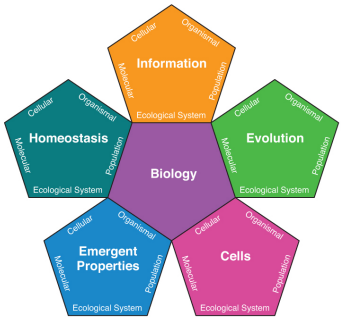
Integrating Concepts in Biology



PowerPoint Slides for Chapter 1:
Heritable Material

1.5 Is all genetic information encoded linearly in the DNA sequence?

by A. Malcolm Campbell, Laurie J. Heyer, & Christopher Paradise

Title Page

Biology Learning Objectives

- Describe the epigenetic code using methylcytosine and its effects on gene activity.
- Evaluate experimental design and analyze data from research on DNA as molecular information.

Normal Bases

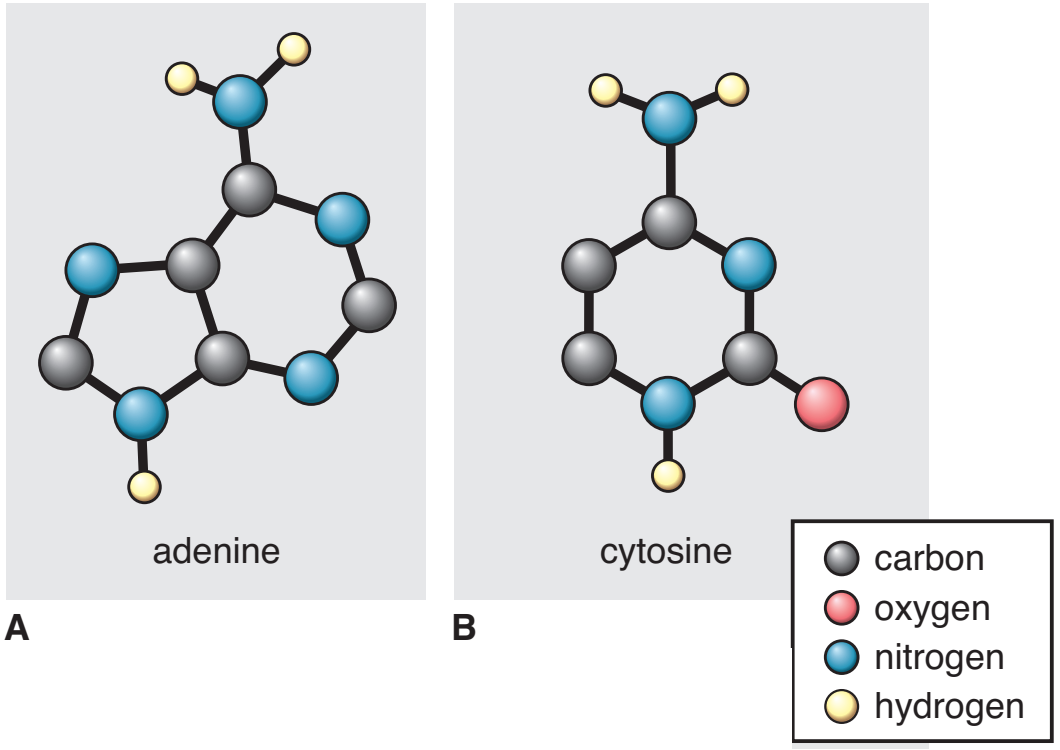


Fig. 1.18

Methylated Bases

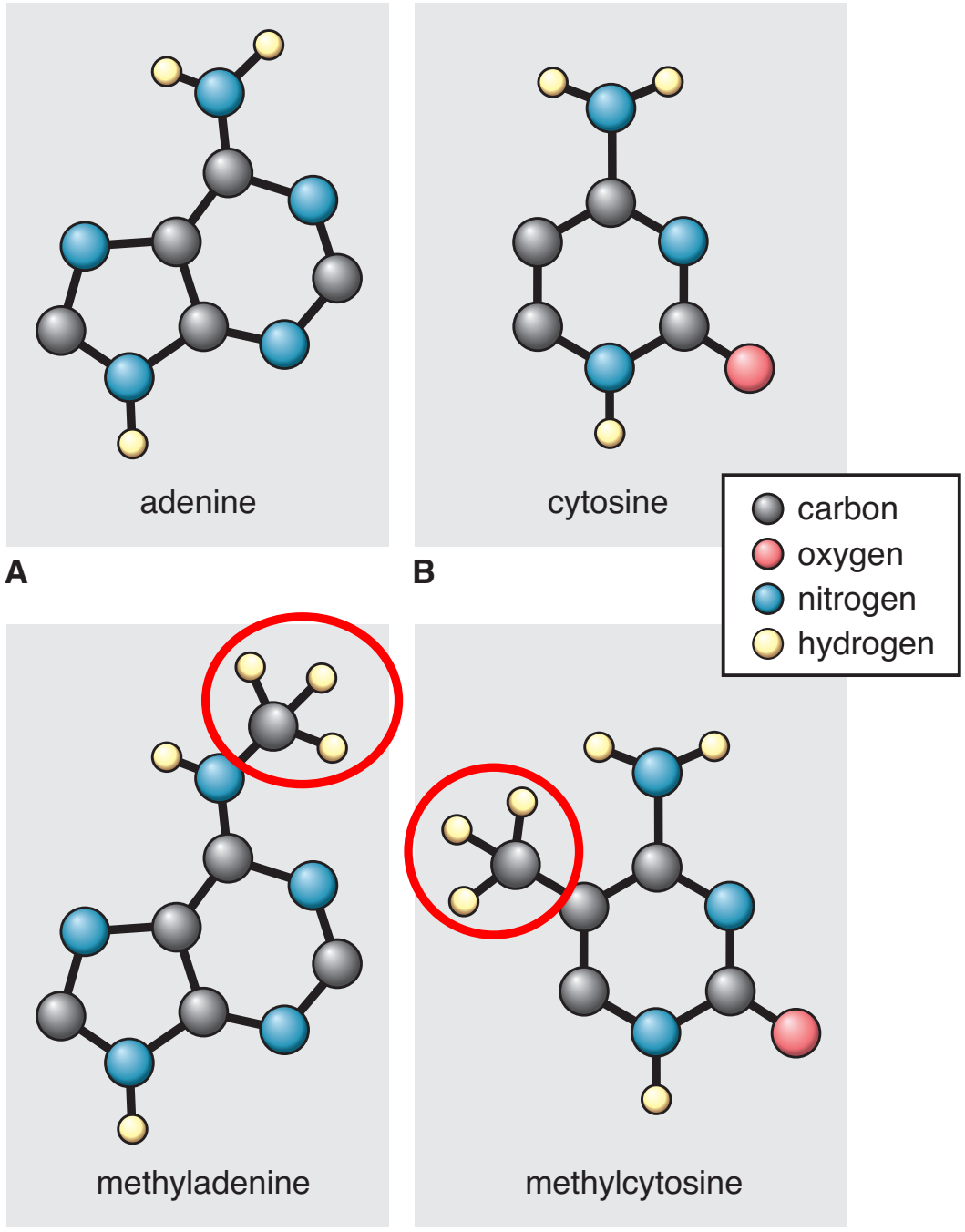


Fig. 1.18

Methylated Bases

different chemical structures

different physical properties

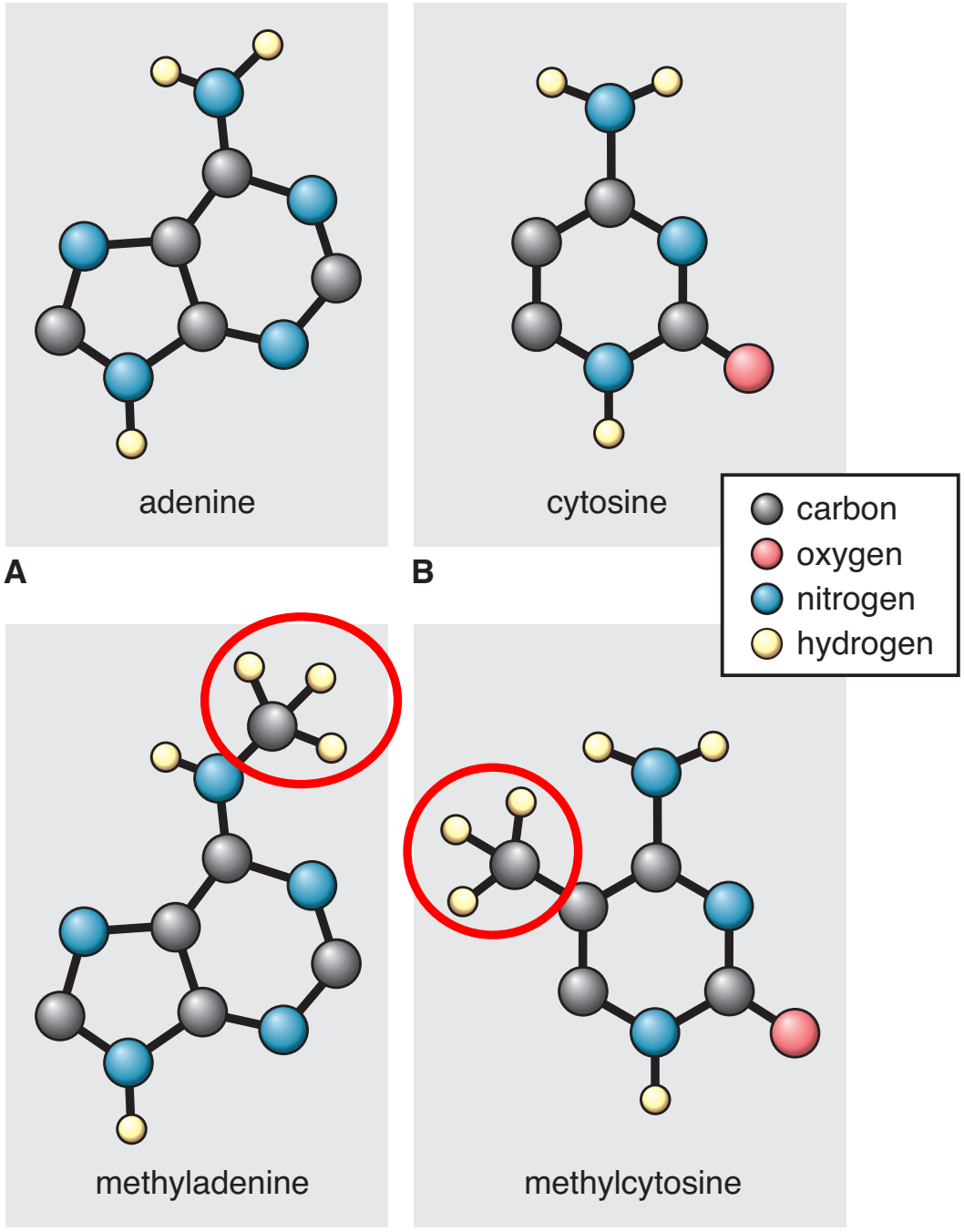


Fig. 1.18

Methylated Bases

these are NOT mutations!

methylation is epigenetic change

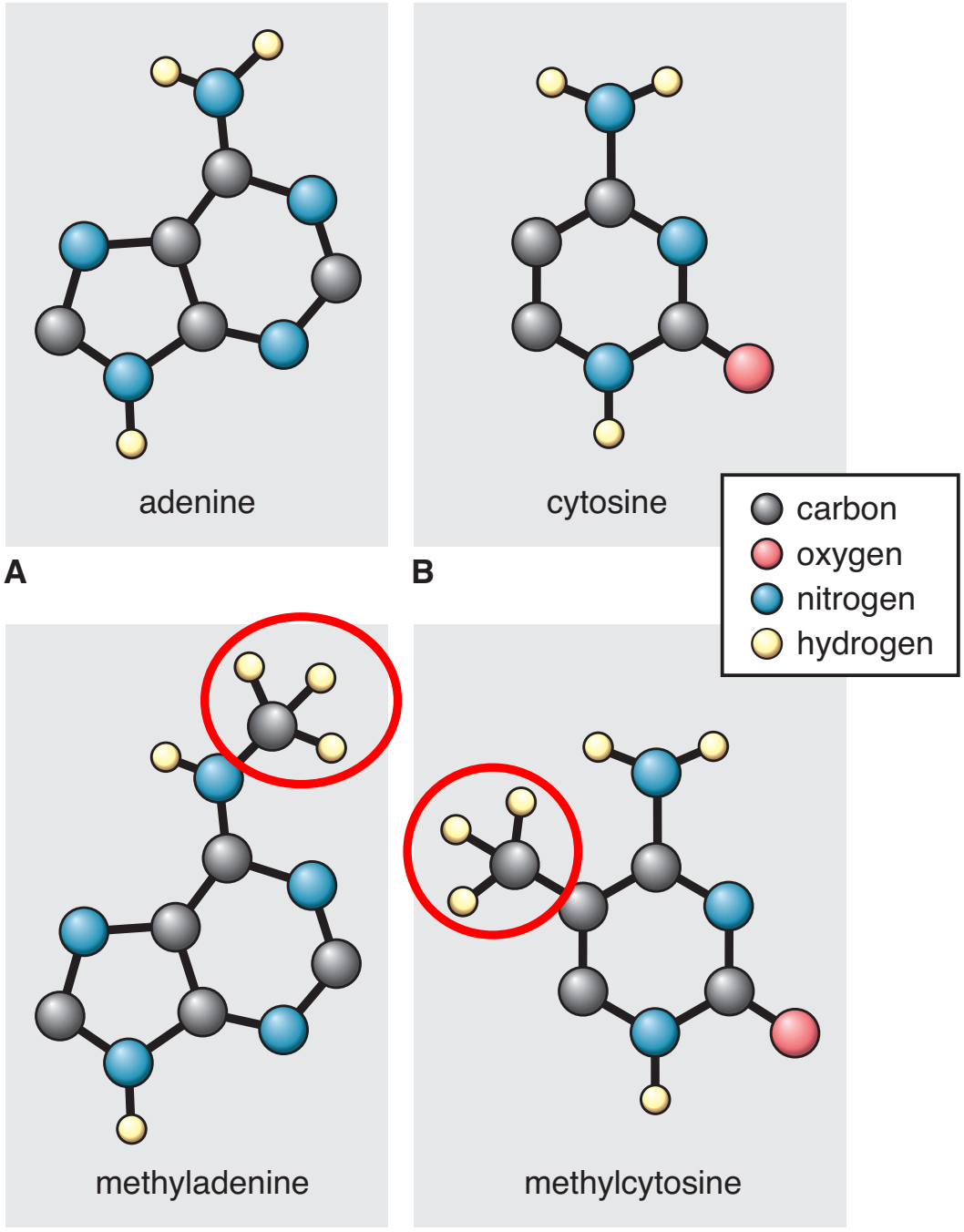


Fig. 1.18

Thin Layer Chromatography

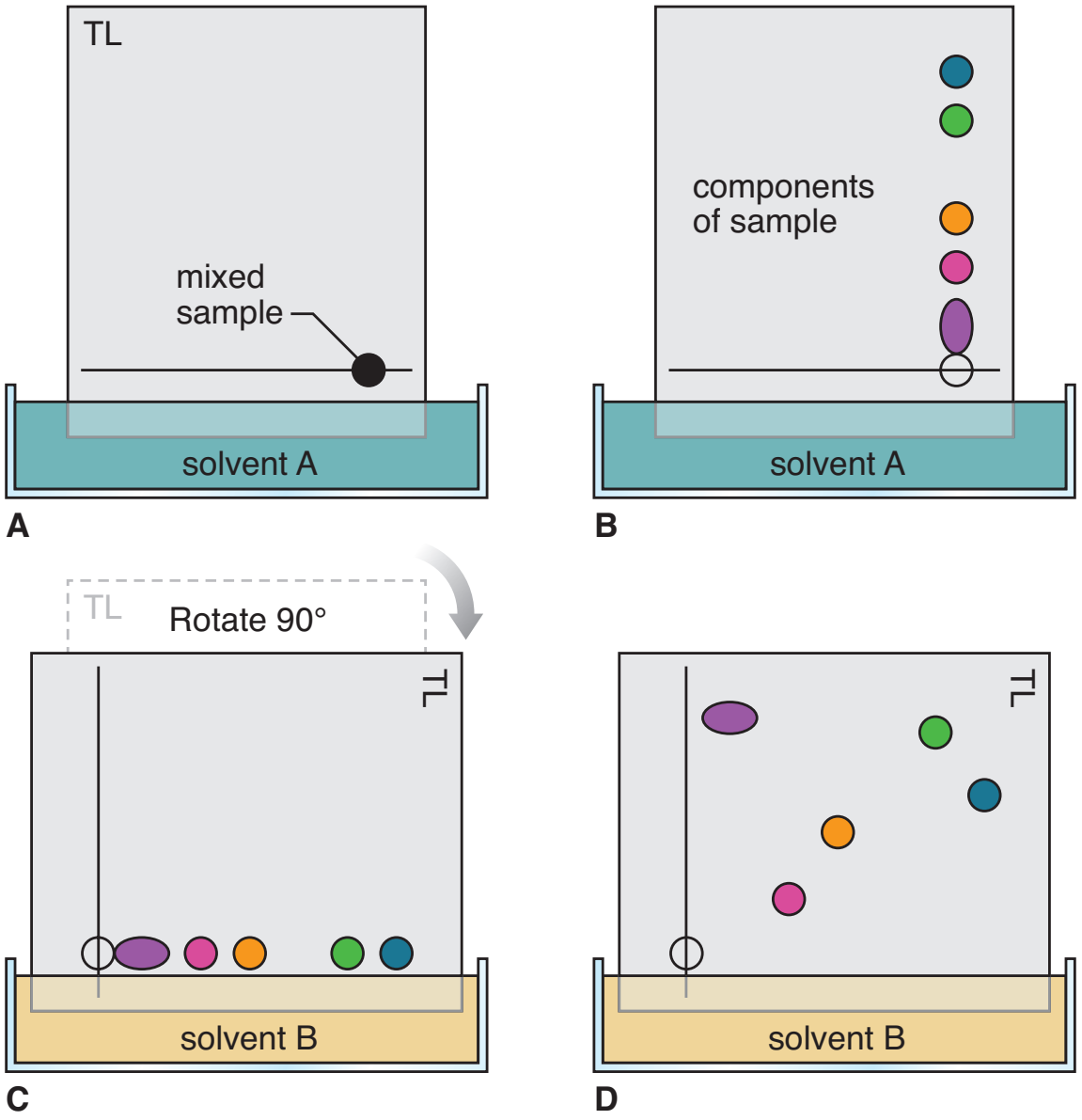


Fig. 1.19

Thin Layer Chromatography

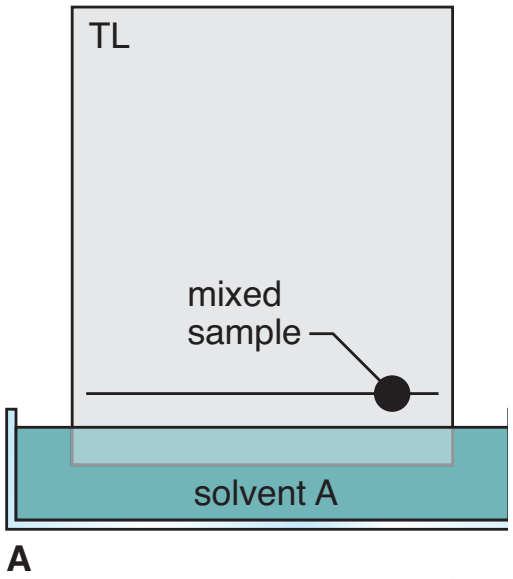


Fig. 1.19

Thin Layer Chromatography

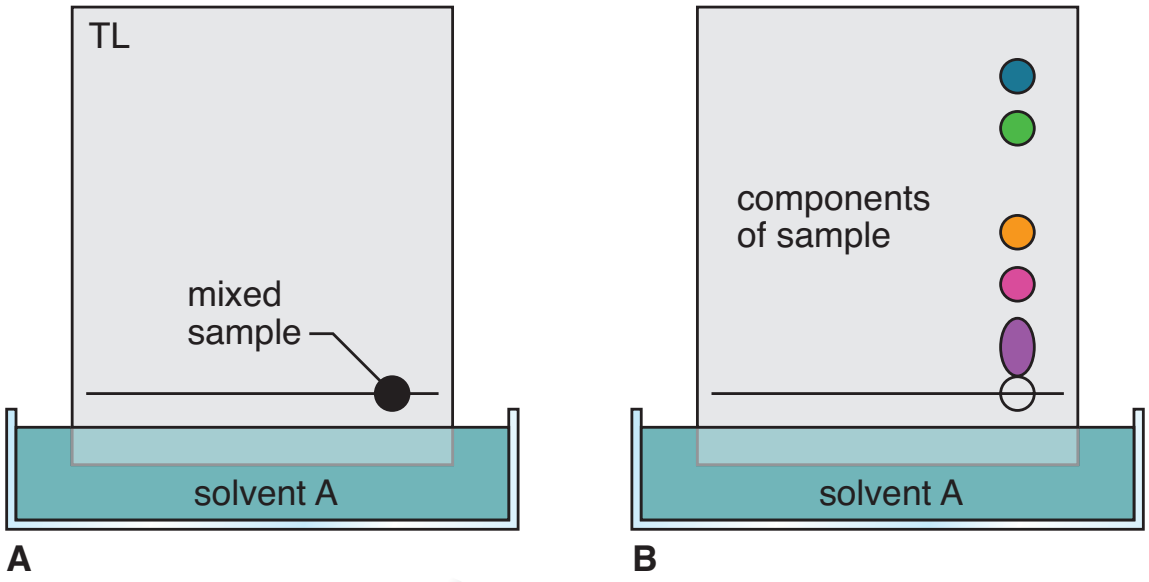


Fig. 1.19

Thin Layer Chromatography

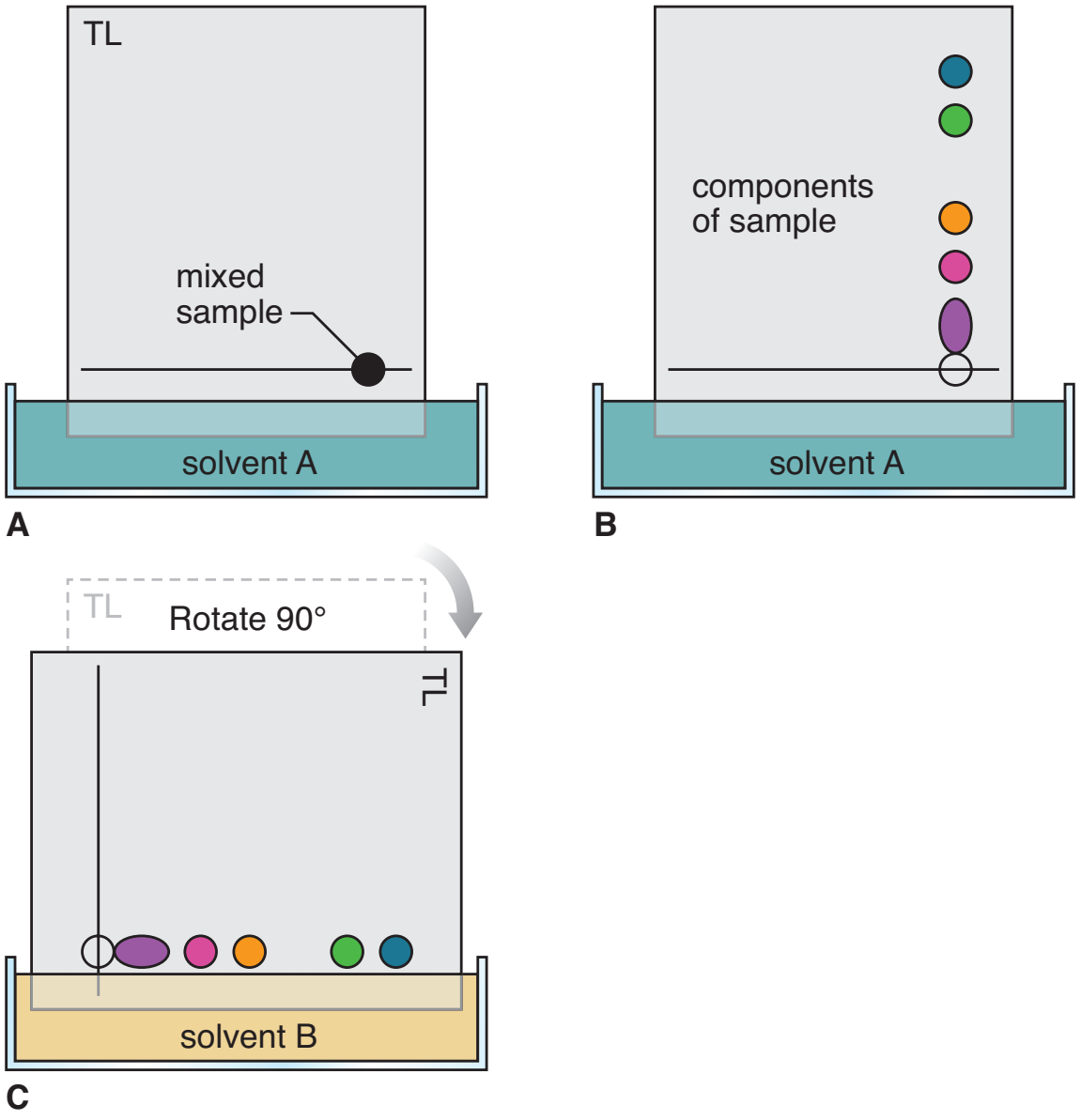


Fig. 1.19

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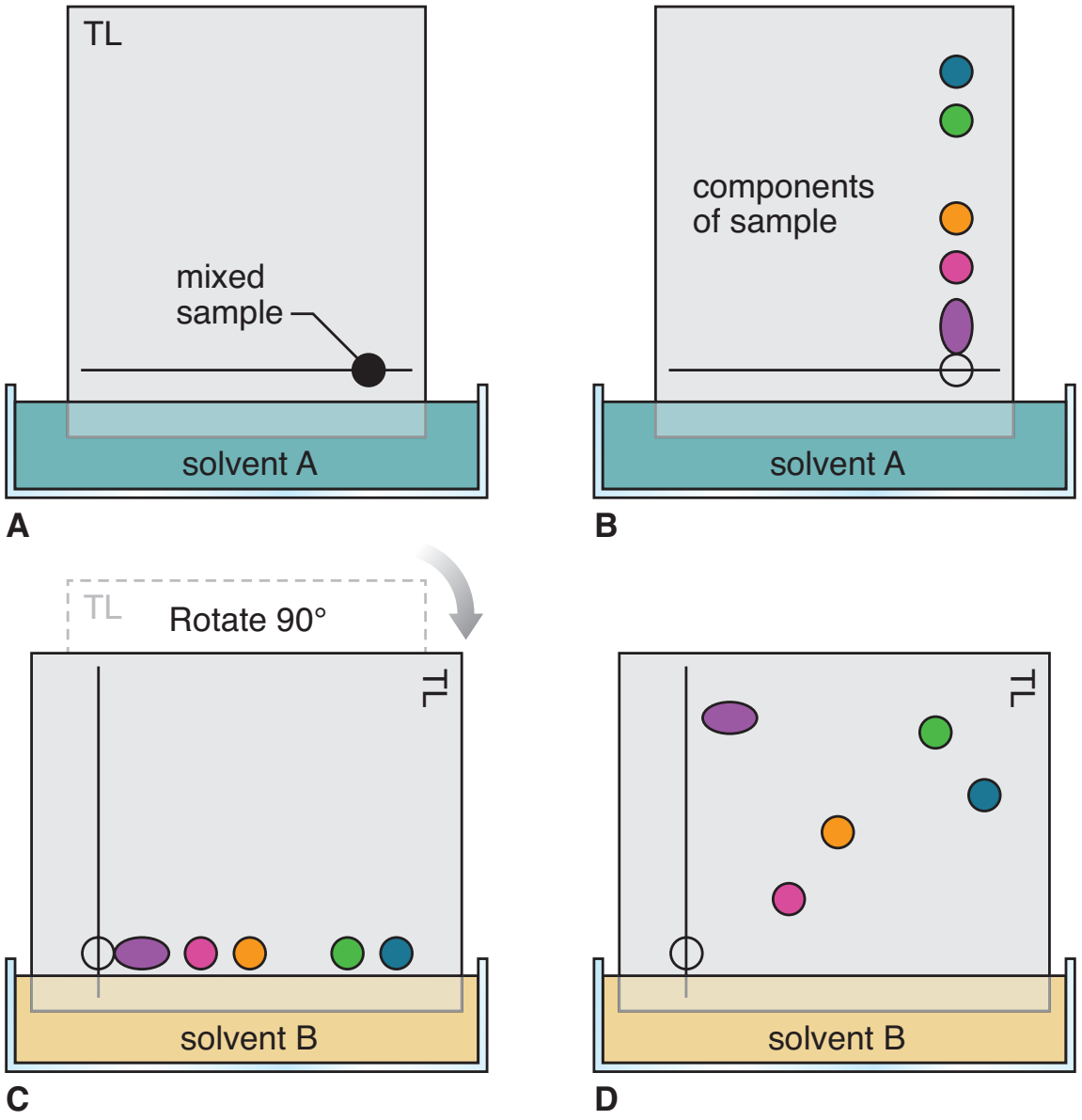
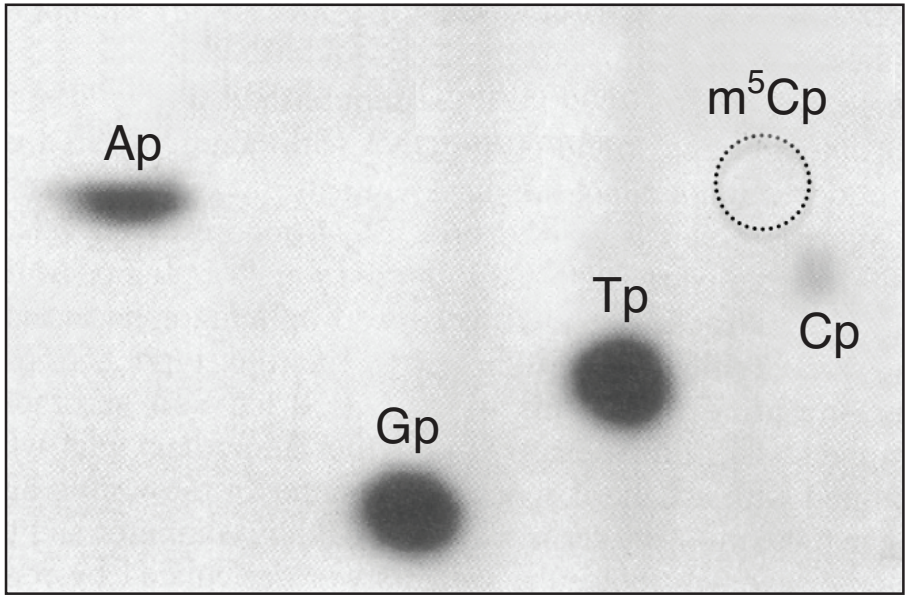
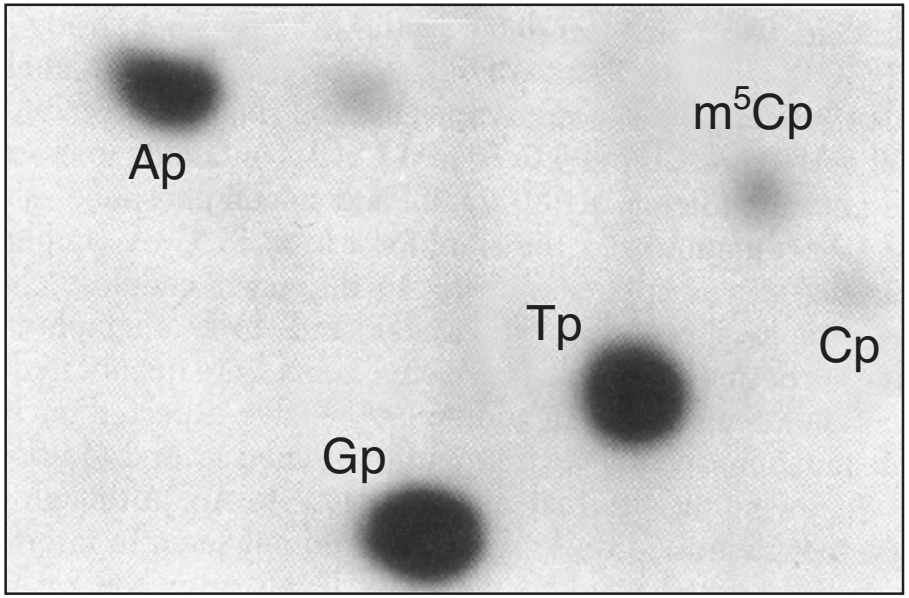


Fig. 1.19

Bases of Active vs Inactive DNA



A active nuclei

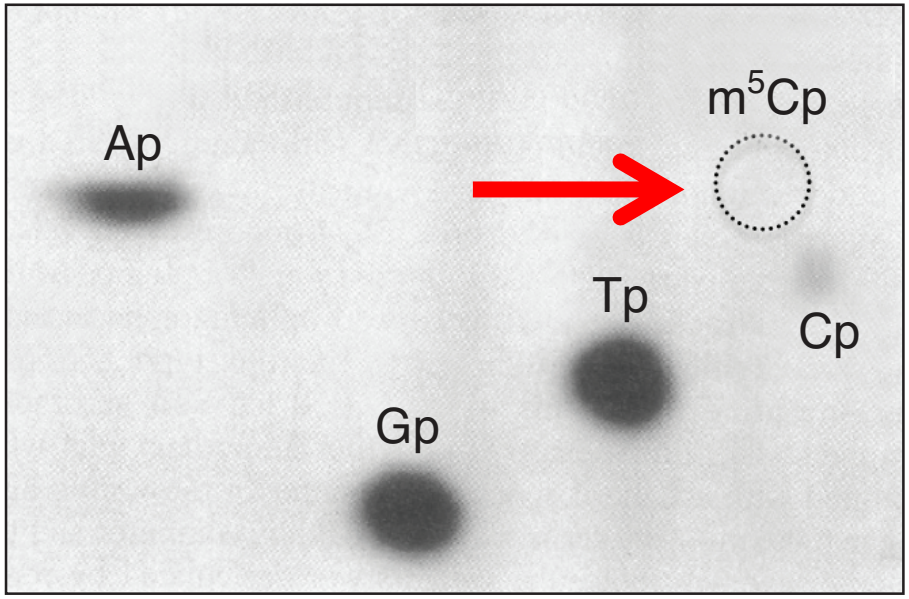


B inactive nuclei

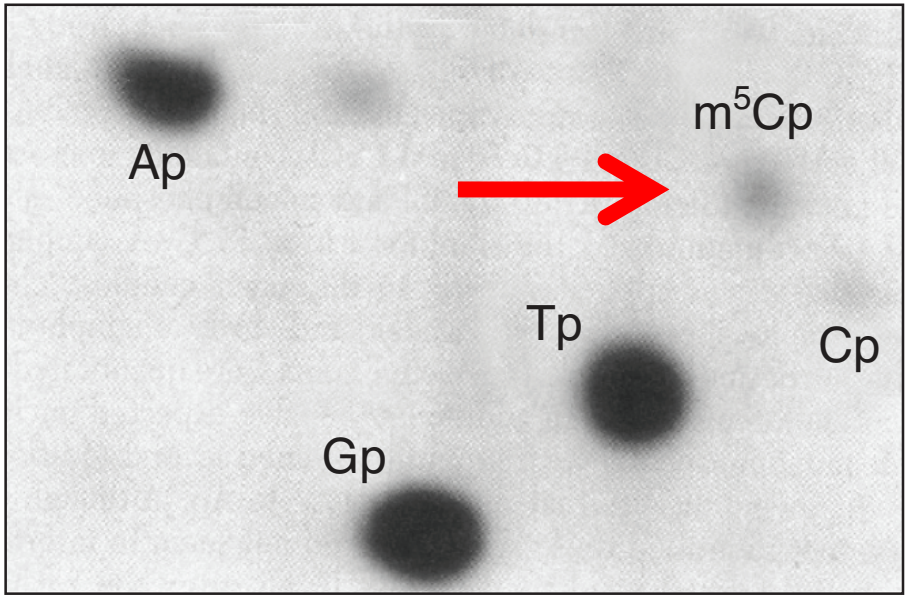
Fig. 1.20

from Naveh-Many and Cedar. 1981.

Bases of Active vs Inactive DNA



A active nuclei



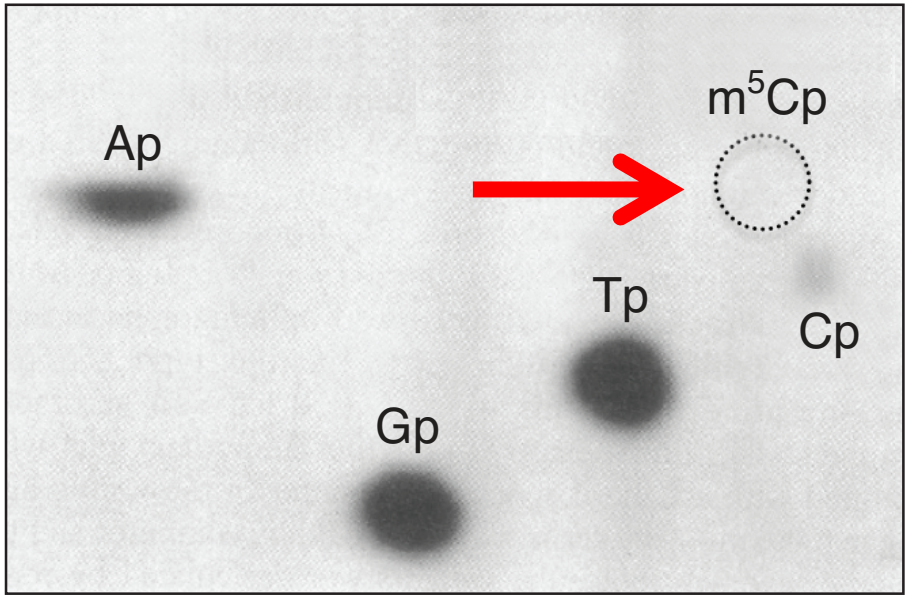
B inactive nuclei

Fig. 1.20

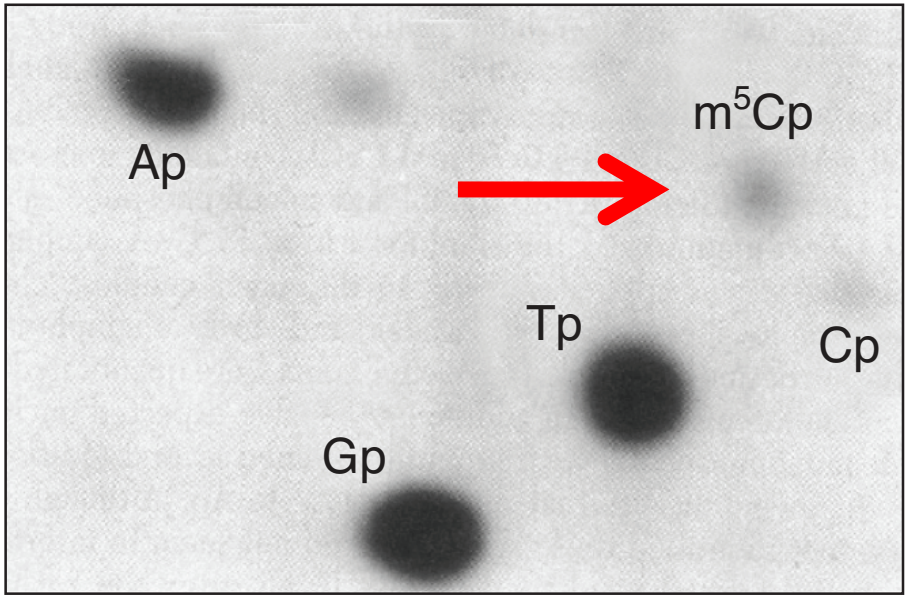
from Naveh-Many and Cedar. 1981.

Bases of Active vs Inactive DNA

What is the general rule about gene activity and methylation?



A active nuclei



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Bases of Active vs Inactive DNA

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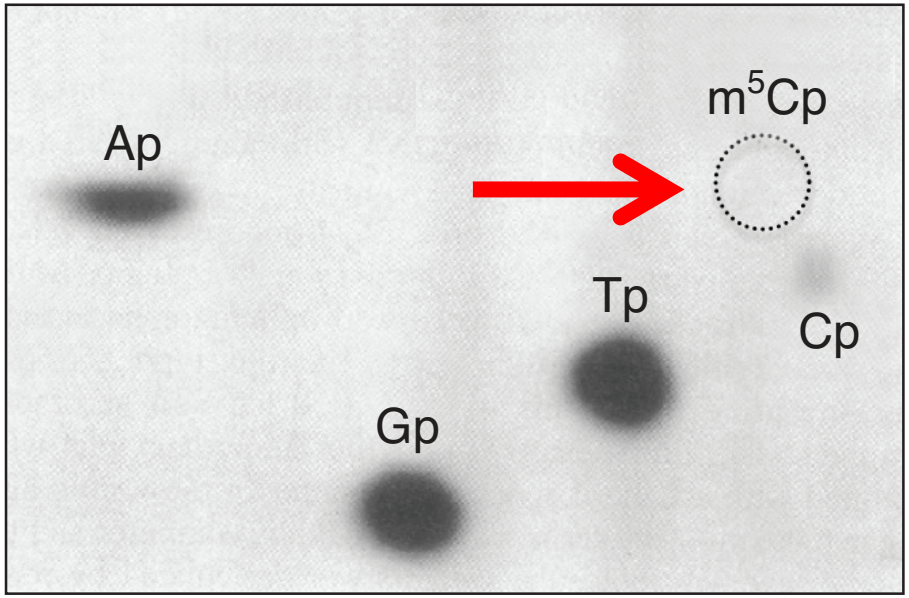
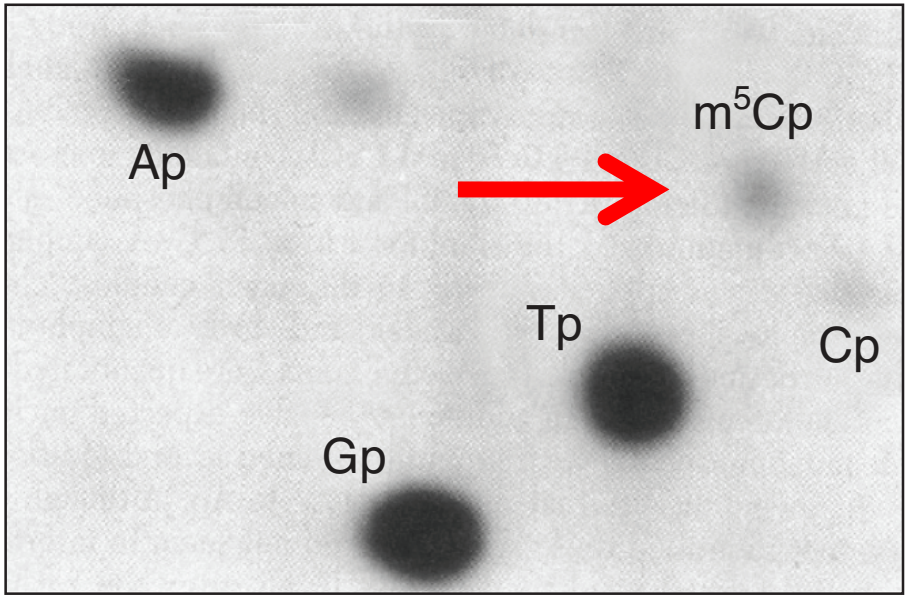


A active nuclei



B inactive nuclei

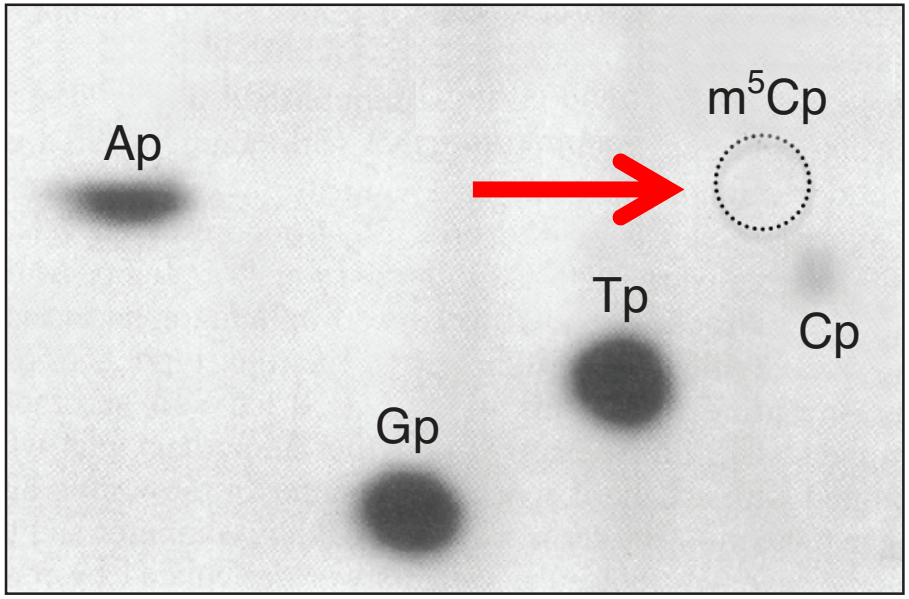
active genes are *hypo*methylated

inactive genes are *hyper*methylated

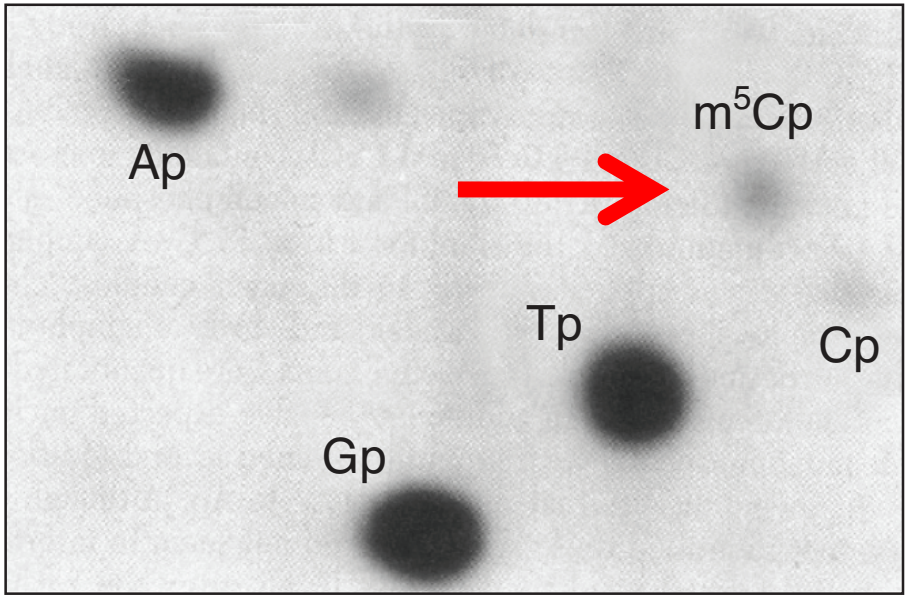
Fig. 1.20

from Naveh-Many and Cedar. 1981.

Cause *vs* Correlation



A active nuclei



B inactive nuclei

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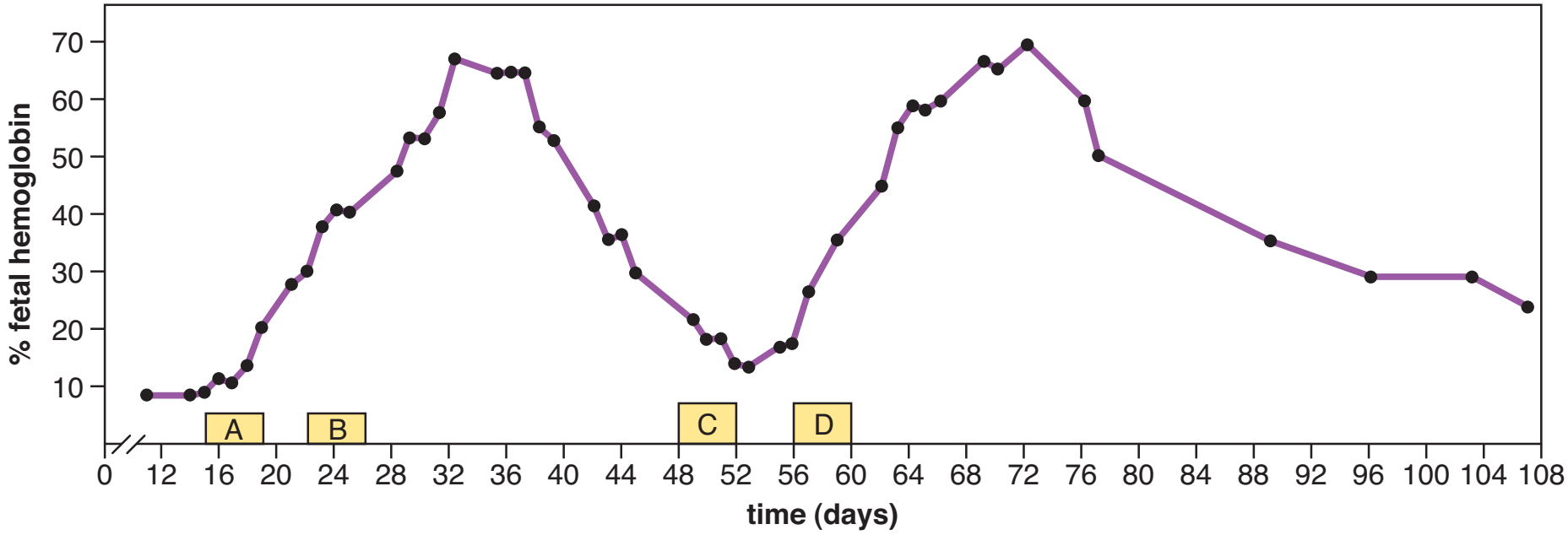
Fig. 1.20

from Naveh-Many and Cedar. 1981.

Pharmacological Gene Regulation

Can genes be regulated by epigenetic changes?



adult monkey responsed to methylase inhibitor

Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

fetal hemoglobin levels over time

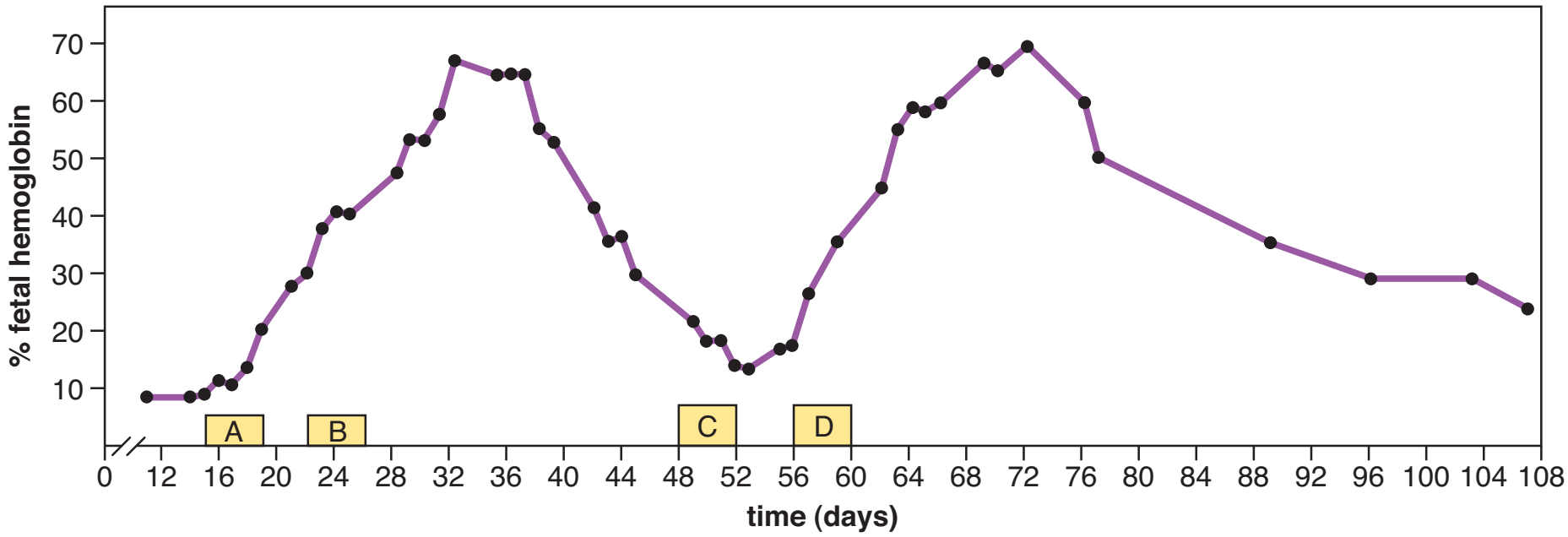


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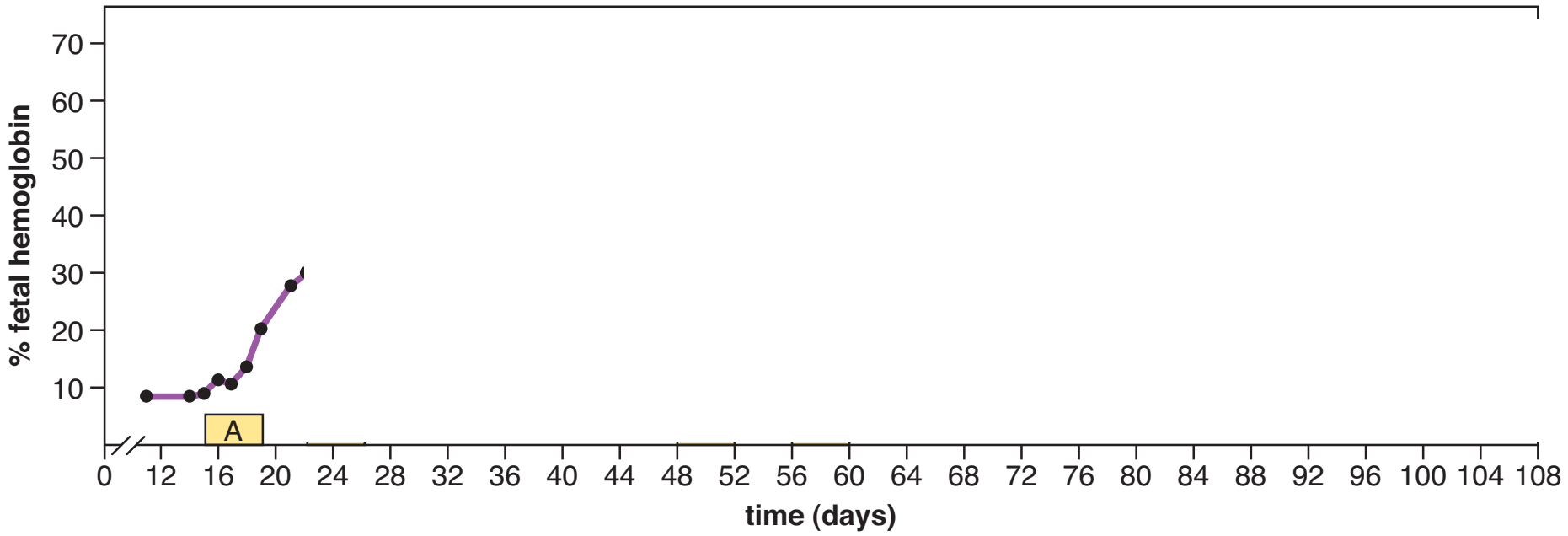
Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

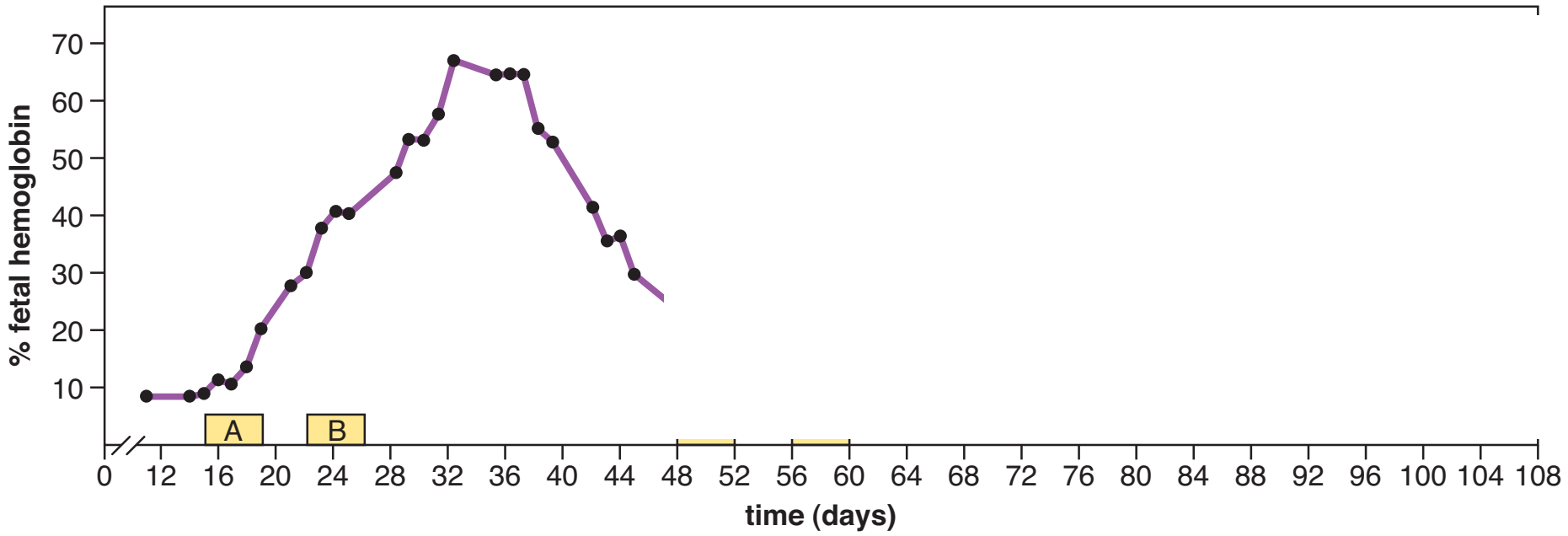


fetal hemoglobin in
response to methylation inhibitor

Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation



fetal hemoglobin in
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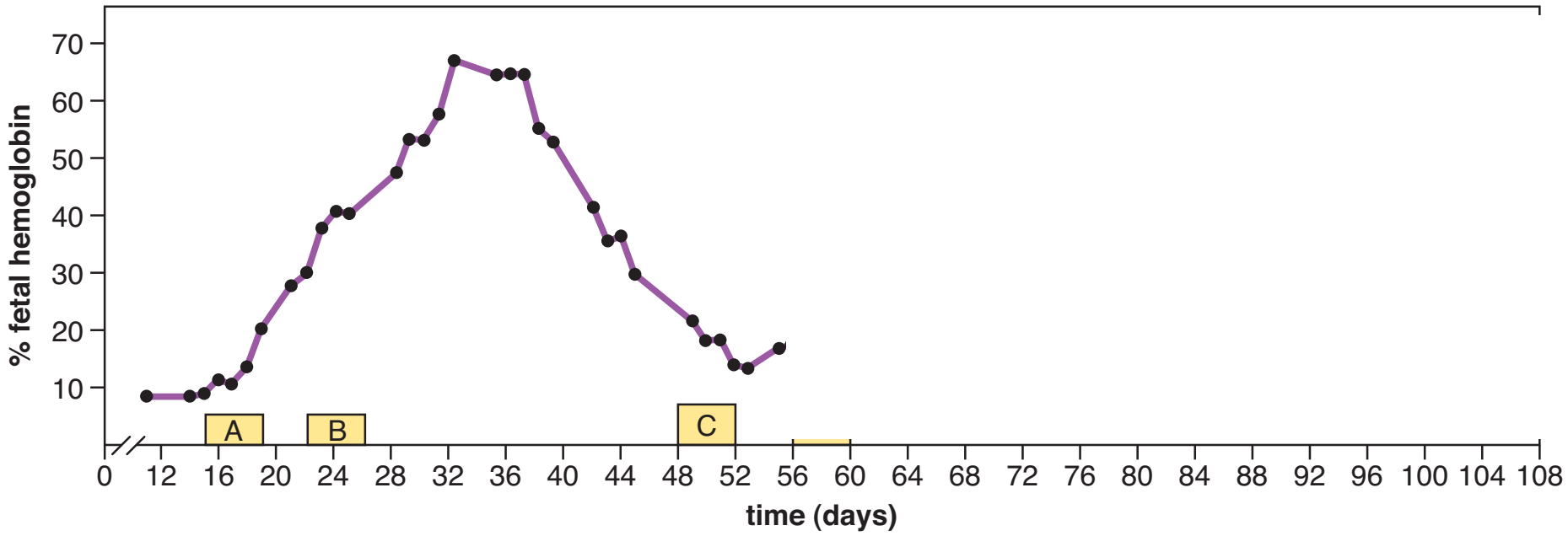
Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

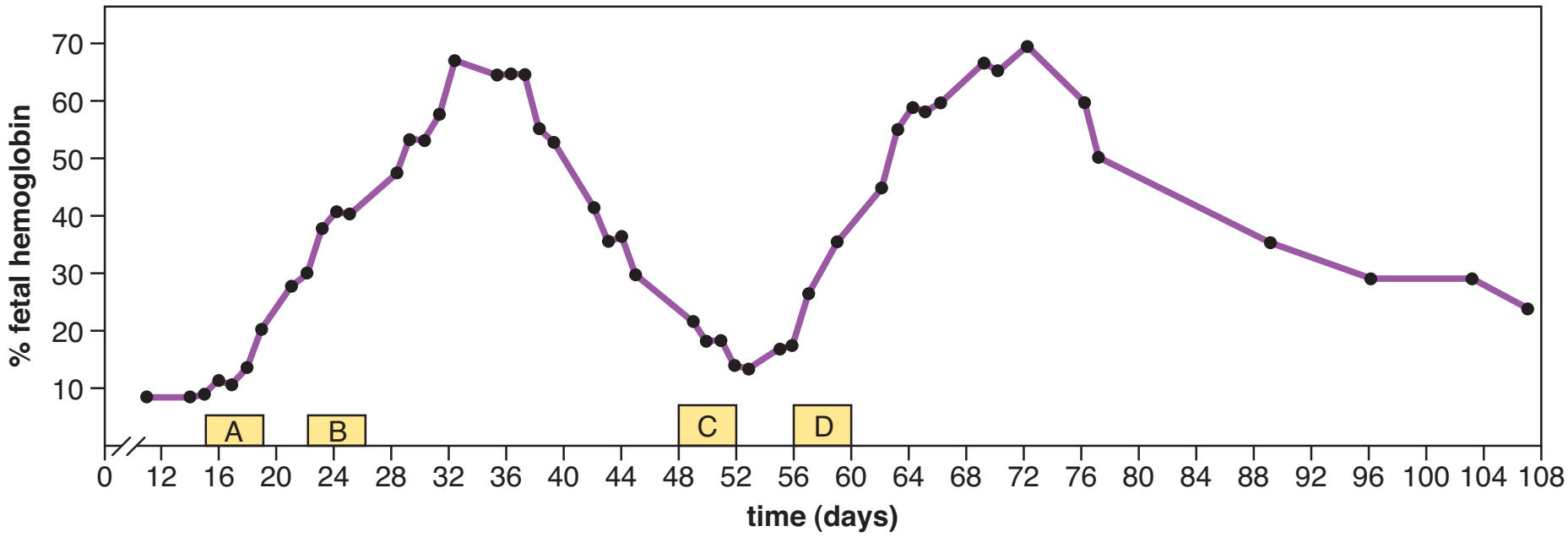


third (higher) dose of methylation inhibitor

Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation



What is the consequence of higher inhibitor dose?

Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

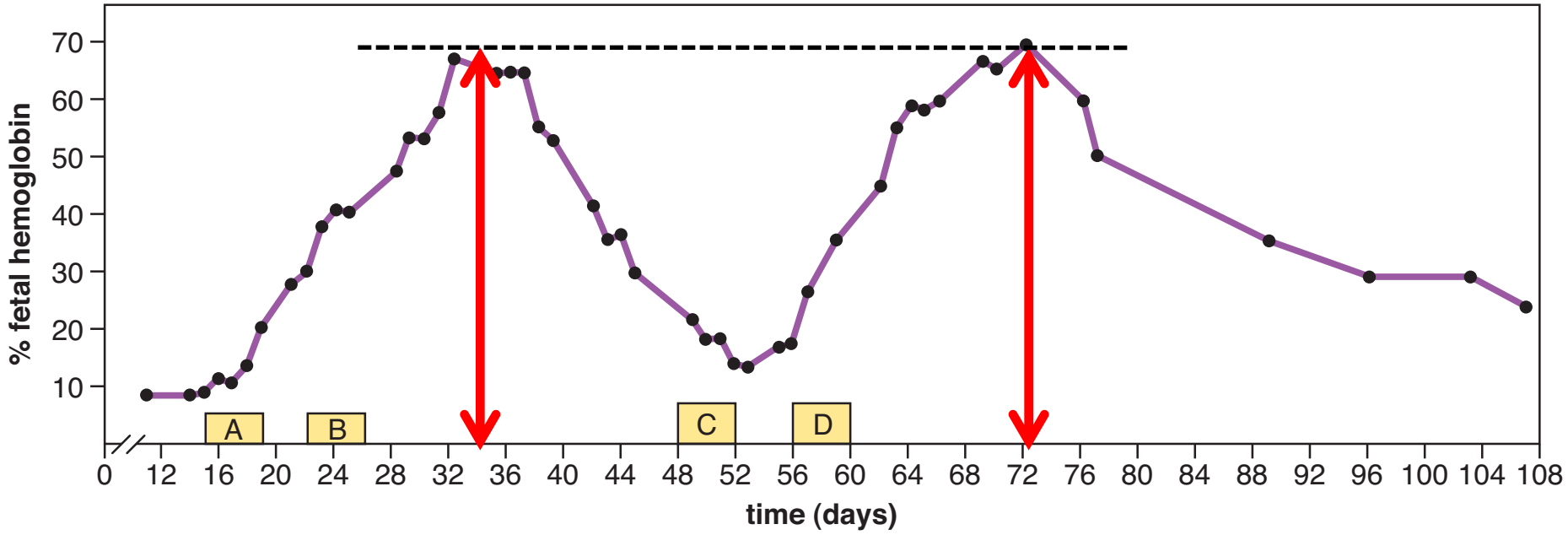


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Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

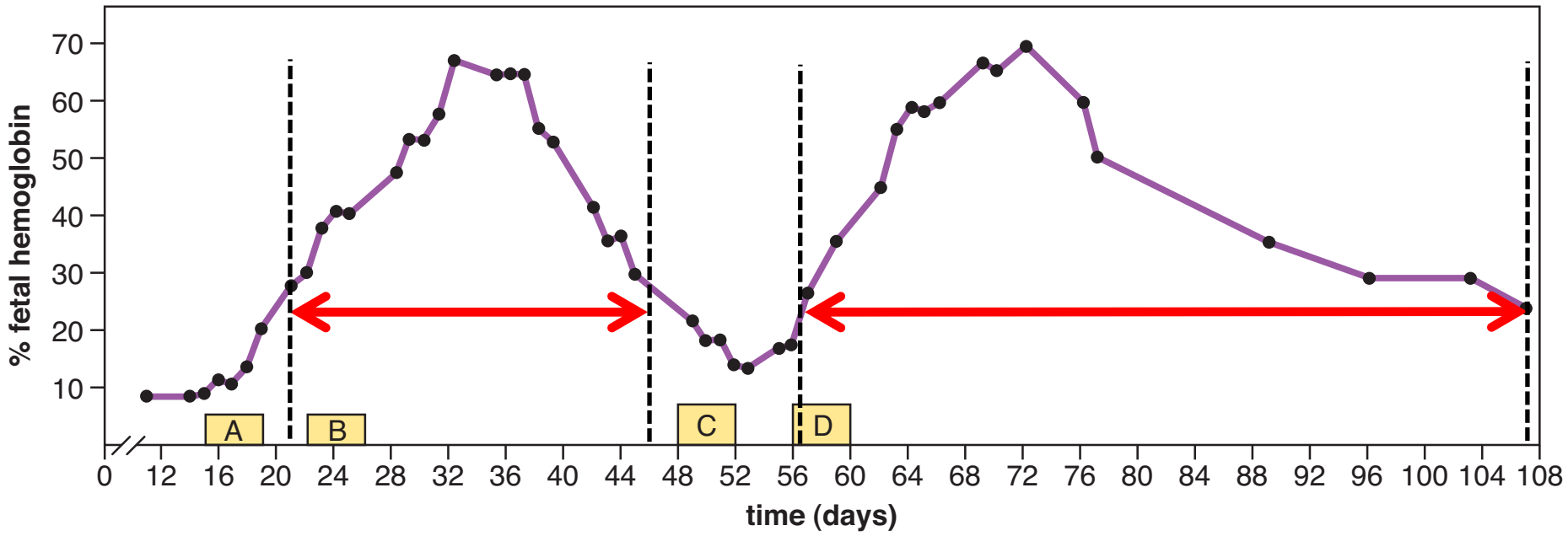

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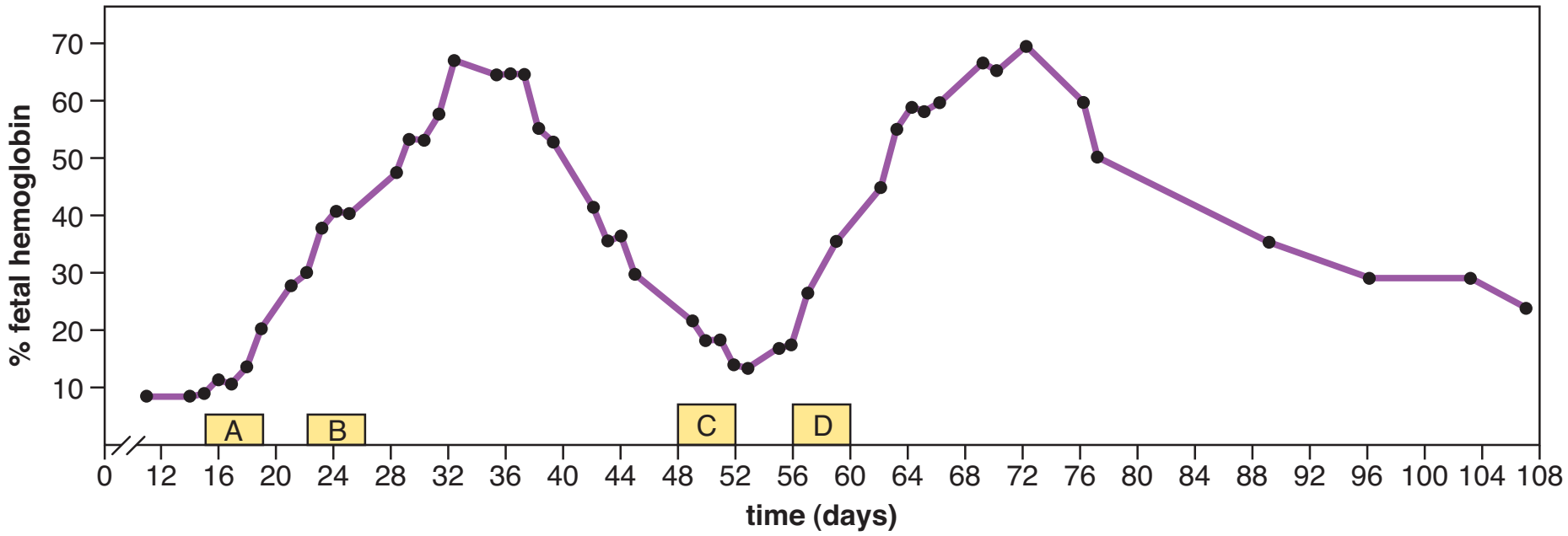
Fig. 1.21

modified from DeSimone, *et al.*, 1982

Pharmacological Gene Regulation

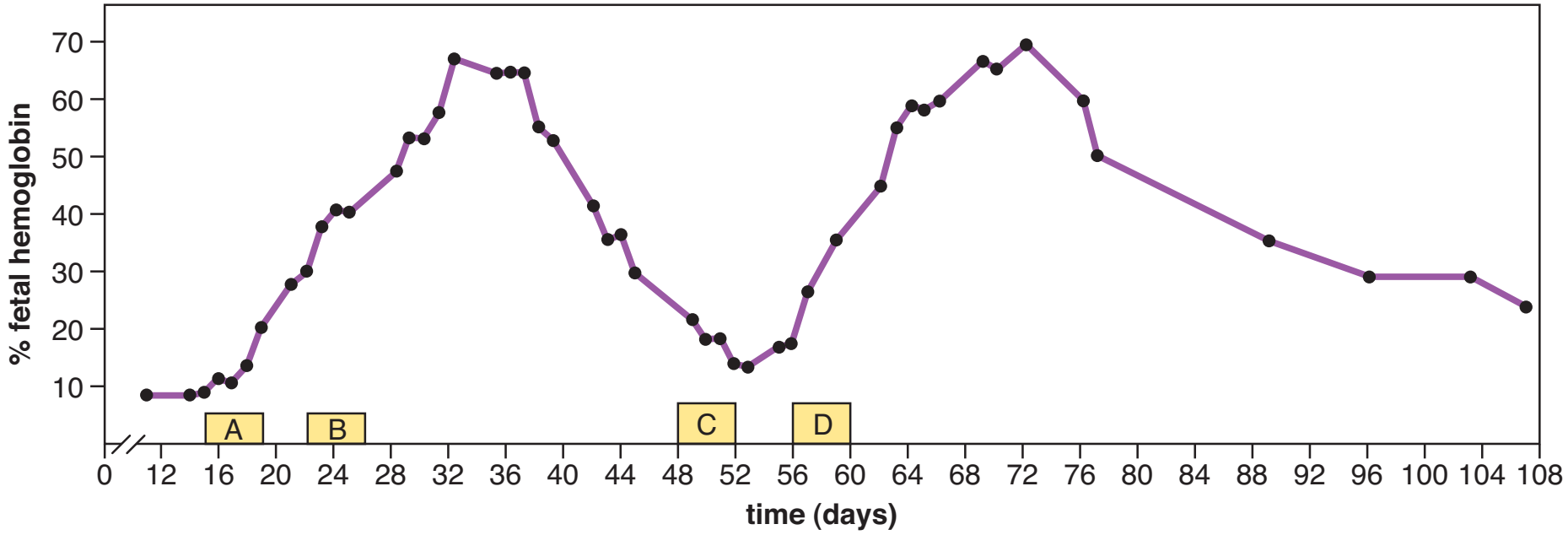


Why was this a bad idea for clinical use?

Fig. 1.21

modified from DeSimone, *et al.*, 1982

Cause *vs* Correlation



Does this experiment show causation?

Fig. 1.21

modified from DeSimone, *et al.*, 1982

End of Chapter 1

Exam questions drawn from:

- IQs
- Review Questions

Look at old tests.
Use this weekend to catch up.
Pace will pick up from now on.
First exam in 2 weeks.