

DIVISION OF VECTOR-BORNE DISEASES

CENTERS  
FOR DISEASE  
CONTROL AND  
PREVENTION



NATIONAL CENTER FOR EMERGING AND ZOO NOTIC INFECTIOUS DISEASES

# If Every Problem Is Unique, Can The Answer Be The Same?

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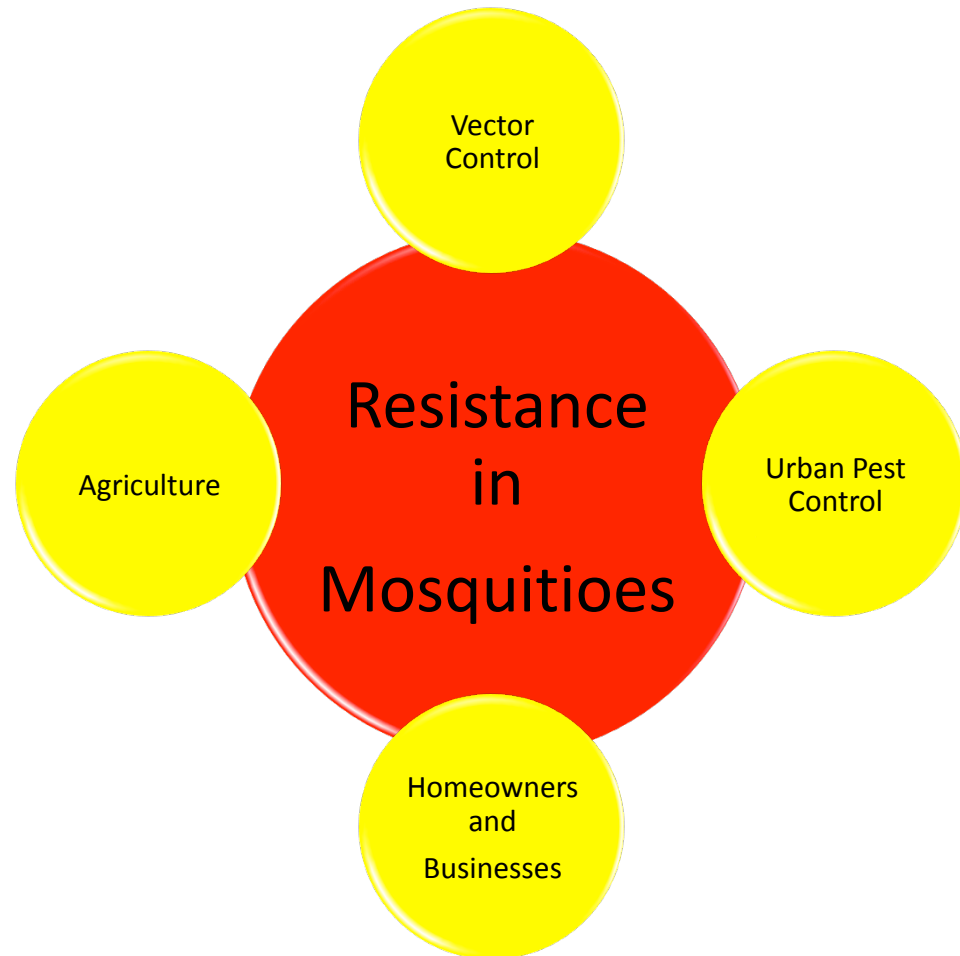


## Threats to Effective Vector Control

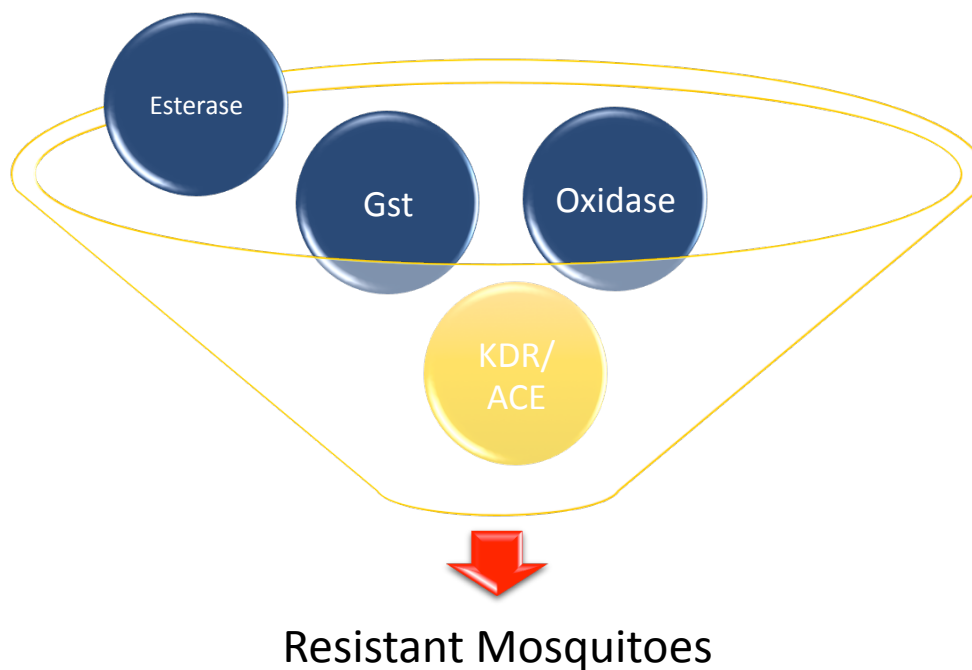
- Regulatory actions
- Pesticide attitudes
- Funds/Incentives for new control insecticides and methods
- Resistance

# Influencers of Resistance Development

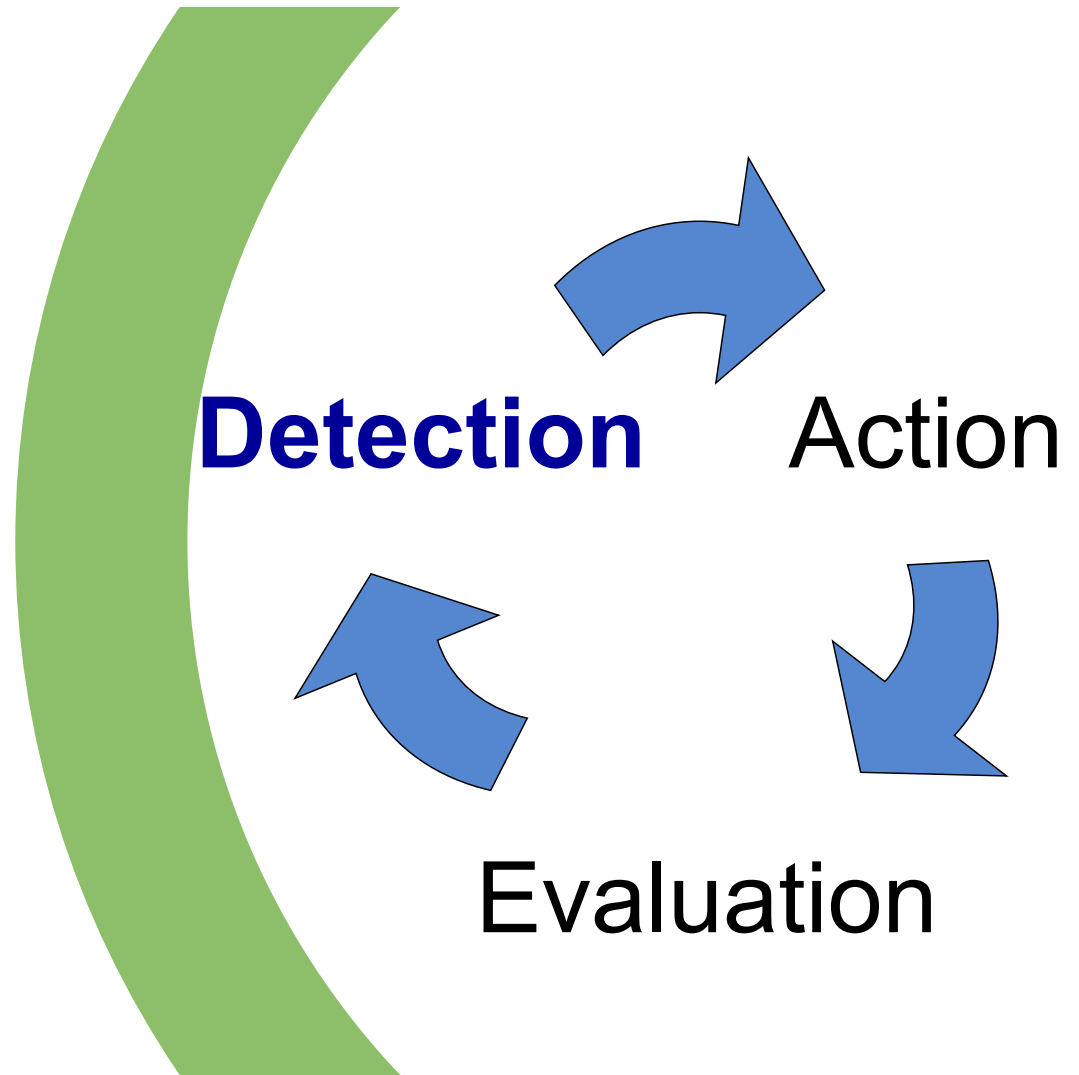
- Insecticides
- Herbicides
- Fungicides
- Fertilizers
- Non-point source runoff



Any one or combination of mechanisms may be present in a resistant population.



The first  
step of  
managing  
resistance  
is  
determining  
what is  
present in a  
population



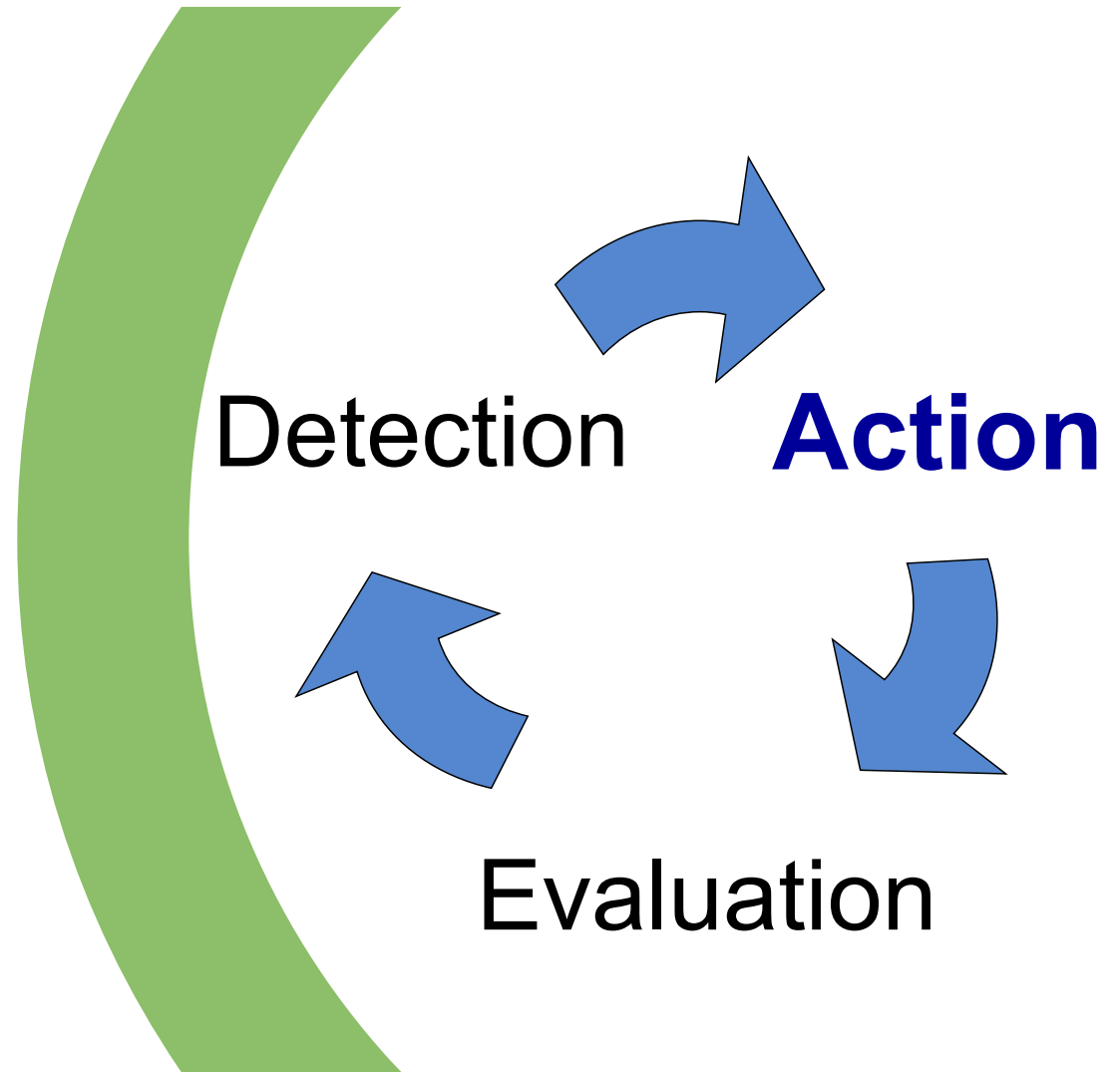


Many tests exist for detecting resistance and its underlying mechanisms in mosquitoes.

Choosing which ones to use is going to be a local decision.

We have a data vacuum on what path works when resistance is detected.

When  
resistance  
is detected  
decide on  
an action



Classic  
Areas of  
Resistance  
Management

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Management by  
moderation

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Management by  
saturation

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Management by  
multiple attack



# Management by Moderation

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Lower dosage and number of application

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Use chemical that are short lived

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Use local treatments if possible

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Refugia

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Change economic threshold

# Management by Saturation

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Rendering R gene functionally recessive by higher dosages on target

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Use of synergists

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Assumes: genes for resistance are dominant, compounds have short residual

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For this to work you need refugia and immigration

# Management by Multiple Attack

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Mixtures of chemicals

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Alternation of chemicals: rotations, mosaics

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Assumptions: no initial resistance, resistance mechanisms are different, similar decay rates in the field.



## Which strategy is Best?

- Moderation?
- Saturation?
- Multiple Attack?

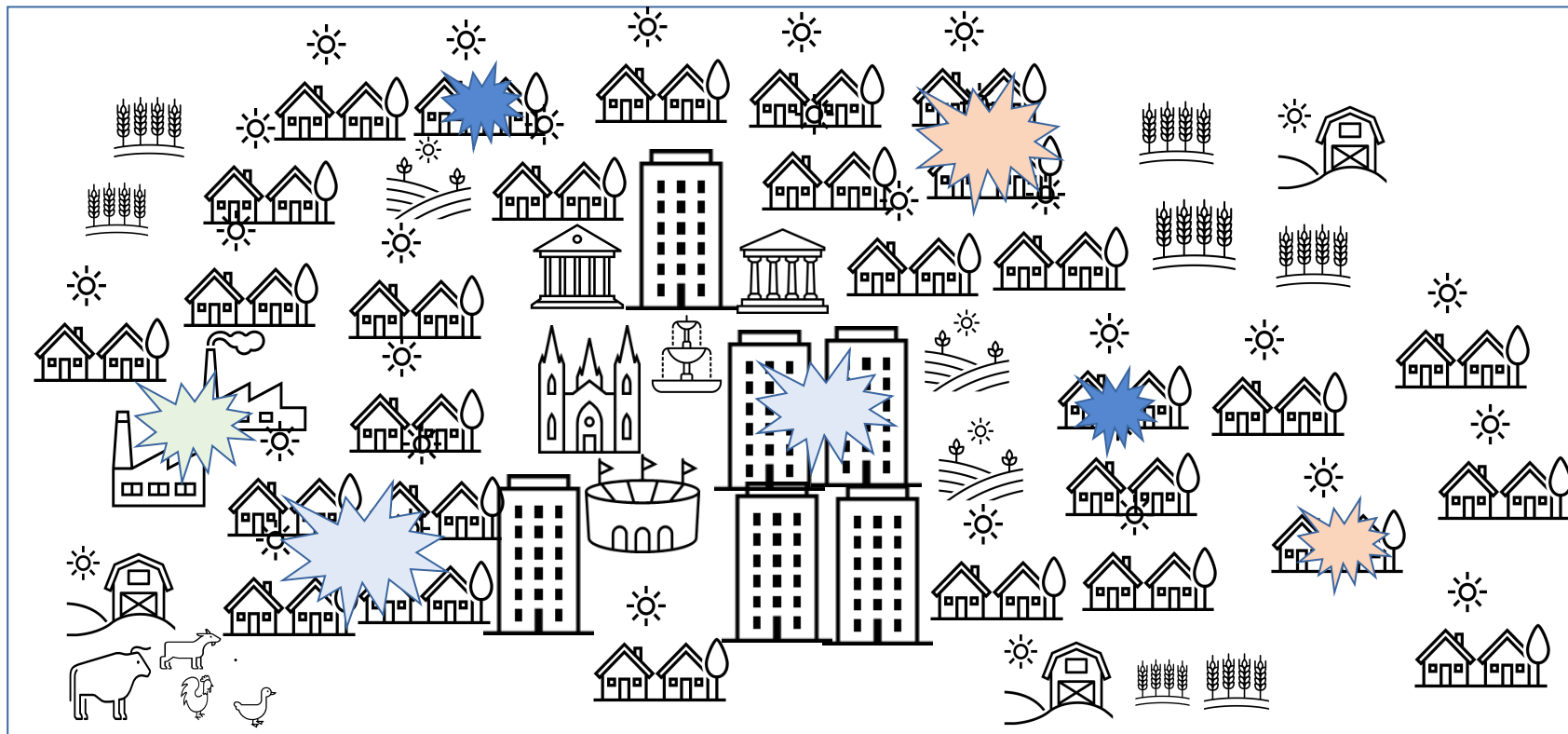
We tend to treat everywhere the same even though selection pressures are not equal....



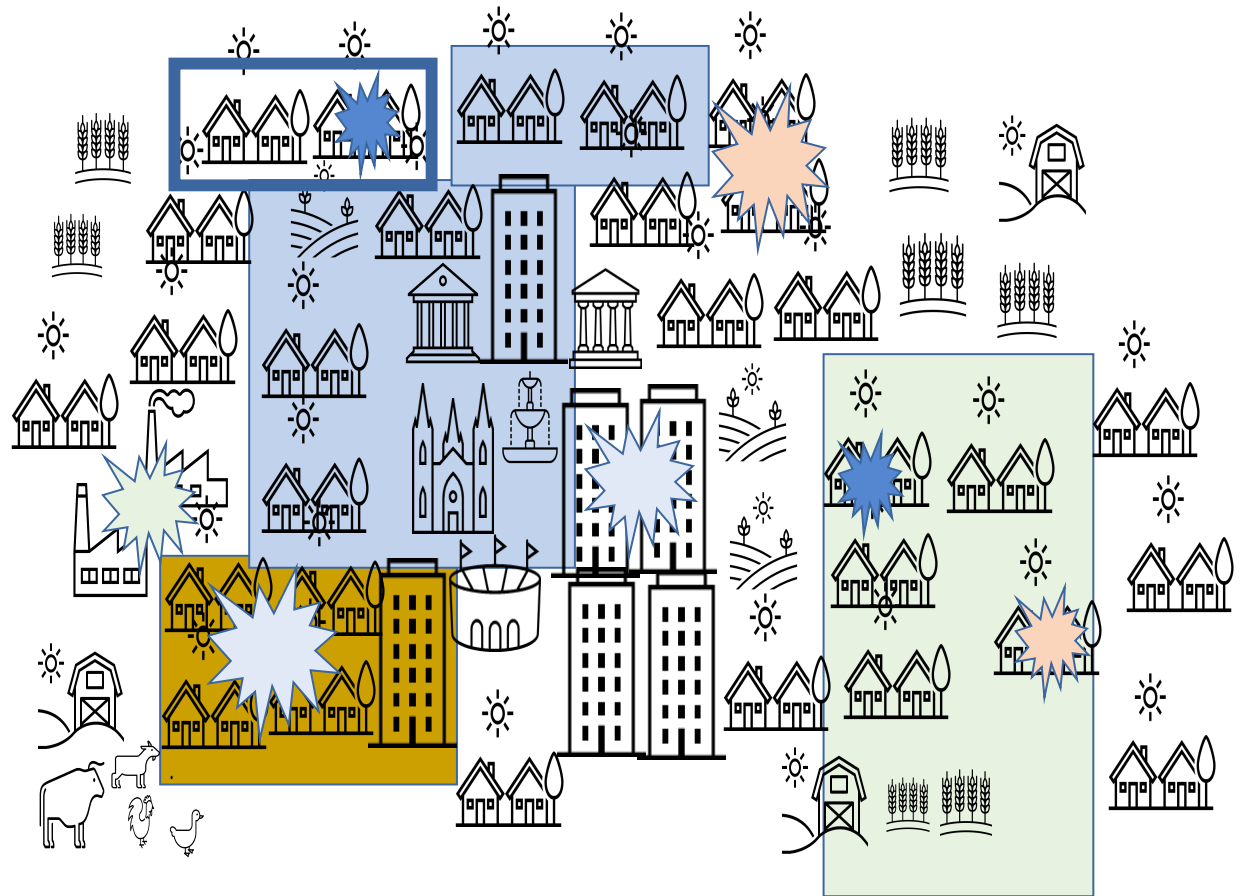
... by using one chemical at one rate.



# Resistance is focal with differing mechanisms



- Blanket approach using one of the 3 strategies may only be partially successful.
- Base strategy in each foci on real data.
- This is **Integrated Mosquito Management!!**





**Knowledge  
and Data  
should drive  
decisions of  
which path to  
use**



Rotate chemicals?



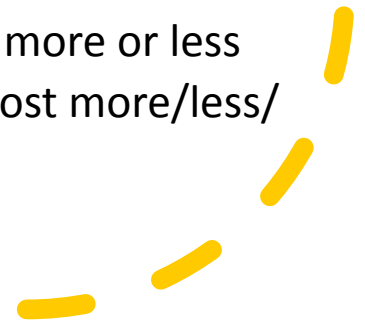
More emphasis on other  
control methods?



Change decision points to  
reduce use?

Money will always be a factor in decisions made for treatments but should not be the sole driver of resistance management

- Some areas do not have resistance so no change in control needed
  - no change in cost
- Areas with resistance:
  - alternating chemicals and using highest rate
    - Increasing rates increases chemical cost
    - Alternative chemical may cost more or less
    - Combination of the two may cost more/less/same



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