Slide 1

What Makes Me Like I Am ?

Environment Influences Gene Expression

BIO 100 Principles of Biology

Slide 2

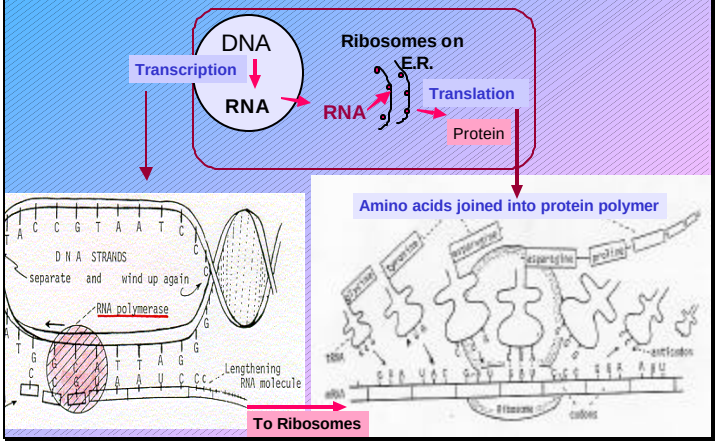
Summary: Genes and Environment

PRINCIPLE:
Genes control metabolism, but are themselves subject to environmental influence -- food, temperature, light, etc.

The phenotype of an organism is the result of environmental conditions operating through the genetic control system.

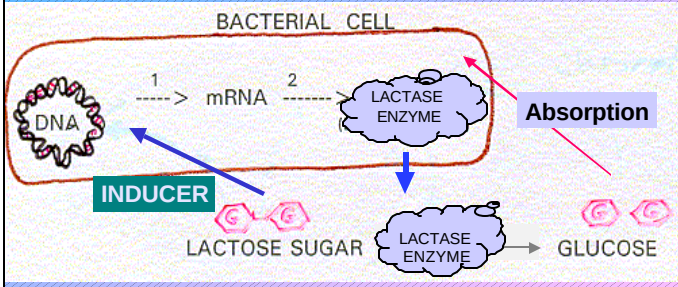
Slide 3

Summary: Gene Expression



Slide 4

How Is Gene Expression Controlled? "The Operon Theory"



PRINCIPLE:
Genes control metabolism, but are themselves subject to environmental control via "inducers."

Slide 5

How Is Gene Expression Controlled? "The Operon Theory"

AN OPERON CONSISTS OF:

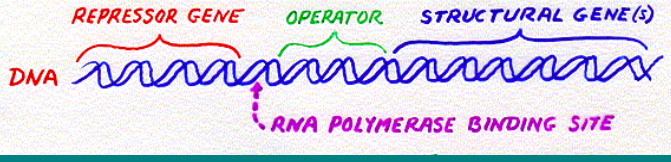


Figure 17-4

Slide 6

How Is Gene Expression Controlled? "The Operon Theory"

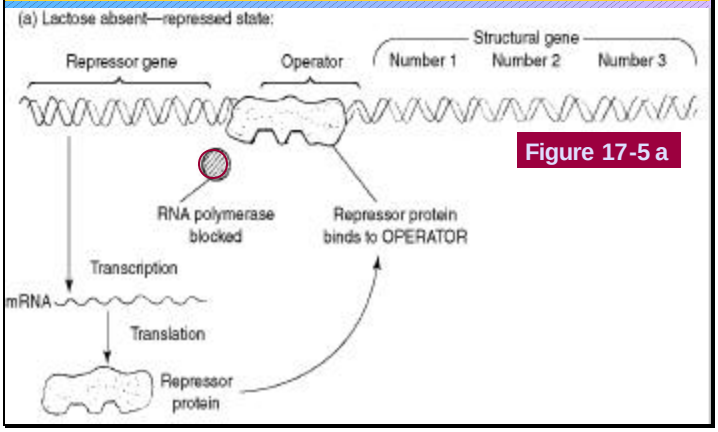
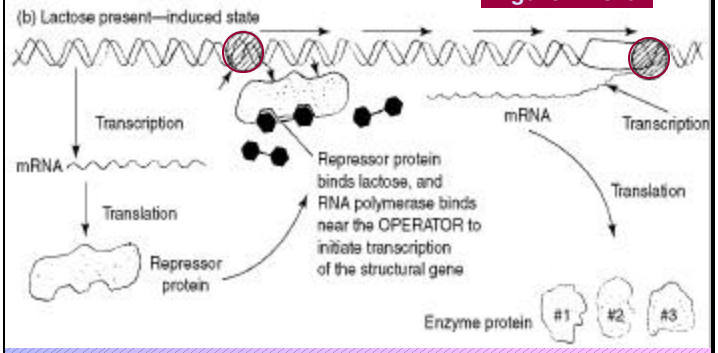


Figure 17-5 a

Slide 7

How Is Gene Expression Controlled? "The Operon Theory"

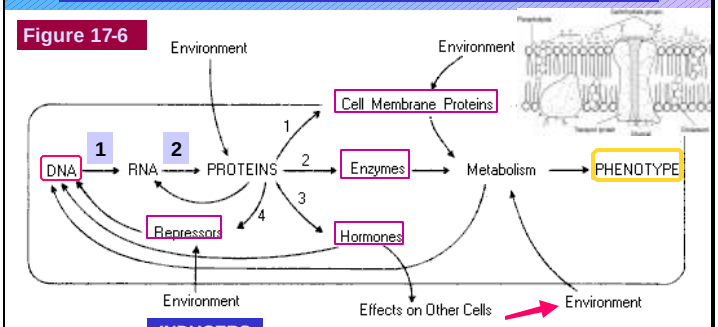
Figure 17-5 b



Slide 8

Summary: Genetic Control Model

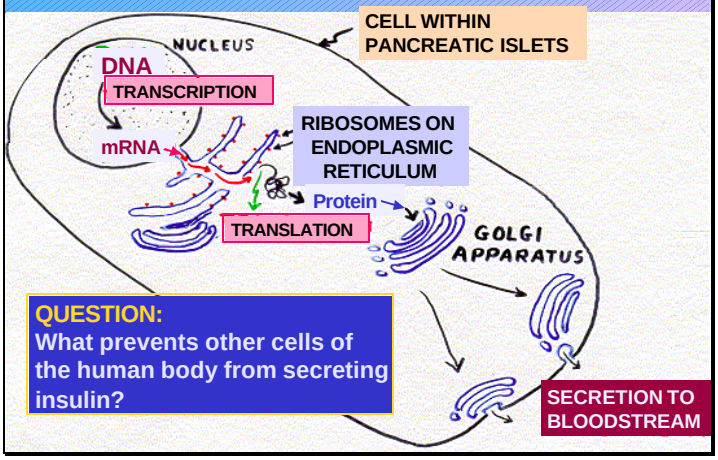
Figure 17-6



INDUCERS
e.g. lactose

Slide 9

Application: Pancreas Producing Insulin

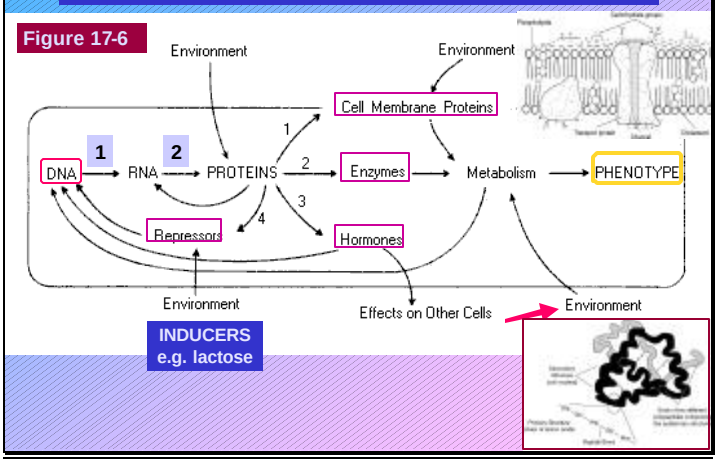


QUESTION:
What prevents other cells of the human body from secreting insulin?

Slide 10

Summary: Genetic Control Model

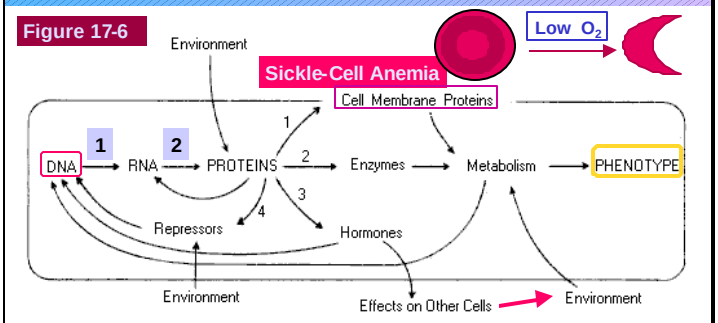
Figure 17-6



Slide 11

Genetic Control: Membranes

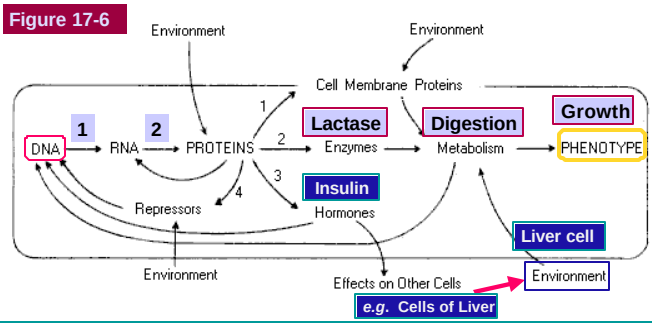
Figure 17-6



Slide 12

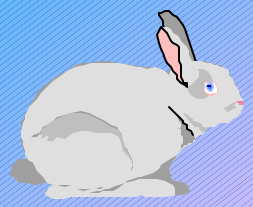
Genetic Control: Enzymes, Hormones

Figure 17-6



Slide 13

Control from Inside and Outside



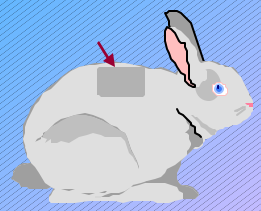
Observation:
Hair color in the Himalayan rabbit is darker body extremities; locations where body temperature is lower.

Hypothesis:
Hair color is controlled by both genotype (inherited alleles) and by environment -- *I.e.* the temperature of the extremities.

Experiment:
Shave off hair at a supposed warmer location of the rabbit's body and cool the body as the hair grows back.

Slide 14

Control from Inside and Outside



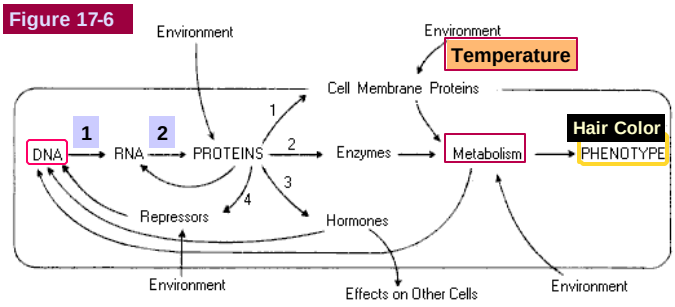
Results:
Re-grown hair in the cooled part of the rabbit's body appears darker in color.

Hypothesis Supported:
Hair color is controlled by both genotype (inherited alleles) and by environment -- *I.e.* the temperature of the extremities.

Slide 15

Control from Inside and Outside

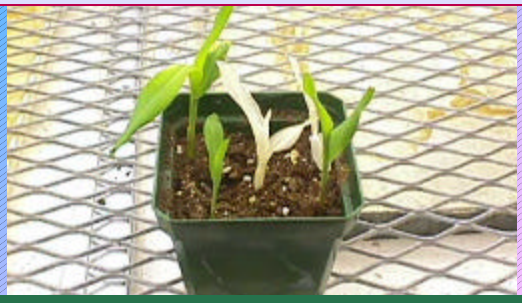
Figure 17-6



PRINCIPLE:
Genes control metabolism, but are themselves subject to environmental influence -- food, temperature, light, etc.

Slide 16

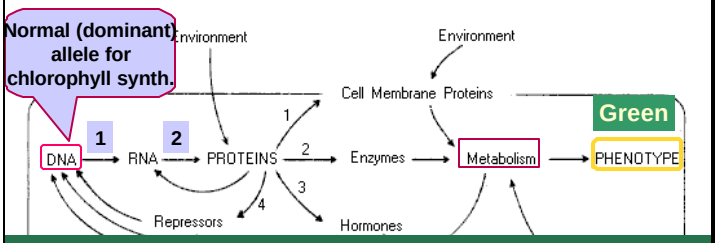
Control from Inside and Outside



ANOTHER EXAMPLE: Albino plants lack a gene for chlorophyll synthesis.

Slide 17

Control from Inside and Outside

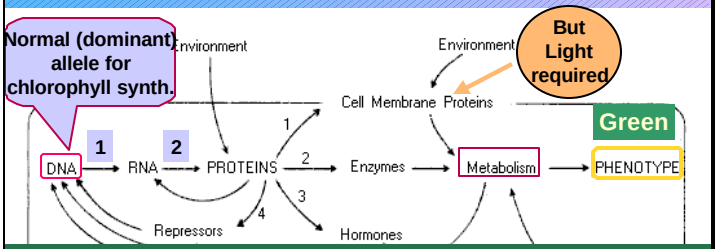


ANOTHER EXAMPLE: Albino plants lack a gene for chlorophyll synthesis.

QUESTION: In what other way can one produce a pale plant?

Slide 18

Control from Inside and Outside



ANOTHER EXAMPLE: Albino plants lack a gene for chlorophyll synthesis.

ANSWER: One can produce a pale plant by growing it in the absence of light.

Slide 19

Summary: Genes and Environment

PRINCIPLE:
Genes control metabolism, but are themselves subject to environmental influence -- food, temperature, light, etc.

The phenotype of an organism is the result of environmental conditions operating through the genetic control system.