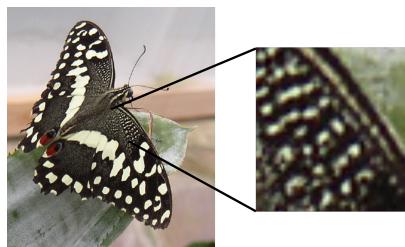


# Day 5 – Basic Picture Processing

## Pixels

- Made of pixels in a grid (width by height)
- Each pixel has three color channels (RGB)
- We manipulate pictures by manipulating pixels one by one



## Colors

- Each component color (red, green, and blue) is encoded as a single byte
- Colors go from (0,0,0) to (255,255,255). you can play with color picker from google
- If all three components are the same, the color is in greyscale
  - (200,200,200)
  - (0,0,0)
  - (255,255,255)

## Basic steps in image processing

```
#import package
from PIL import Image

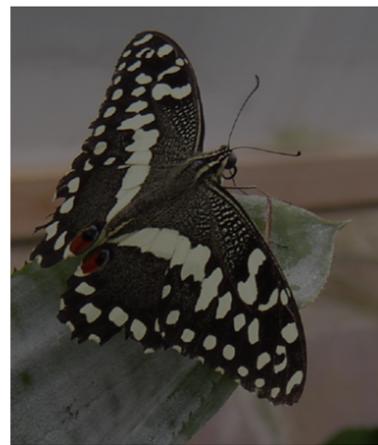
#start to read in the picture.
#picture should be in the same folder as the py file
pic = Image.open('butterfly.jpg')

#get the size of the picture
[width, height] = pic.size
pixels = pic.load()

#nested Loop to process a picture
for x in range(width):
    for y in range(height):
        (r, g, b) = pixels[x, y]
        # This step is key to do something to a pixel

pic.save('result.jpg')
```

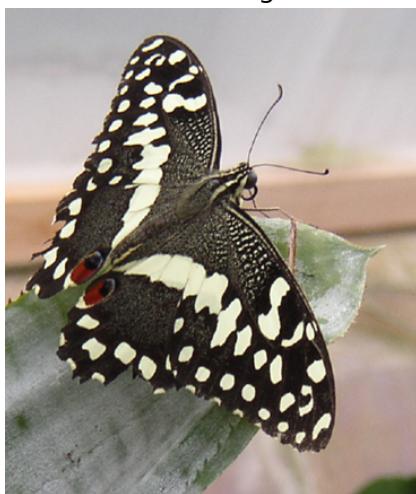
## Exercise 1: Darken a picture



Note.  $5/2$  in python is  $2.5$ ,  $5//2$  in python is  $2$

## Exercise 2: Salt and Pepper

- Distort your picture by adding in salt and pepper to the picture
- Hint: use random to generate random noise and add to pixel's RGB



## Homework

- Create a filter that change your picture

Examples:

- remove all red or blue or green
- grey out a picture