# Understanding runny nose!

- What is it?
  - A.k.a. rhinitis and rhinorrhea
  - An unwelcome guest
- How to cope with it?

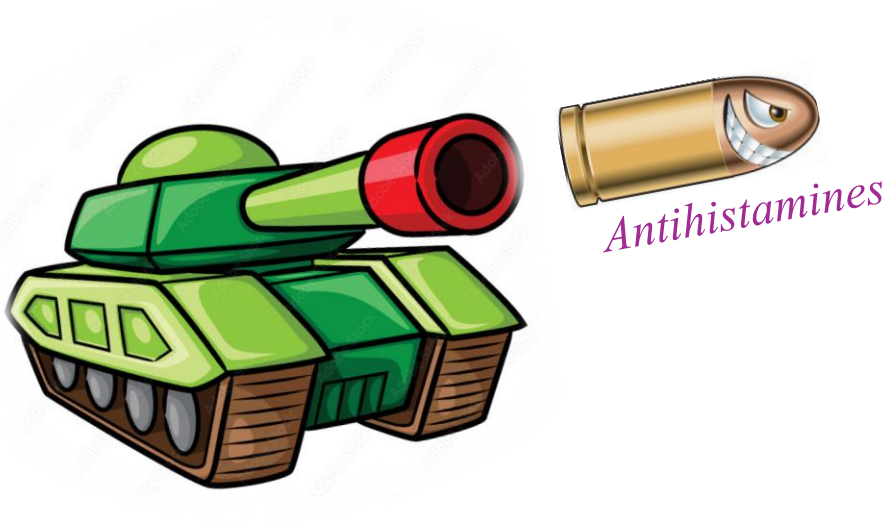
# Common Causes of Runny Nose

- Possible causes:
  - Sudden changes in the weather
  - Strong irritants or odors
  - Your favorite spicy foods
  - Some medications
  - Chronic health conditions, e.g. allergies

- *How might the causses of a runny nose differ between seasons?*
- *Any connection between environmental changes and health?*

# How to Tackle the Runny Nose!

- *Antihistamines - the secret weapon in the battle against allergy symptoms*

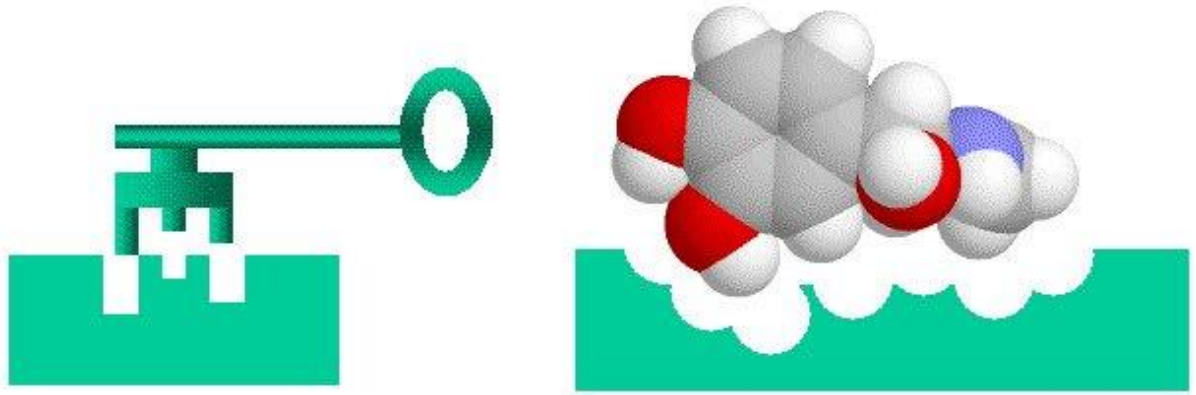


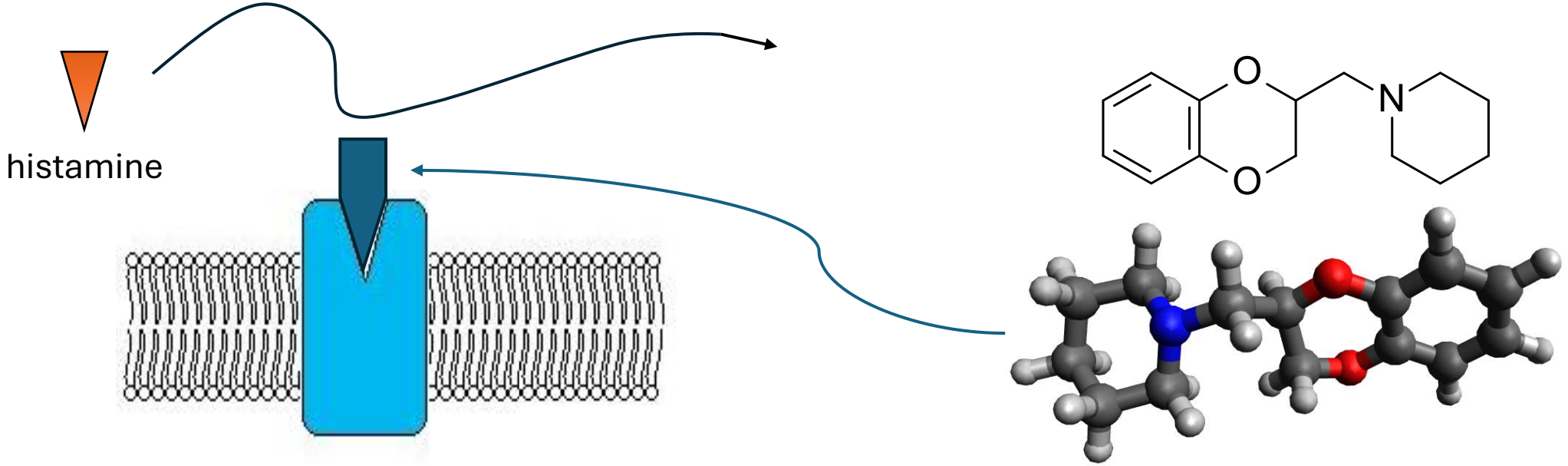
# What are antihistamines?

- *The superpowers – they combat*
  - *allergy symptoms*
  - *runny nose*
  - *sneezing*
  - *itchy eyes.*
- *Bonus:*
  - *help nausea and prevent motion sickness*


# How do they work?

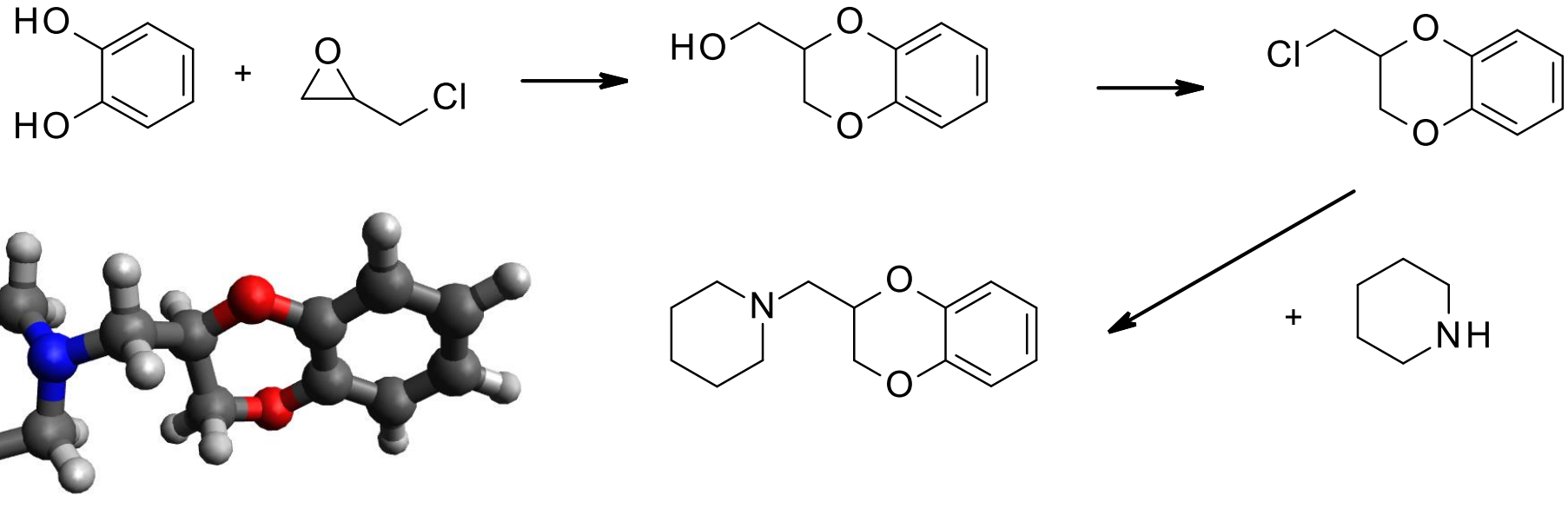
- Mechanism: Block the attachment of histamine to histamine receptors
- First antihistamine ever discovered: piperoxan ($C_{14}H_{19}NO_2$)

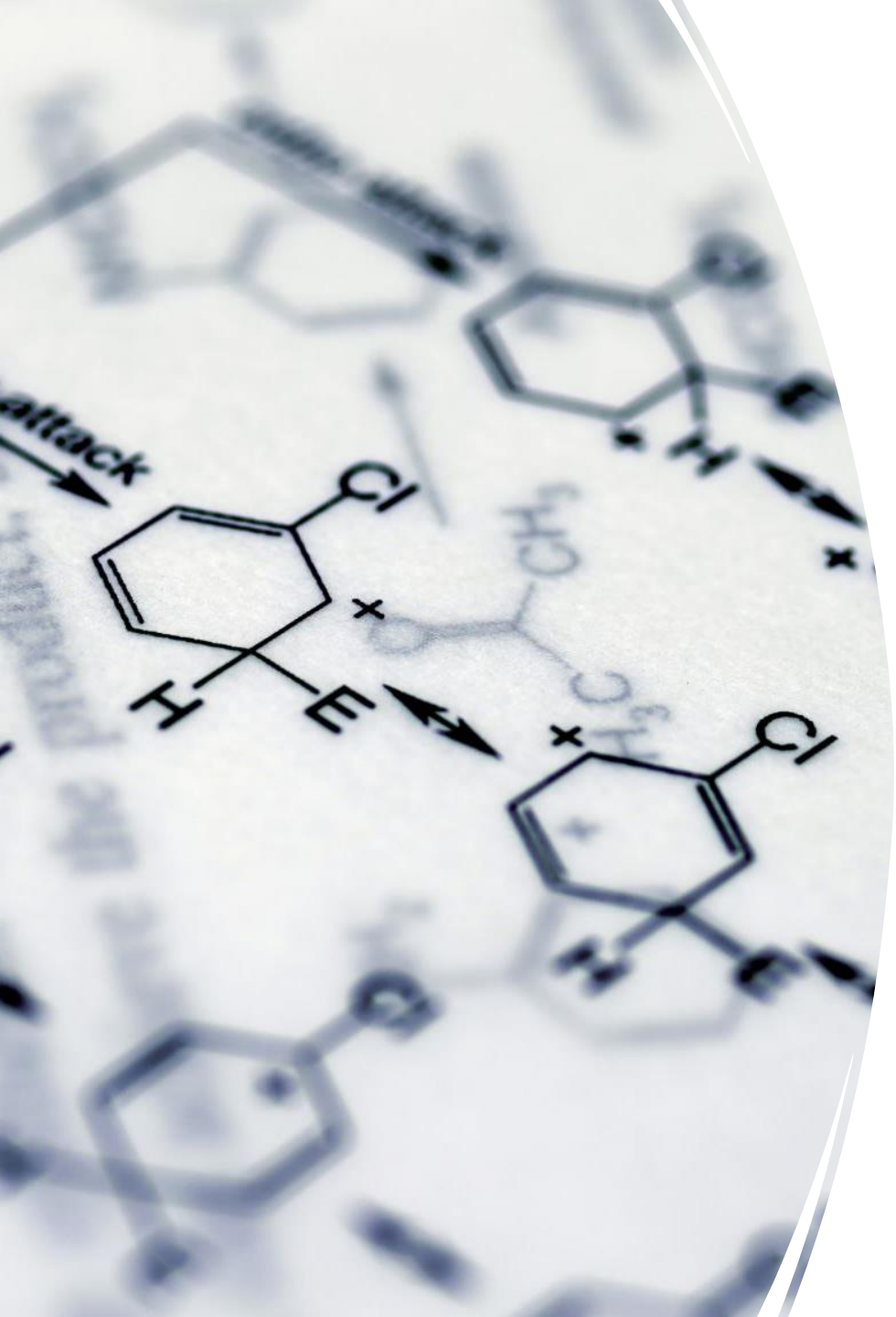




# The journey of drug synthesis

- Drug synthesis:
  - Synthesis of Piperoxan from catechol



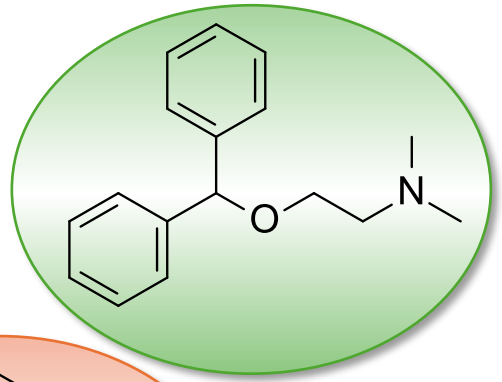



# What is the relationship between chemistry and medicine?

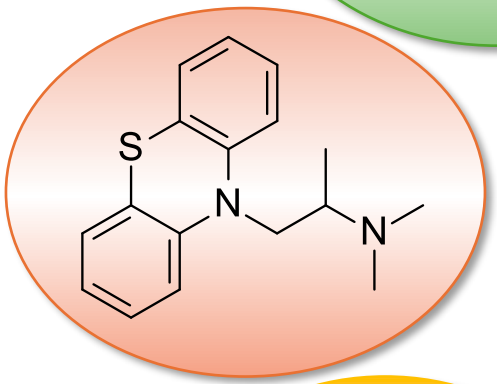
- ***When constructing the drug molecule,***
  - *do the chemical reagent listen to the chemist's instruction?*
  - *why the chemical reagents follow the design of the chemist to give the final drug structure?*

# Meet some members of antihistamines:

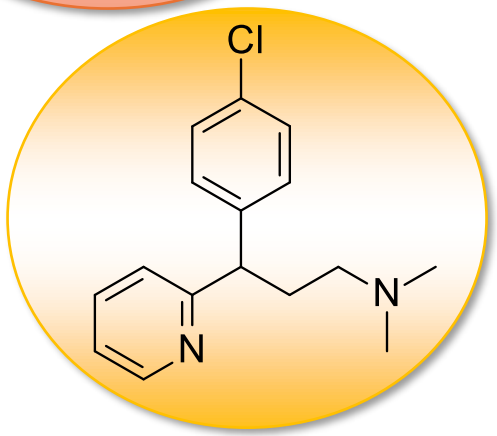
Diphenhydramine
($C_{17}H_{21}NO$)

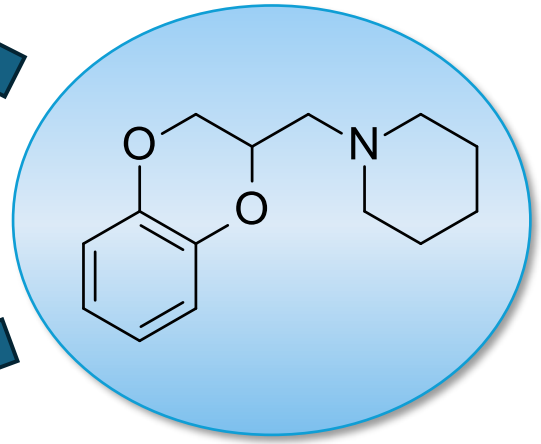



Promethazine
($C_{17}H_{20}N_2S$)




Chlorpheniramine
($C_{16}H_{19}ClN_2$)




Piperoxan
($C_{14}H_{19}NO_2$)

*What similarities and differences do you notice?*

*How might these affect their functions?*

Compare and contrast the structures of different antihistamines.

# If you are a chemist …

- You are to design a new antihistamine, what features would you include in the chemical structure?