and baby ratio.**

 **4- We made a graph**

**Data and result:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Number**  | **Body part** | **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** | **A9** | **A10** | **A11** | **A12** | **A13** | **A14** | **A15** |
| **1** | **Length**  | **162** | **156** | **156** | **166** | **164** | **156** | **166** | **152** | **160** | **175** | **166** | **168** | **162** | **161** | **170** |
| **2** | **head** | **59** | **58** | **58** | **57** | **64** | **54** | **60** | **58** | **59** | **65** | **61** | **59.5** | **62** | **61** | **60** |
| **3** | **hand** | **69** | **72** | **65** | **70** | **73** | **66** | **72** | **66** | **72** | **83** | **69** | **73** | **66** | **69** | **75** |
| **4** | **span** | **19** | **19** | **20** | **21** | **20** | **20** | **20** | **19** | **19** | **22** | **17** | **18** | **16** | **15** | **18** |
| **5** | **Total leg** | **83** | **82** | **79** | **85** | **95** | **88** | **100** | **95** | **98** | **102** | **93** | **81** | **87** | **89** | **93** |
| **6** | **Rump length**  | **86** | **87** | **87** | **90** | **92** | **86** | **86** | **84** | **82** | **96** | **86** | **91** | **93** | **90** | **90** |
| **7** | **Foot length**  | **25** | **27** | **26** | **29** | **30** | **27** | **25** | **23.5** | **26** | **30** | **26** | **27** | **28** | **26** | **26** |

|  |  |  |
| --- | --- | --- |
| **Average**  | **Adult ratio** | **Baby ratio** |
| **162.7** | **1** | **1** |
| **59.75** | **2.7** | **1.45** |
| **70.6** | **2.3** | **2.4** |
| **18.8** | **8.7** | **8** |
| **90** | **1.6** | **0.9** |
| **94.6** | **1.9** | **1.45** |
| **26.7** | **6.2** | **6.4** |

**Discussion: we measurement the sizes of body parts and noticed the difference ratios for adult and baby after make calculations so we conclude Difference between allometric and isometric growth and finally we make a graphs.**

**Questions:**

1. **What is the dependent variable in your experiments? Body parts like length, head,…...**
2. **What is the independent variable? Ratio of baby**
3. **Controlled variables? Ratio of baby part**
4. **Control? Ratio of baby parts**
5. **Level of treatment? Ratio of baby parts**
6. **Replication? Average**

**Appendices**:

* **Average of length = 162+ 156+ 156+ 166+ 164+ 156+166+152+160+175+166+168+162+161+171 \ 15 = 162.7**
* **Average of head = 59+ 58+ 58+57+ 64+ 54+ 60+ 58+ 59+ 65+61+ 59.5+ 62+ 61+60 \ 15 = 59.7**

**And so on ……….**

* **Ratio for length “baby” = length or height \ part of body (length) =**

 **= 48\ 48 = 1**

* **Ratio for head “baby” = length or height \ head =**

 **= 48 \ 33 = 1.45**

* **Ratio for length “adult” = length \ length or height =**

 **= 162.7 \ 162.7 = 1**

* **Ratio for length “adult” = length or height \ head =**

 **= 162.7 \ 59.75 = 2.7**

**And so on ……….**

**σ= √ ∑( xi−μ)2 \n**

**References:**

1. [**https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/allometry**](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/allometry)
2. [**https://www.nature.com/scitable/knowledge/library/allometry-the-study-of-biological-scaling-13228439/?error=cookies\_not\_supported&code=9c2ea78f-dff3-4510-9c0a-8e128bcdce1e**](https://www.nature.com/scitable/knowledge/library/allometry-the-study-of-biological-scaling-13228439/?error=cookies_not_supported&code=9c2ea78f-dff3-4510-9c0a-8e128bcdce1e)
3. Weiner, J., Campbell, L. G., Pino, J., & Echarte, L. (2009). The allometry of reproduction within plant populations. *Journal of Ecology*, *97*(6), 1220-1233.