Practical details

- Literature:
  1. Wahde, M. *Introduction to Evolutionary Computation*
  2. Wahde, M. *Introduction to Neural Networks*
  3. Wahde, M. *Introduction to swarm intelligence*

  + Problem collections.

- Course web page:
  http://www.me.chalmers.se/~mwahde/courses/isd/ai2/2007/2007.html

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Practical details (schedule)

Date	Time	Room	Contents
20071113	13.00-15.45	SJ	Course introduction, biological basis of evolutionary algorithms (EAs)
20071116	13.00-15.45	SJ	Basics of EAs
20071120	13.00-15.45	LT	Using EAs, properties of EAs
20071123	13.00-15.45	SJ	Advanced EA topics
20071130	13.00-15.45	SJ	Applications of EAs,
20071204	13.00-15.45	SJ	Introduction to neural networks
20071214	13.00-15.45	LT	Backpropagation **assignment (handout)**
20071218	13.00-15.45	SJ	Particle swarm optimization
20071220	13.00-15.45	SJ	Ant colony optimization
20080116	09.00-13.00	SJ	**Exam**

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Practical details

- My telephone number: 772 3727

- Location: M building, 2nd floor, behind ”café Bulten”.

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Practical details

- During the course, you may ask questions any time, not only during lectures.

- Concerning the assignments, you may discuss with other students, but you ***must hand in your OWN solution.*** Solutions in which the report lacks name or civic registration number, ***will not be corrected***.

- ***Note: The exam will take place on Jan. 16.***

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Practical details

- Use your e-mail address from the IT university (or your Chalmers address, if applicable), i.e.

  <your full name>@ituniv.se

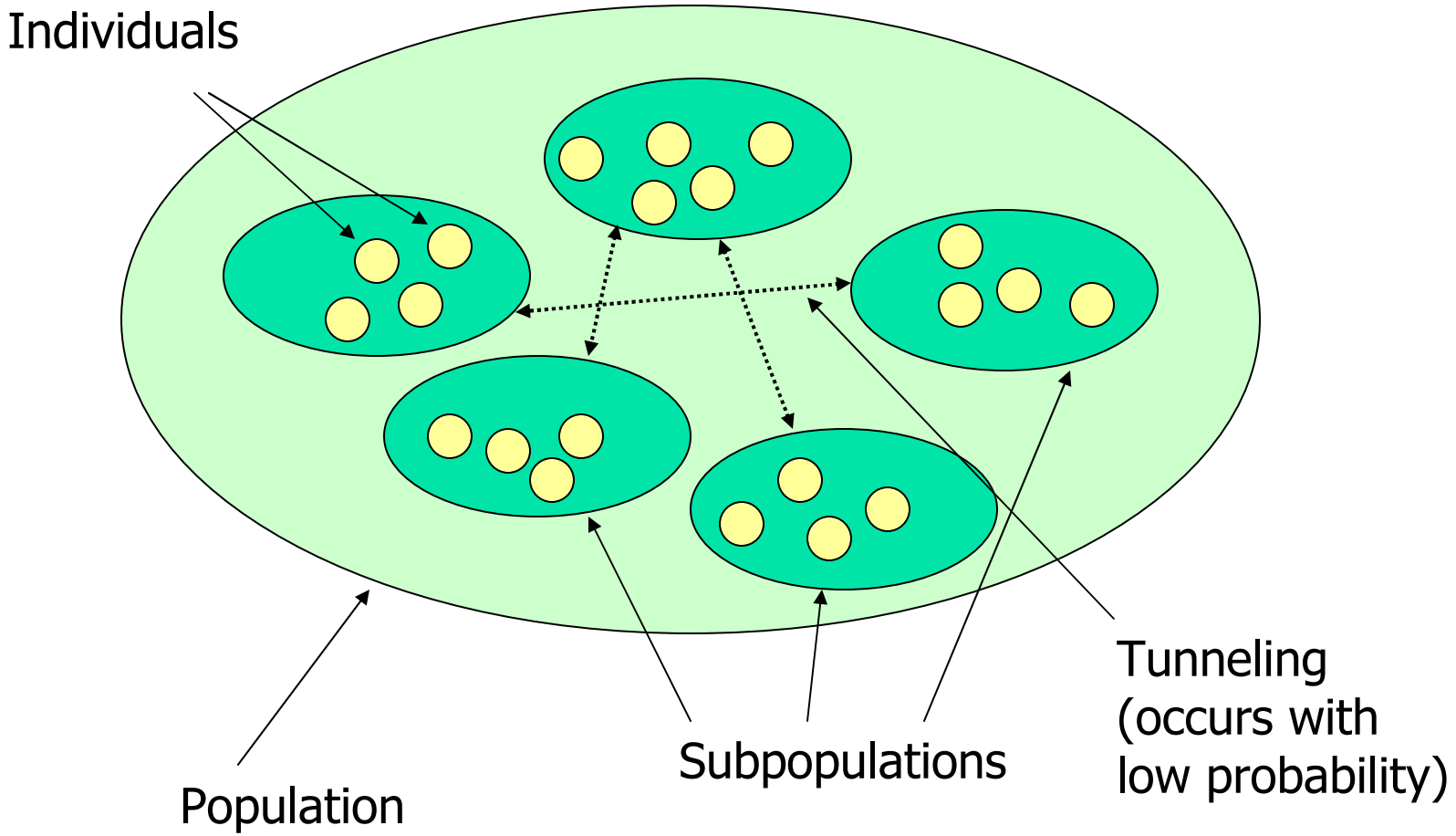
  <your full name>@student.chalmers.se

  In any case, make sure that the name field (”From” in the e-mail) lists your *full name*, using ordinary letters: No nicknames, abbreviations, Chinese (or other) characters etc.
  Note: ***I will ignore e-mails that do not fulfil this basic requirement!***

Examination

- Assignment: 50%
- Exam: 50%

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde



Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Chromosome numbers in selected species

Fruit fly	8
Cat	38
Human	46
Ape	48
Horse	64
Dog	78
Carp	104

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

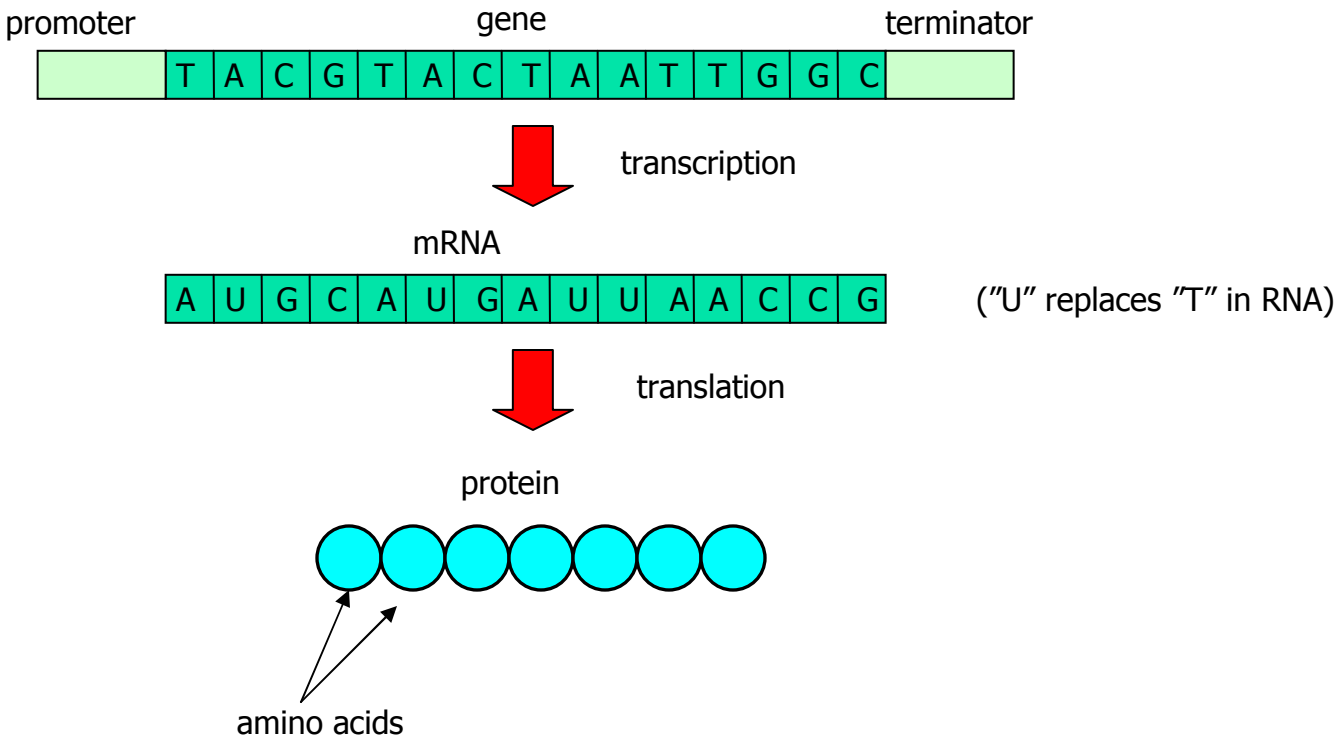
Number of genes in selected species

Bacterium	500-6,000
Yeast	6,000
Fruit fly	13,600
Human	~25,000

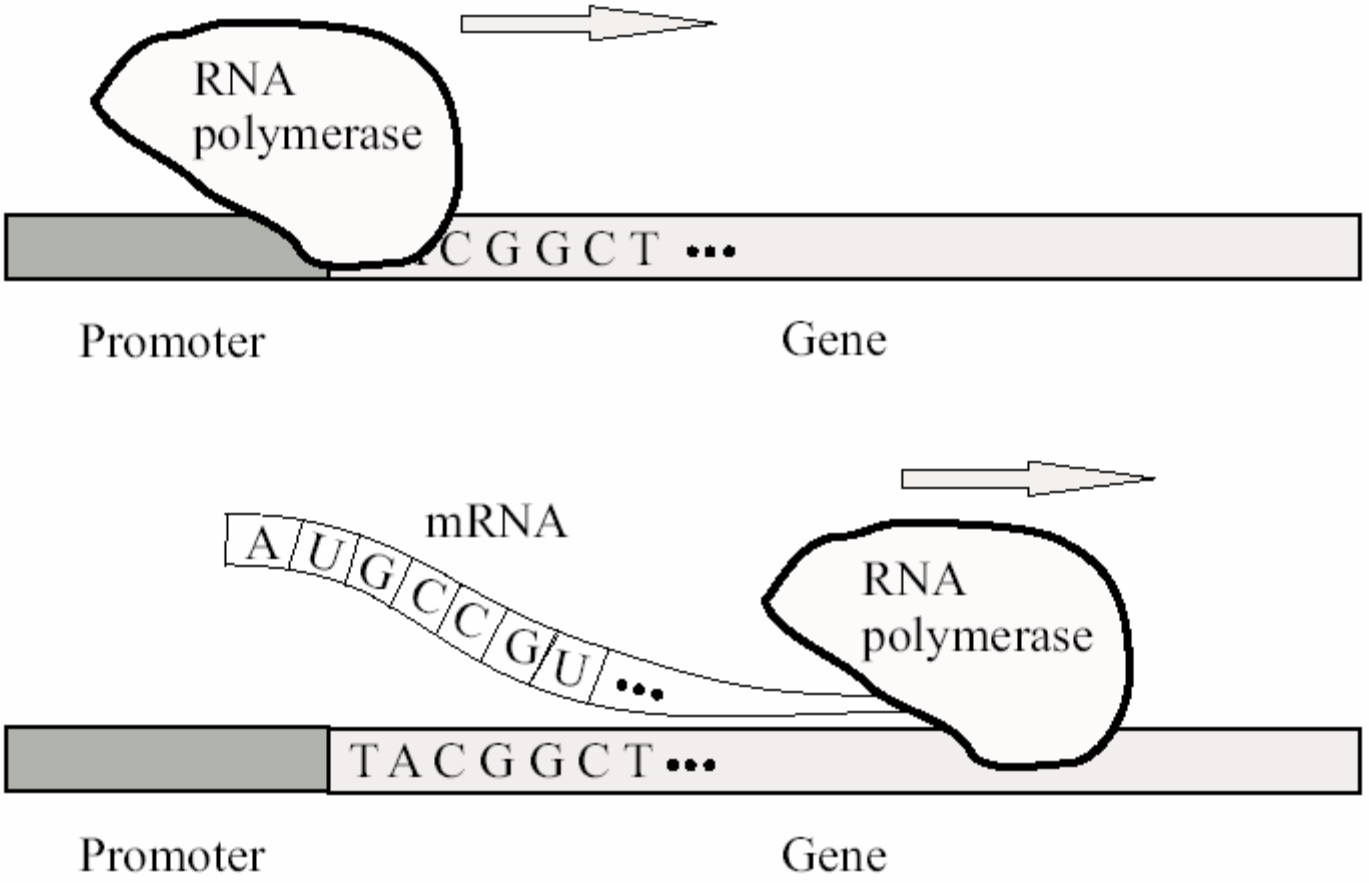
(However, there are many species (e.g. some fish) with more genes than humans)

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Genes are used for making proteins, through the two steps of *transcription* and *translation*:

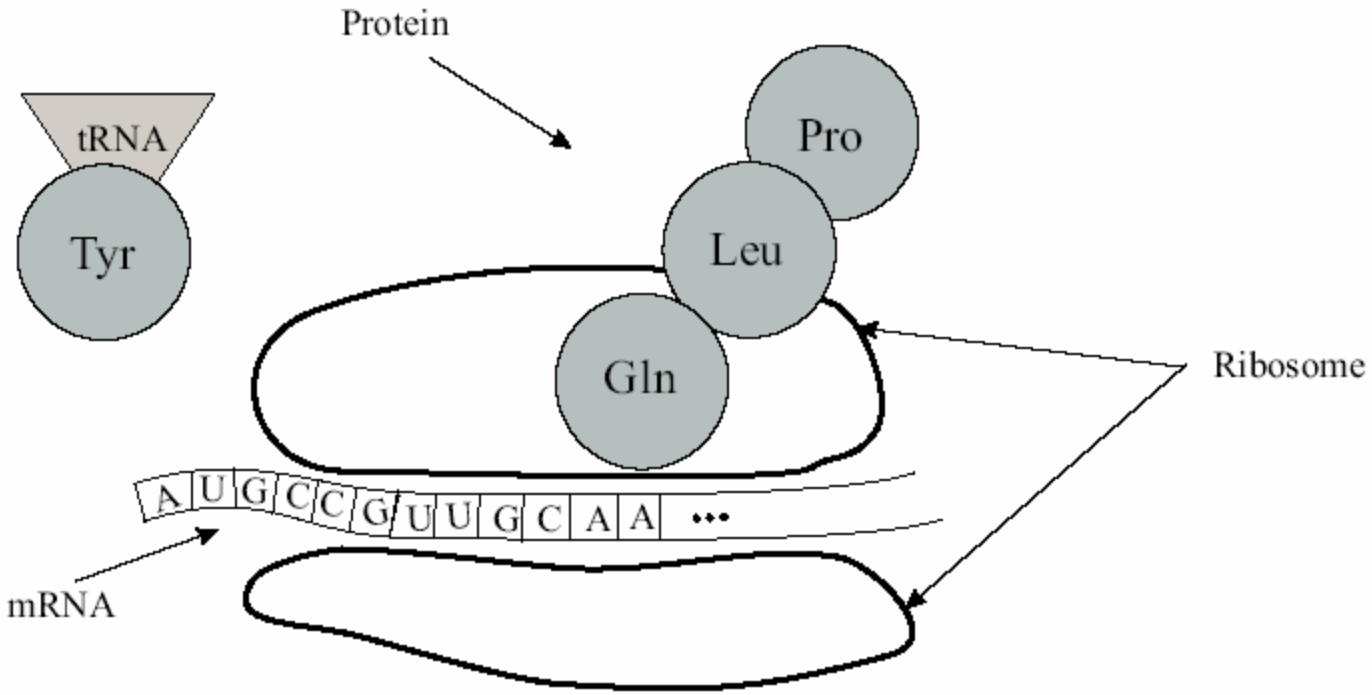


Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde



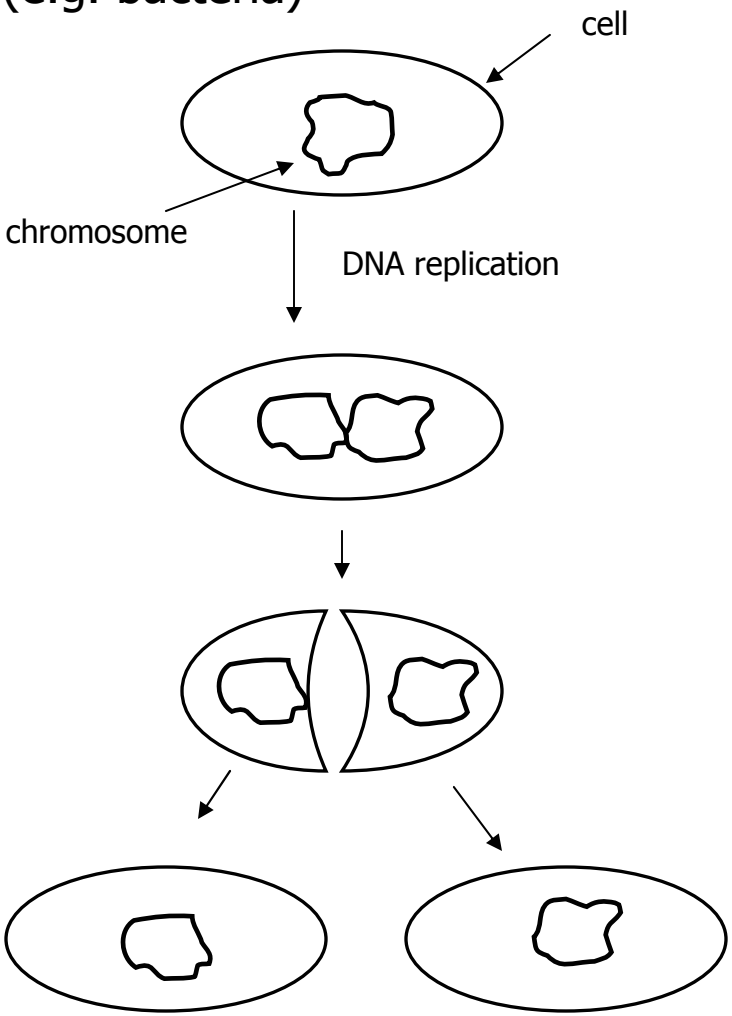
Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Translation: (mRNA producing protein)

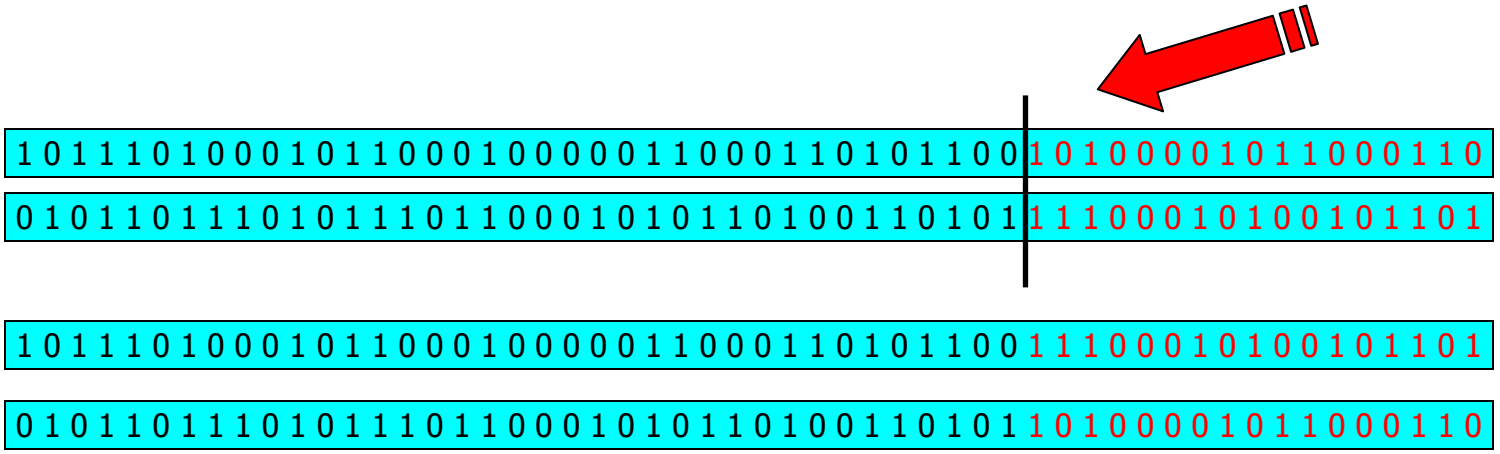


Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Asexual reproduction (e.g. bacteria)

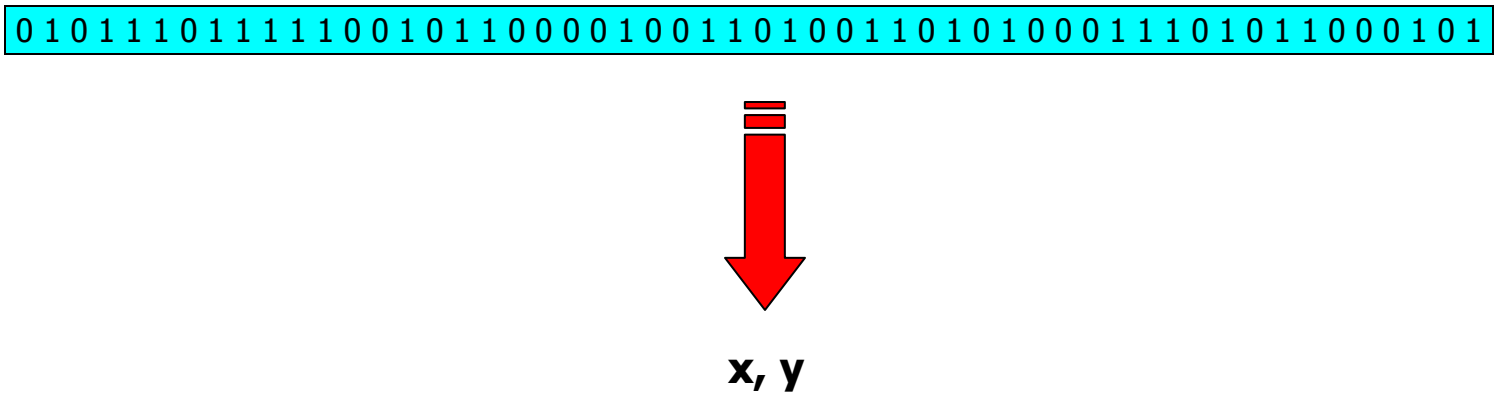


Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde



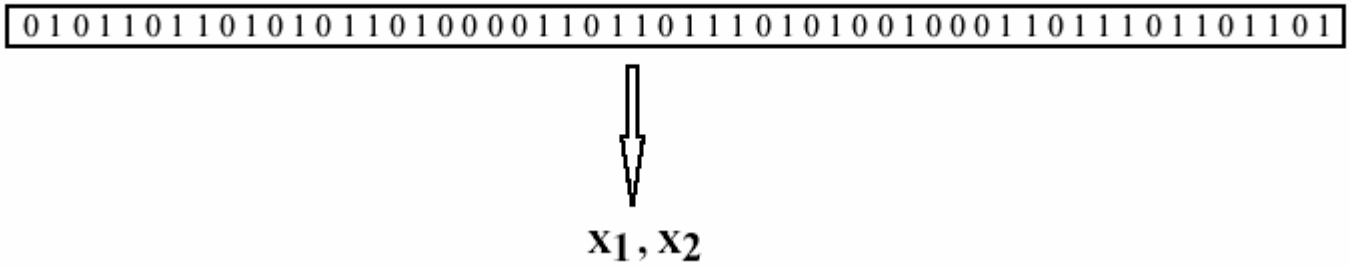
Reproduction (crossover) in EAs.

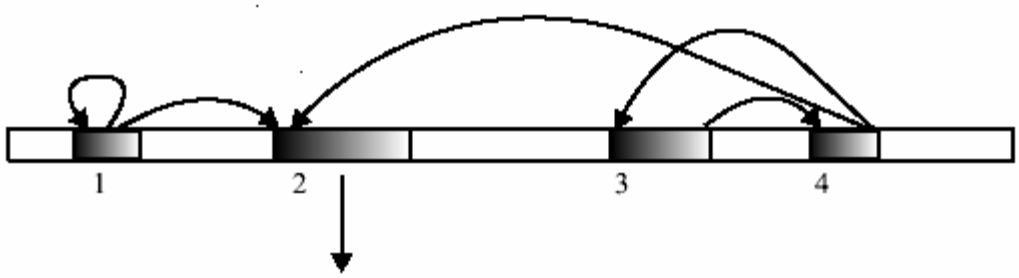
Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde



The decoding procedure in EAs is, in general, strongly simplified!

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

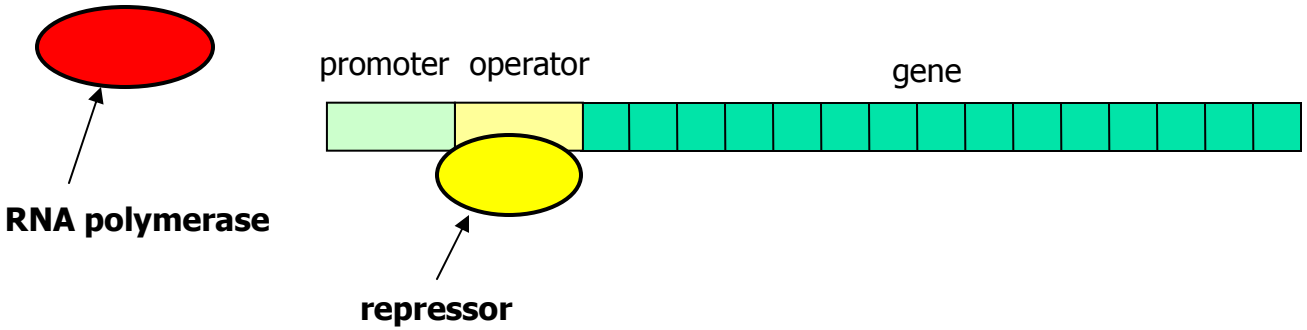




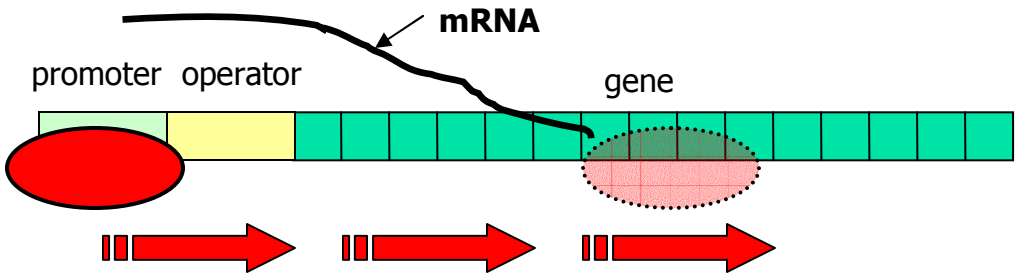
Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Regulatory genes: (transcription factors) genes that regulate the expression of other genes.
Example of gene regulation:

Repressor protein (= the product of some other (regulatory) gene) bound to operator site: transcription is prevented



Repressor *not* bound to operator: the RNA polymerase can reach the promoter and proceed with transcription:

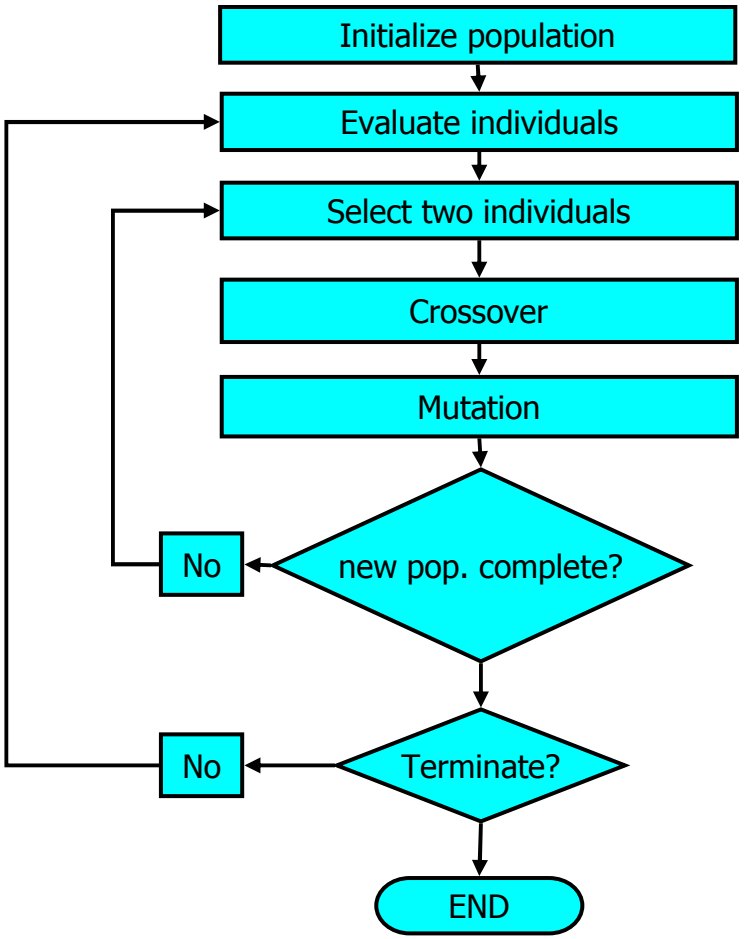


Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde

Evolution

- Acts on **populations** of individuals (of a given species).
- Information is stored in the form of **chromosomes**.
- Each chromosome contains many **genes**.
- Well adapted individuals spread their genetic material (**reproduction**)
- Sexual reproduction: combination of genetic material from two individuals.
- Mutations generate new material for evolution to work with.

Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde



Mattias Wahde, PhD, associate professor, Chalmers University of Technology
e-mail: mattias.wahde@chalmers.se www: www.me.chalmers.se/~mwahde