

Geneticist Name: _____

Period: _____

Gene Expression and Phenotype

Objective: Determine and identify whether genes and/or environmental factors could influence an organism's phenotype.

Introduction: The blueprint for all organisms lies in their genetic material. This blueprint gives the potential physical traits for the organism. When the genes become a phenotype, we say they are expressed. The expression of many traits is affected by the environment of the organism. Therefore, their genetic potential may not be their actual phenotype.

Environmental conditions which may alter gene expression:

- Temperature
- Light
- Moisture
- Minerals
- Nutrients

Instructions: Read the description of each case study. Then provide the following information on the Case Study Profile Sheet.

- Case
- Phenotype
- Genes or Environment
- Supporting Material

Vocabulary Terms:

Phenotype: an individual's observable traits, such as height, eye color, and blood type.

Genotype: an individual's collection of genes; the two alleles inherited for a particular gene.

Gene expression: the process by which genetic instructions are used to synthesize gene products.

Environment: all of the variables that a physical system comes in contact with.

A. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

B. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

C. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

D. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

E. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

F. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

G. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

H. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

I. Case _____

Phenotype _____

Genes OR Environment (circle one)

Supporting Material

- _____
- _____

Conclusion

How do genes and the environment come together to shape an organism's phenotype?

Do genes or the environment play a larger role on an organism's phenotype? Explain.

Nature Against Nurture? Scientists Declare A Draw In Genetics vs. Environment Debate

By Rhodi Lee, Tech Times | May 22, 6:32 AM Like Follow Share Tweet Reddito



It has long been a subject of debate: are human traits determined by nurture or nature? Now, a team of researchers has investigated whether our genes or the environment, where we have been raised in, influences who we are.

For the study published in the journal *Nature Genetics* on May 18, Danielle Posthuma, from the Vrije Universiteit Amsterdam, and colleagues looked at nearly every study on twins that has been conducted in the past 50 years.

They surveyed over 2,700 studies on twins to look at over 17,000 traits, comparing variations in identical twins, who share all their genes, and also the differences between fraternal twins, who share half their genes.

The researchers in particular looked at physical traits such as metabolism, height and weight as well as psychological traits, which include intelligence, personality, temperament and likelihood to suffer from depression.

They found that 49 percent of the average variation for human diseases and traits can be attributed to genetics. Fifty-one percent, on the other hand, can be attributed to environmental factors. They likewise found that about two-thirds of the traits are the result of the cumulative effect of many genes.

"Estimates of heritability cluster [register] strongly within functional domains, and across all traits the reported heritability is 49%," reported the researchers. "For a majority (69%) of traits, the observed twin correlations are consistent with a simple and parsimonious model where twin resemblance is solely due to additive genetic variation.

Although the results showed a near draw between nurture and nature, there were variations within the traits and diseases that were examined. Risks for bipolar disorder, for instance, were found to be 68 percent attributable to genetics. Thirty-two percent of the odds were due to environmental factors.

Odds for eating disorder were likewise 40 percent genetics and 60 percent environmental while risks for behavioral and mental disorders due to alcohol use were 59 percent environmental and 41 percent genetics.

Social values and attitudes were found to be largely influenced by environmental factors while ophthalmological, psychiatric, and skeletal traits are largely determined by genetic factors. The researchers, however, pointed out that there was no single trait without the contribution of genetic factors.

"What is comforting is that, on average, about 50 percent of individual differences are genetic and 50 percent are environmental," said Beben Benyamin, from the University of Queensland. "The findings show that we need to look at ourselves outside of a view of nature versus nurture, and instead look at it as nature and nurture."