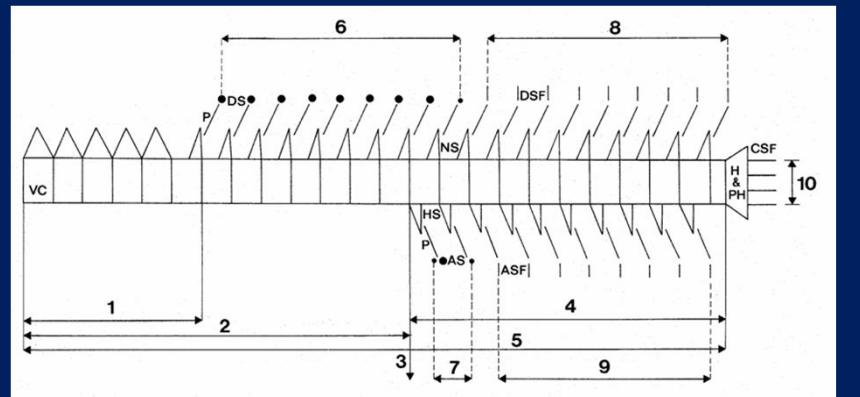
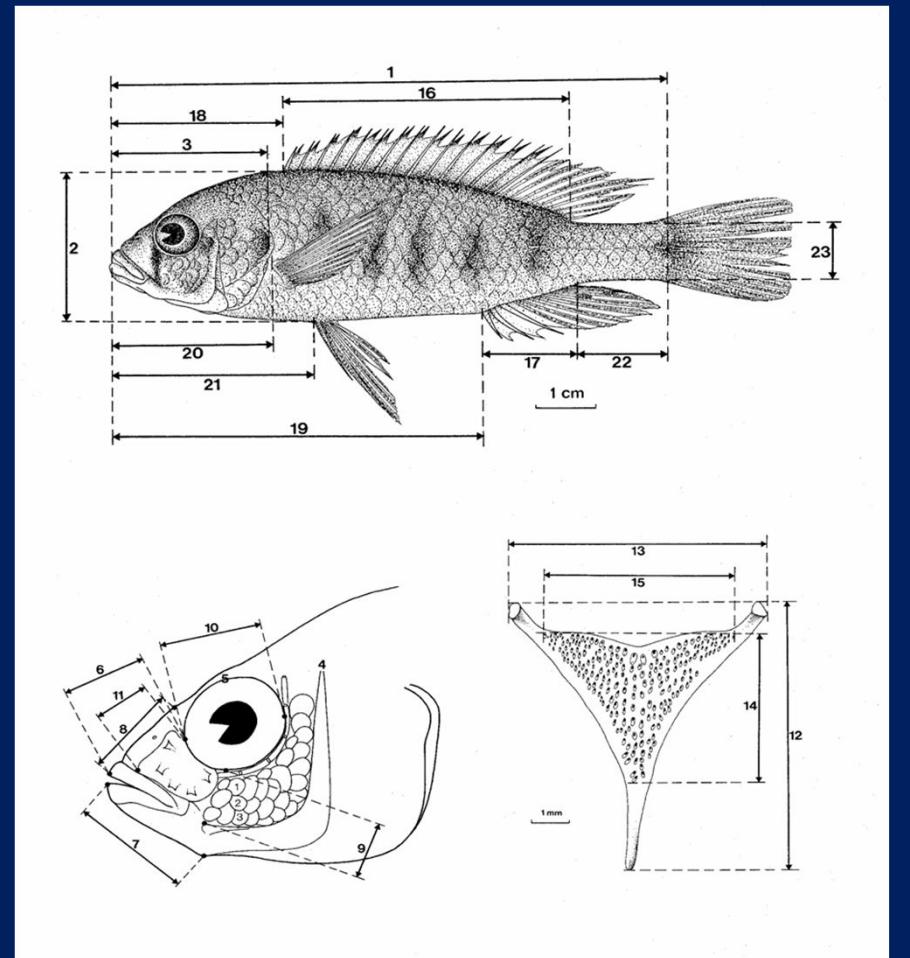
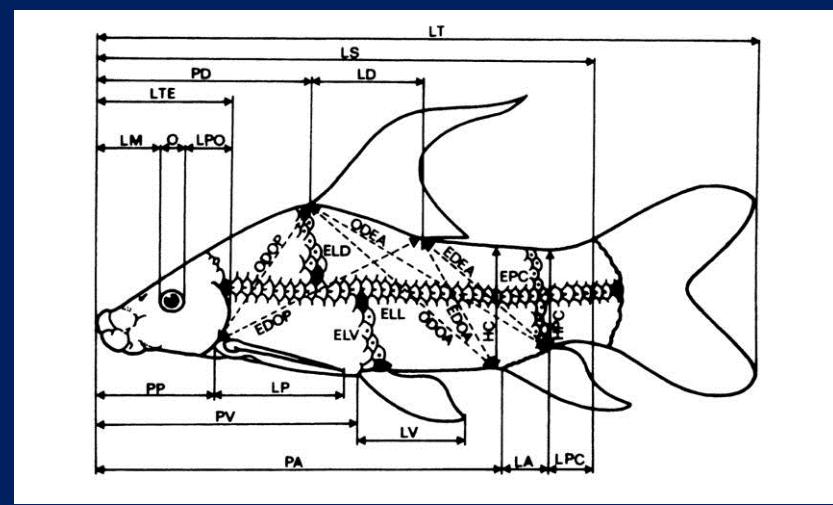


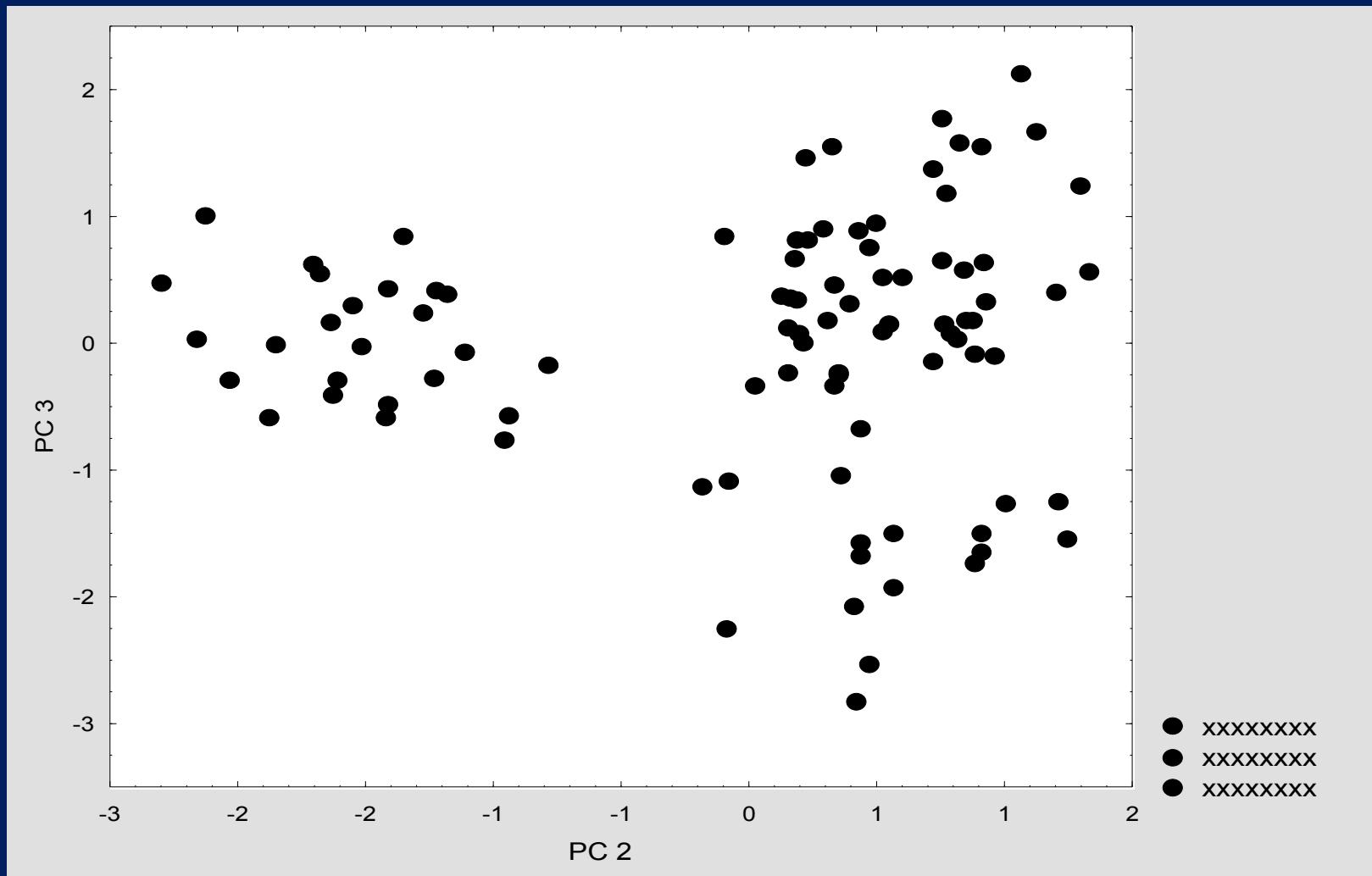
How ?

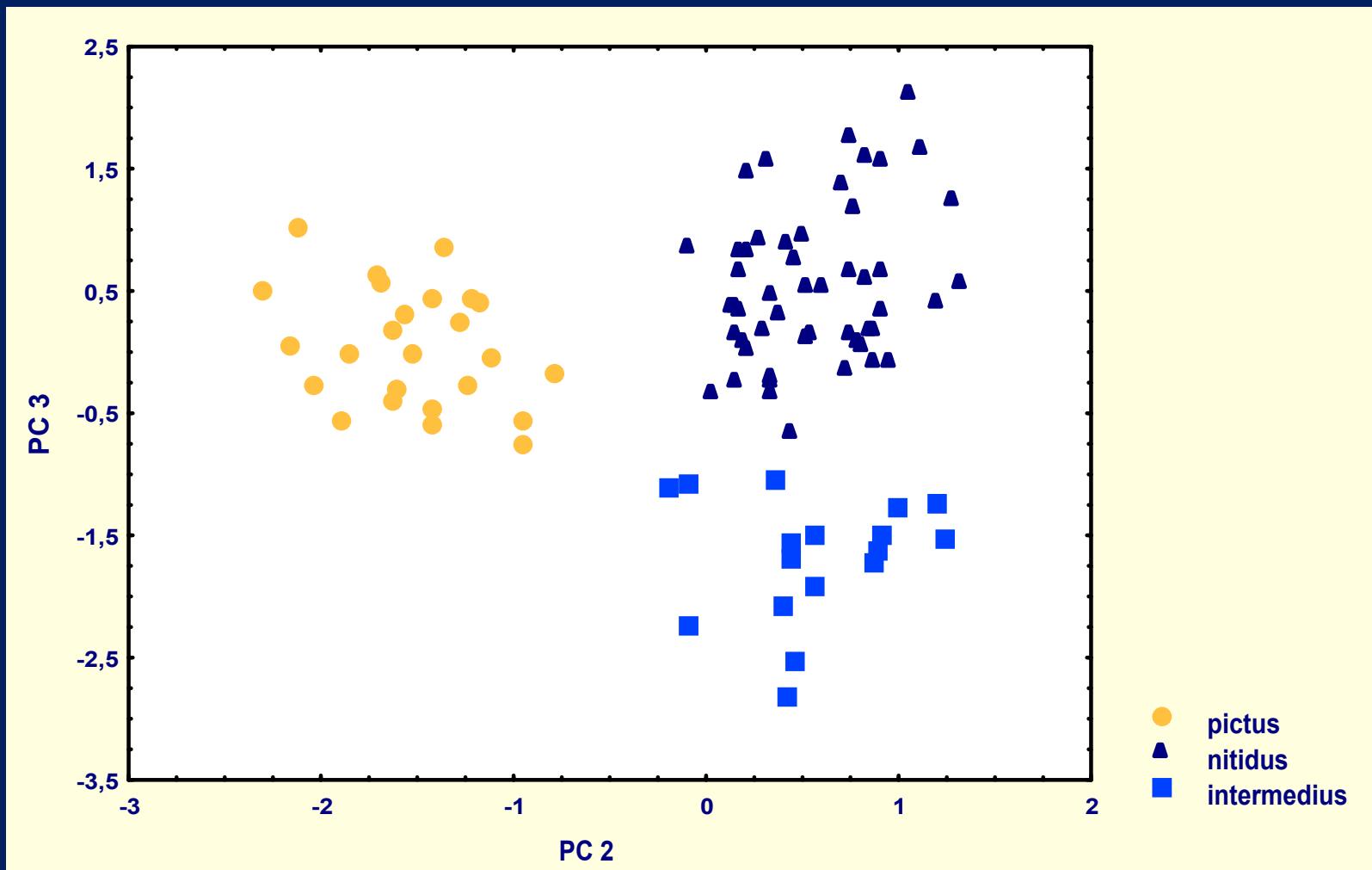
morphometrics

- measurements, counts, qualitative observations
 - univariate and multivariate data analyses

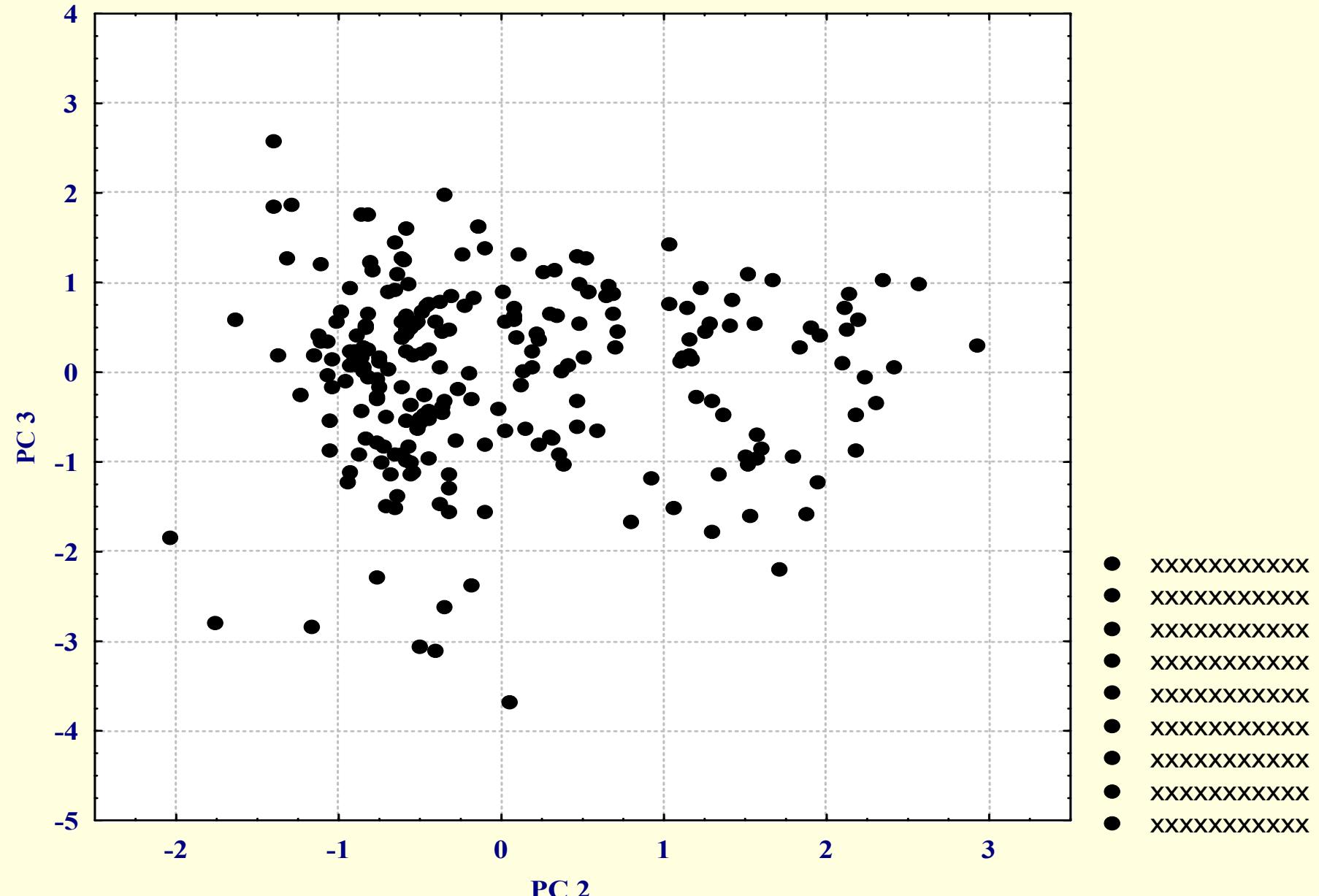


A taxonomist's wet dream

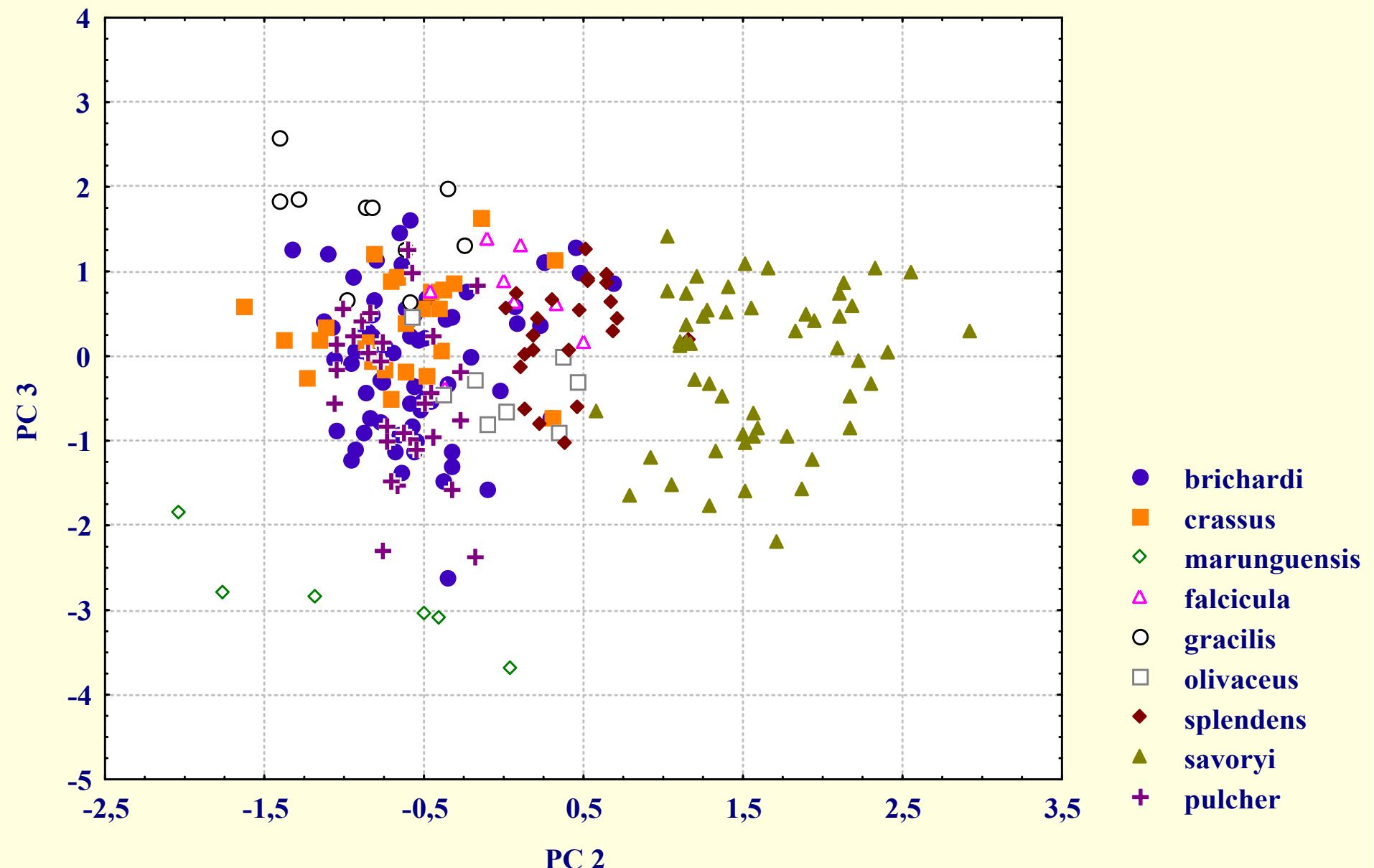




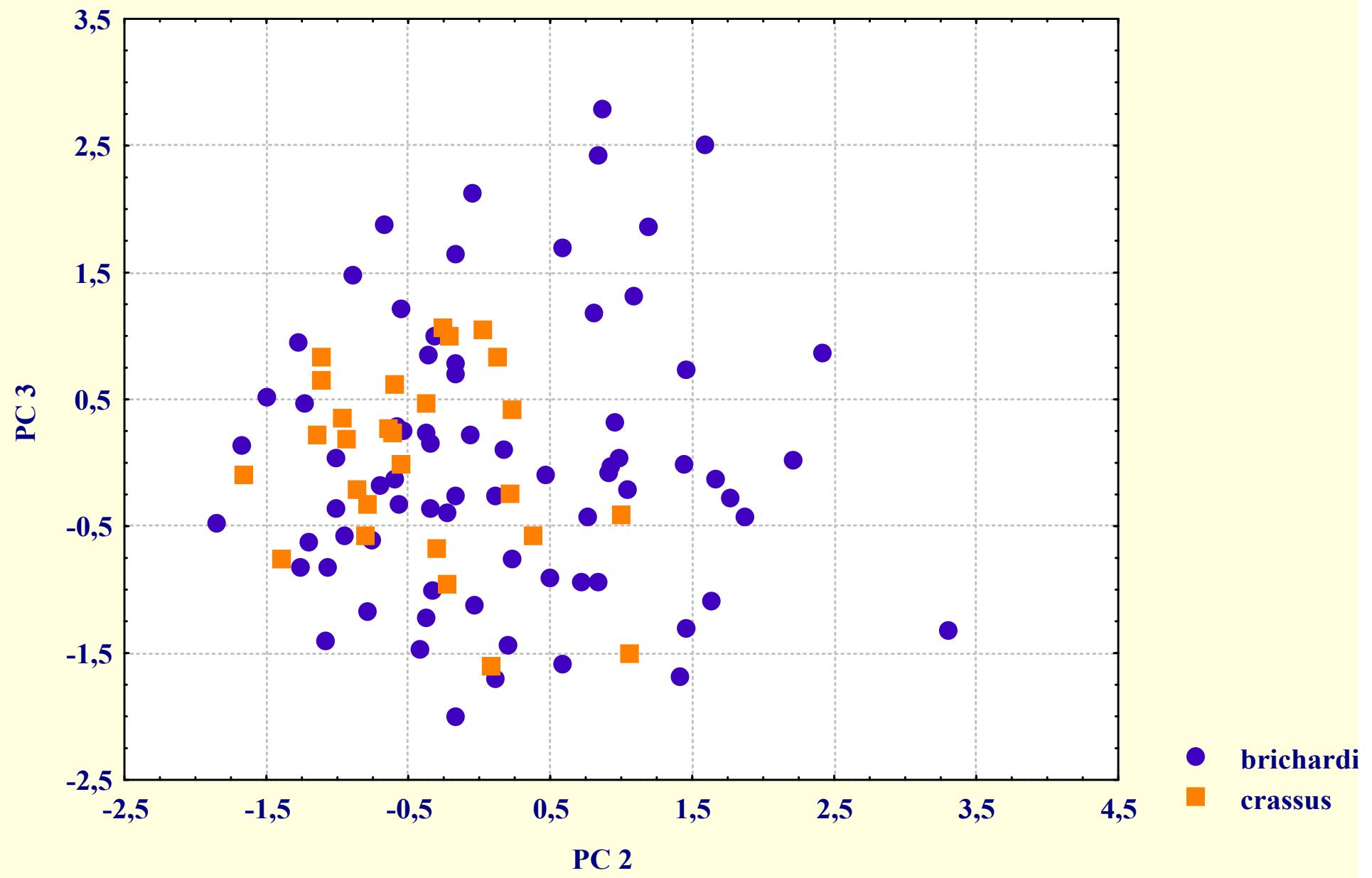
A taxonomist's nightmare

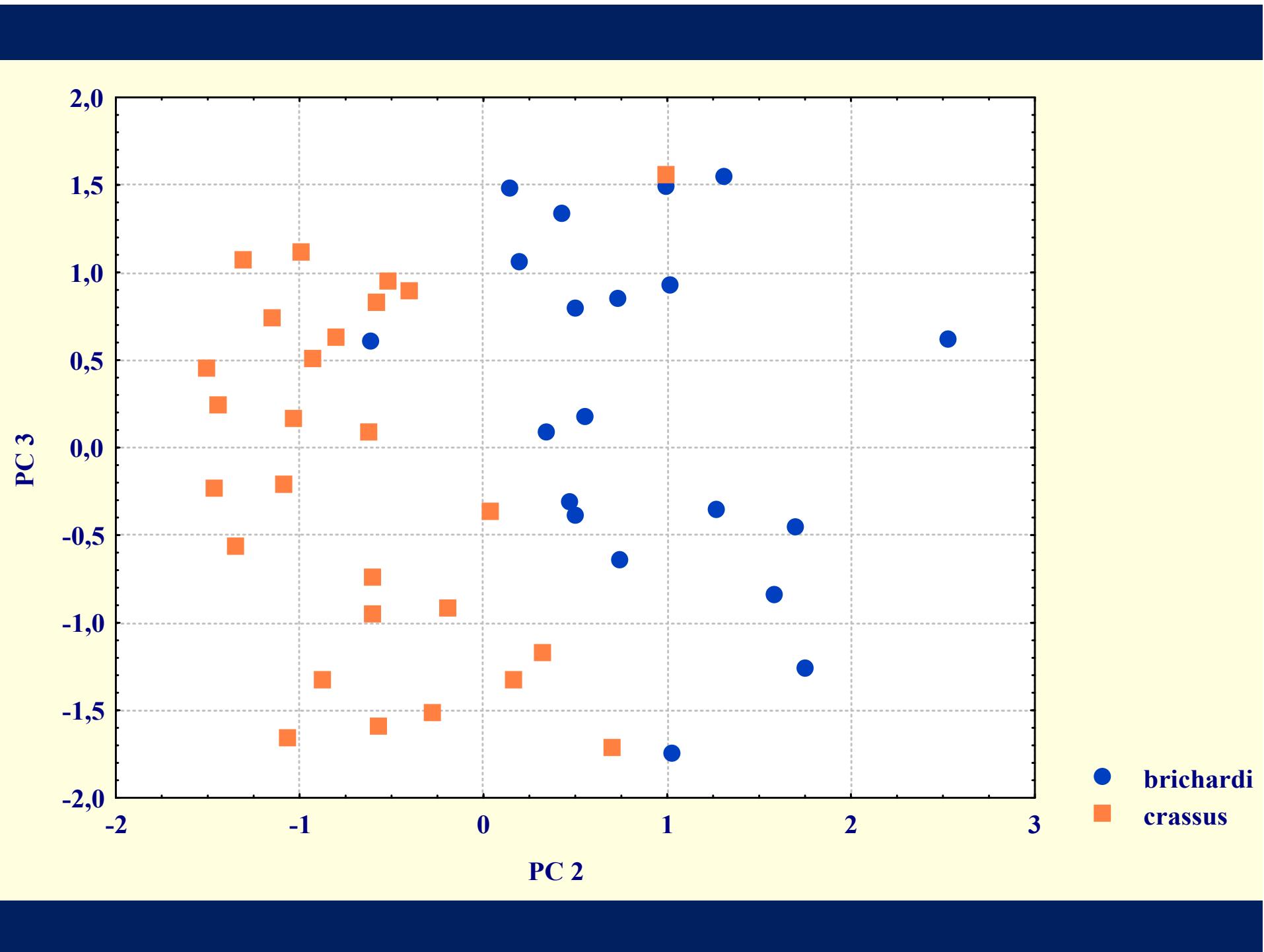




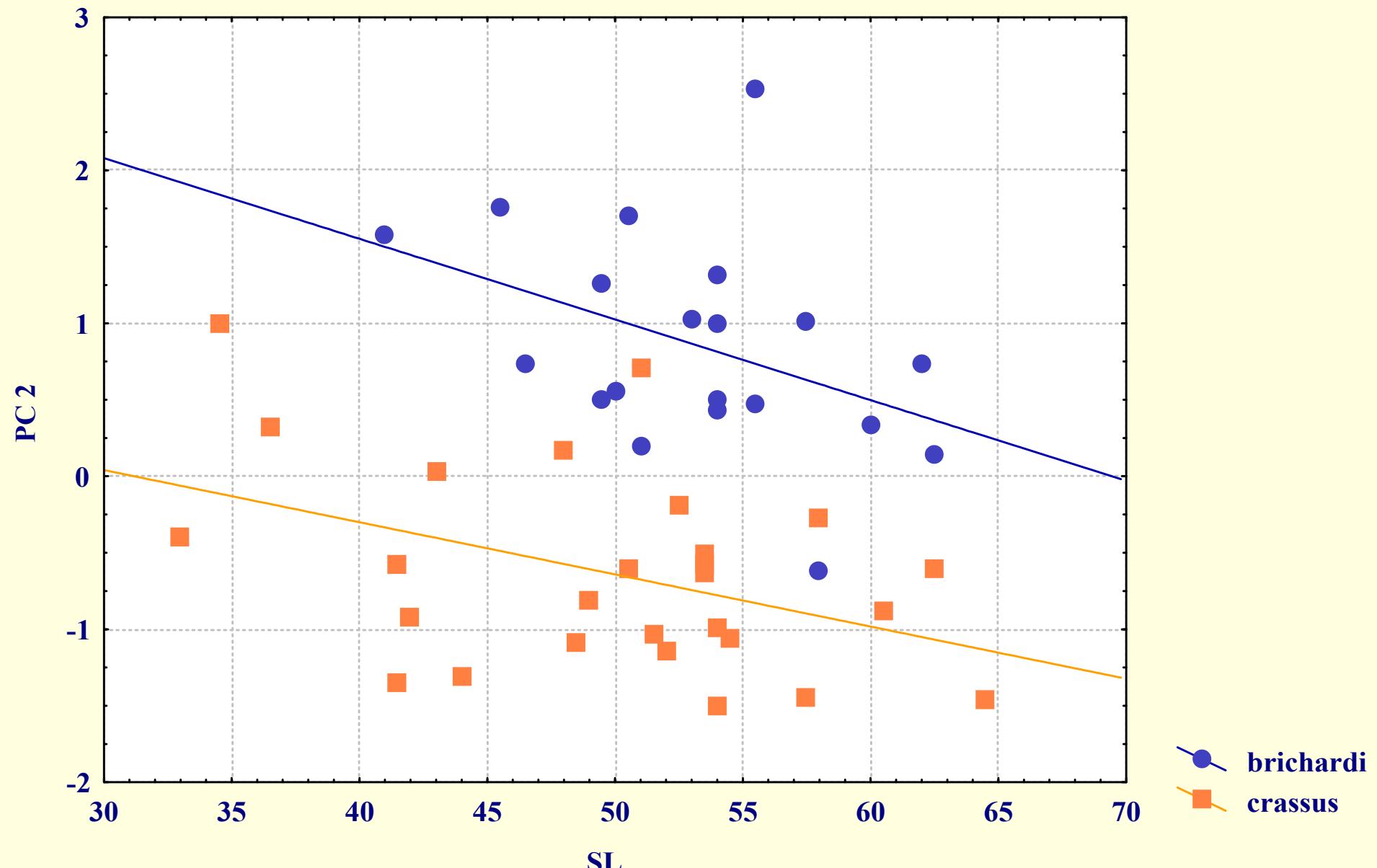


The much underestimated art of interpretation

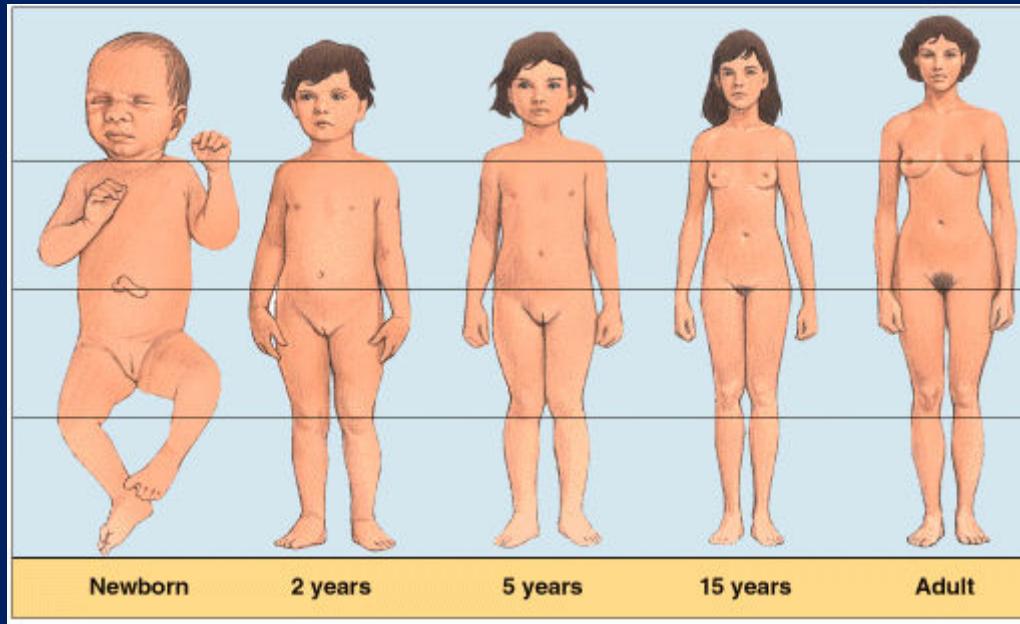




Allometry is often neglected



Allometry



Differential growth of one structure compared to another (usually length); covariation of different morphological elements

Allometry

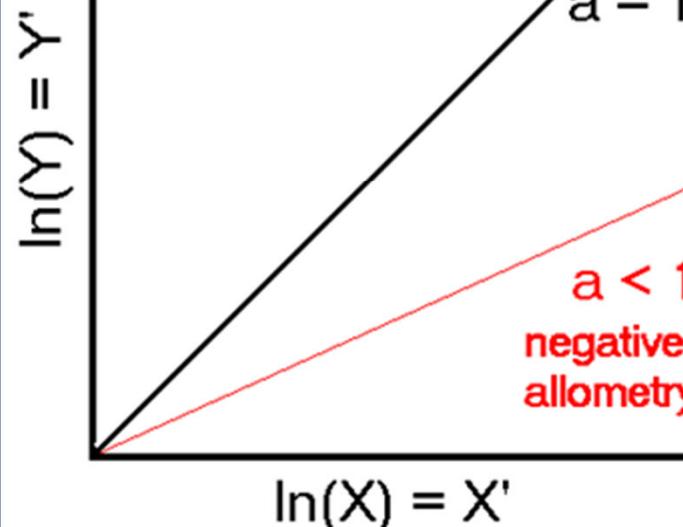
$$y = bx^a$$

$$\log y = \log b + a \log x$$

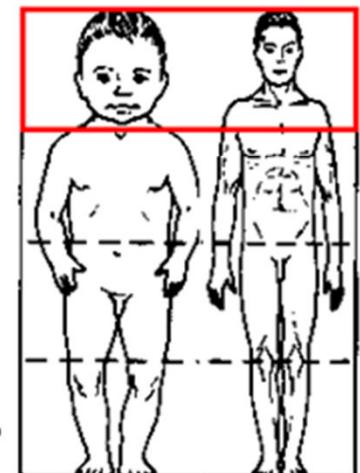
$\log b$ = intercept

a =constant, determines slope

Negative Allometry:
Y grows slowly
relative to X



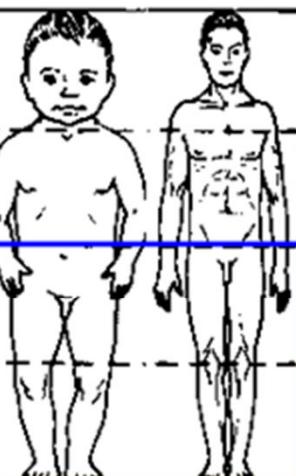
Head grows slowly
relative to torso



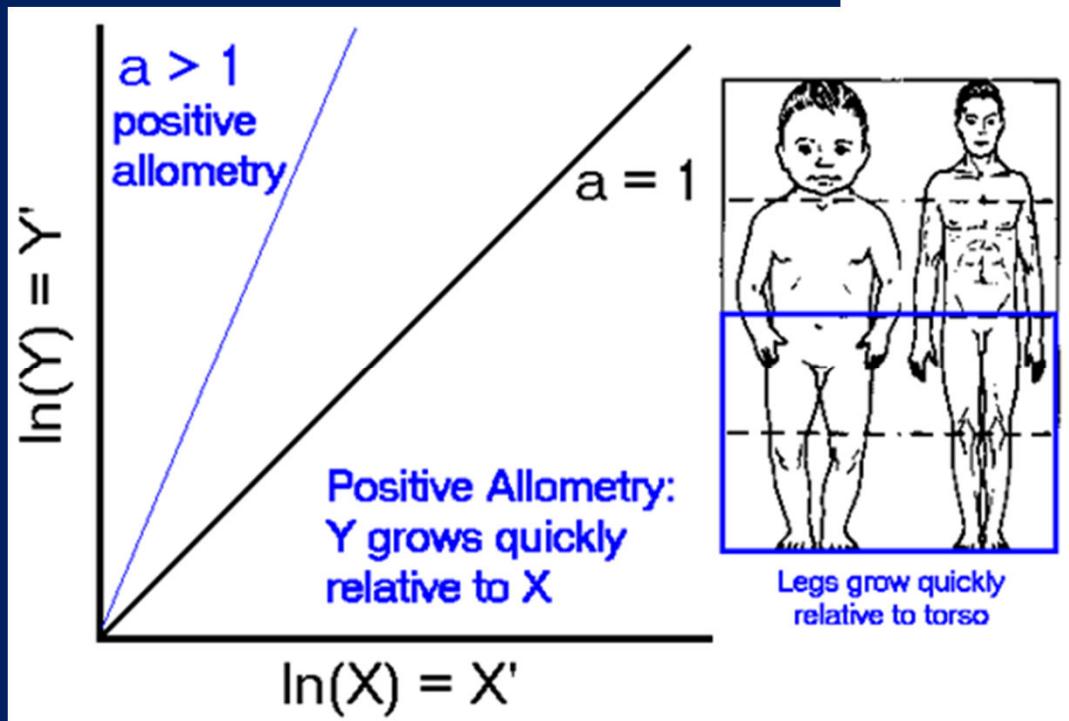
$a > 1$
positive
allometry

$a = 1$

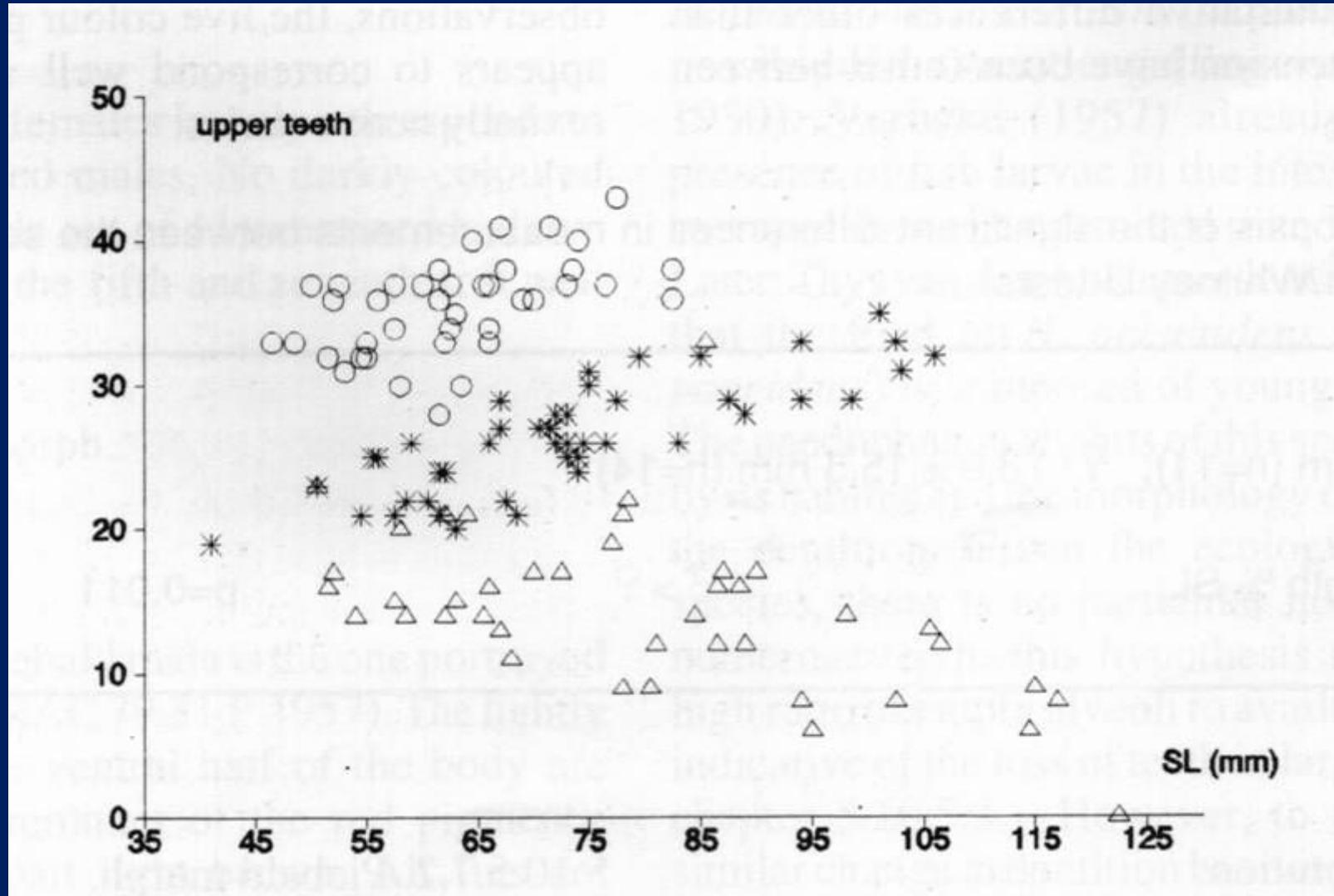
Positive Allometry:
Y grows quickly
relative to X



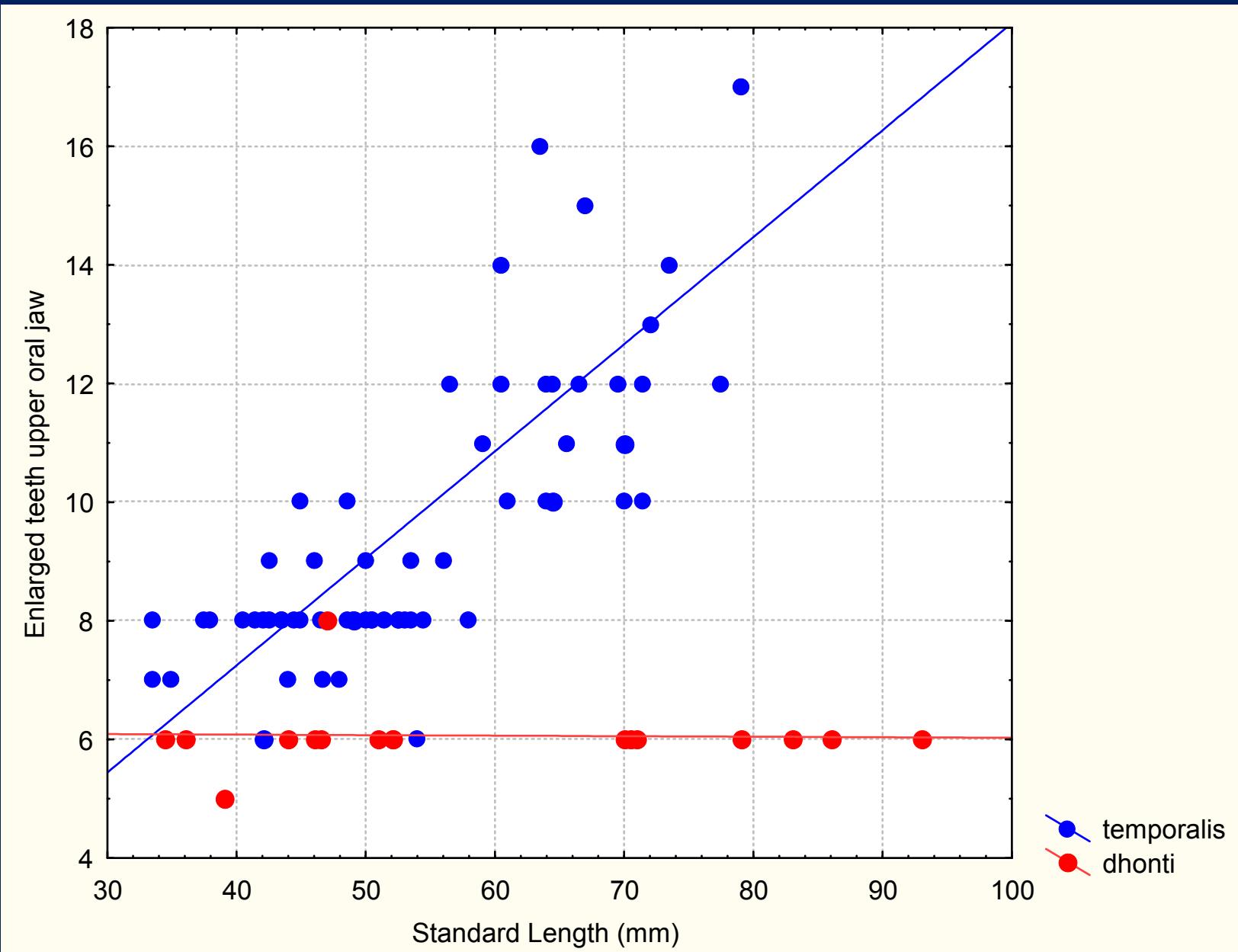
Legs grow quickly
relative to torso

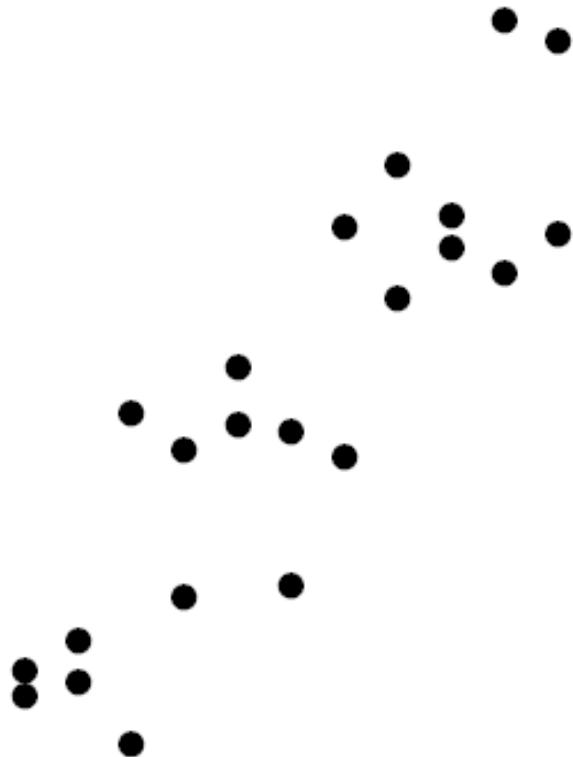


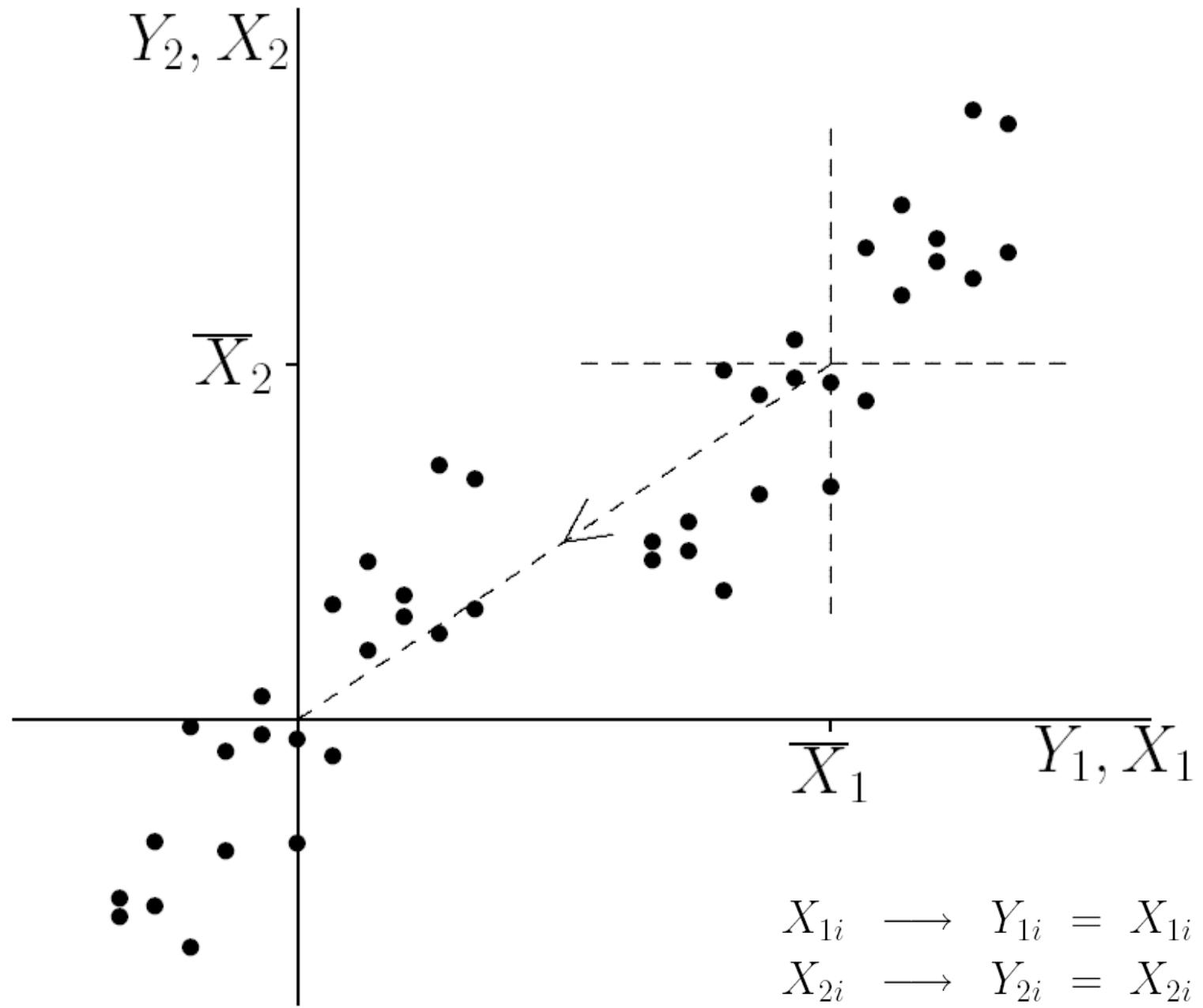
Size is important

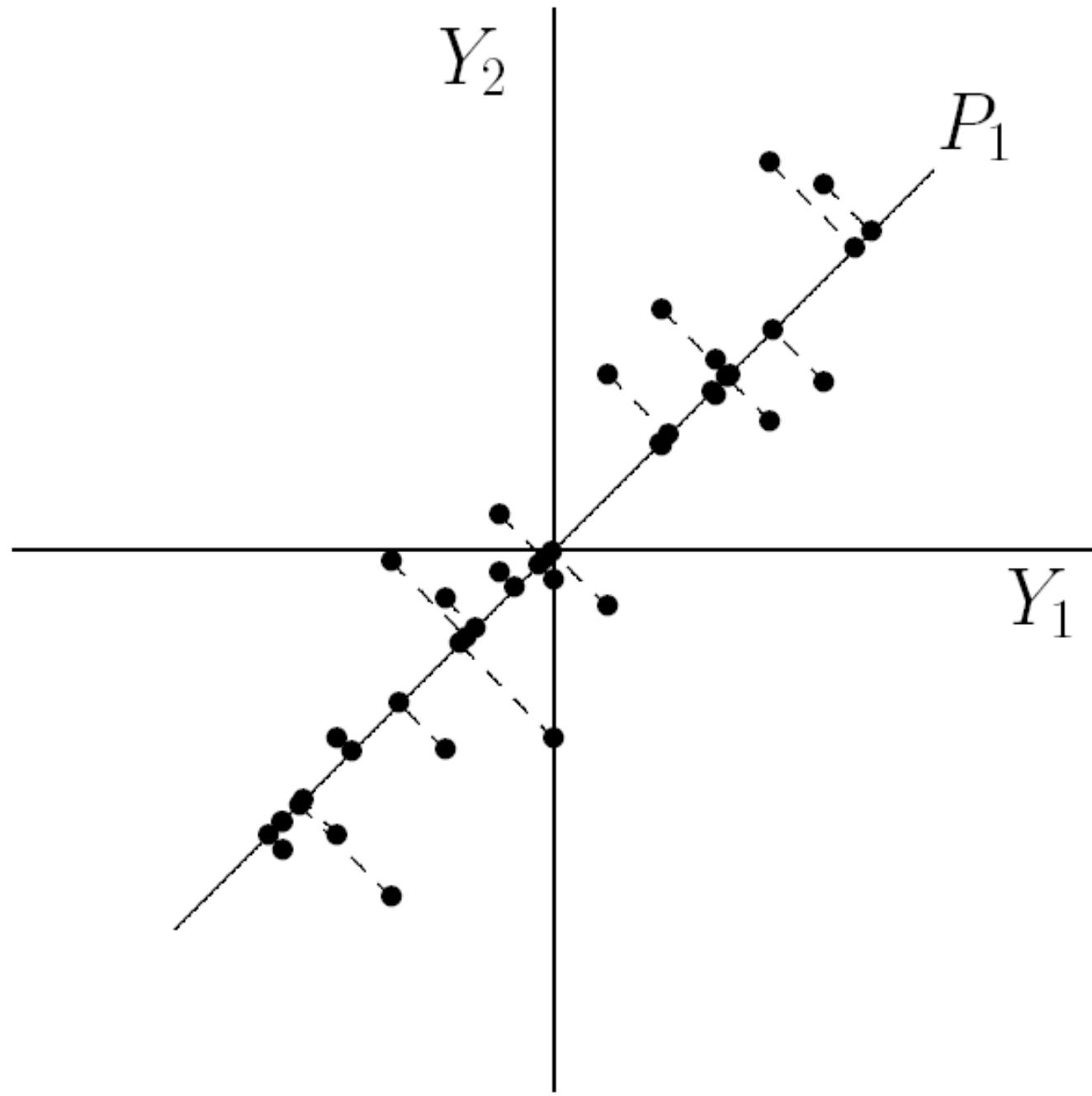


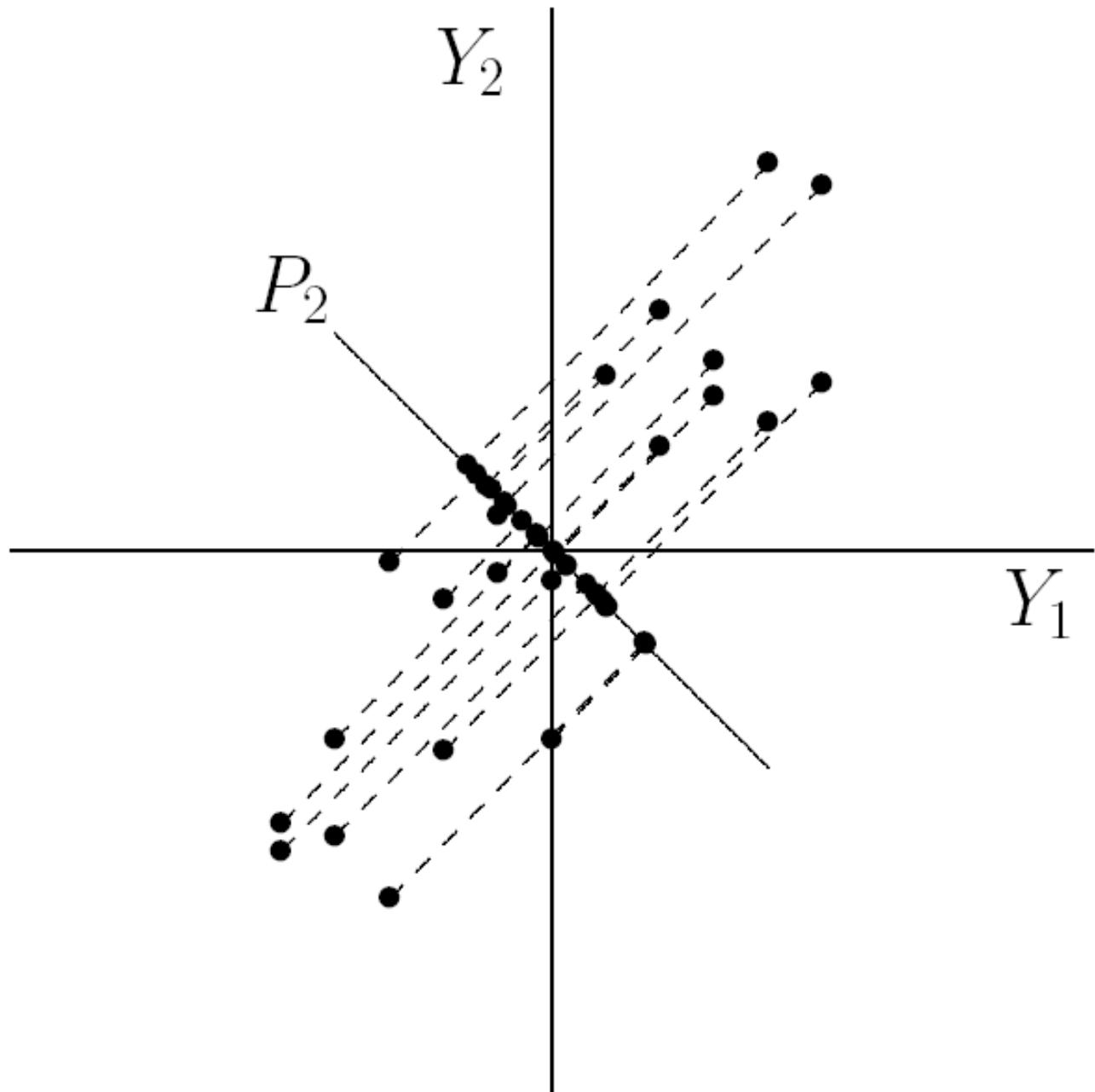
Size is important

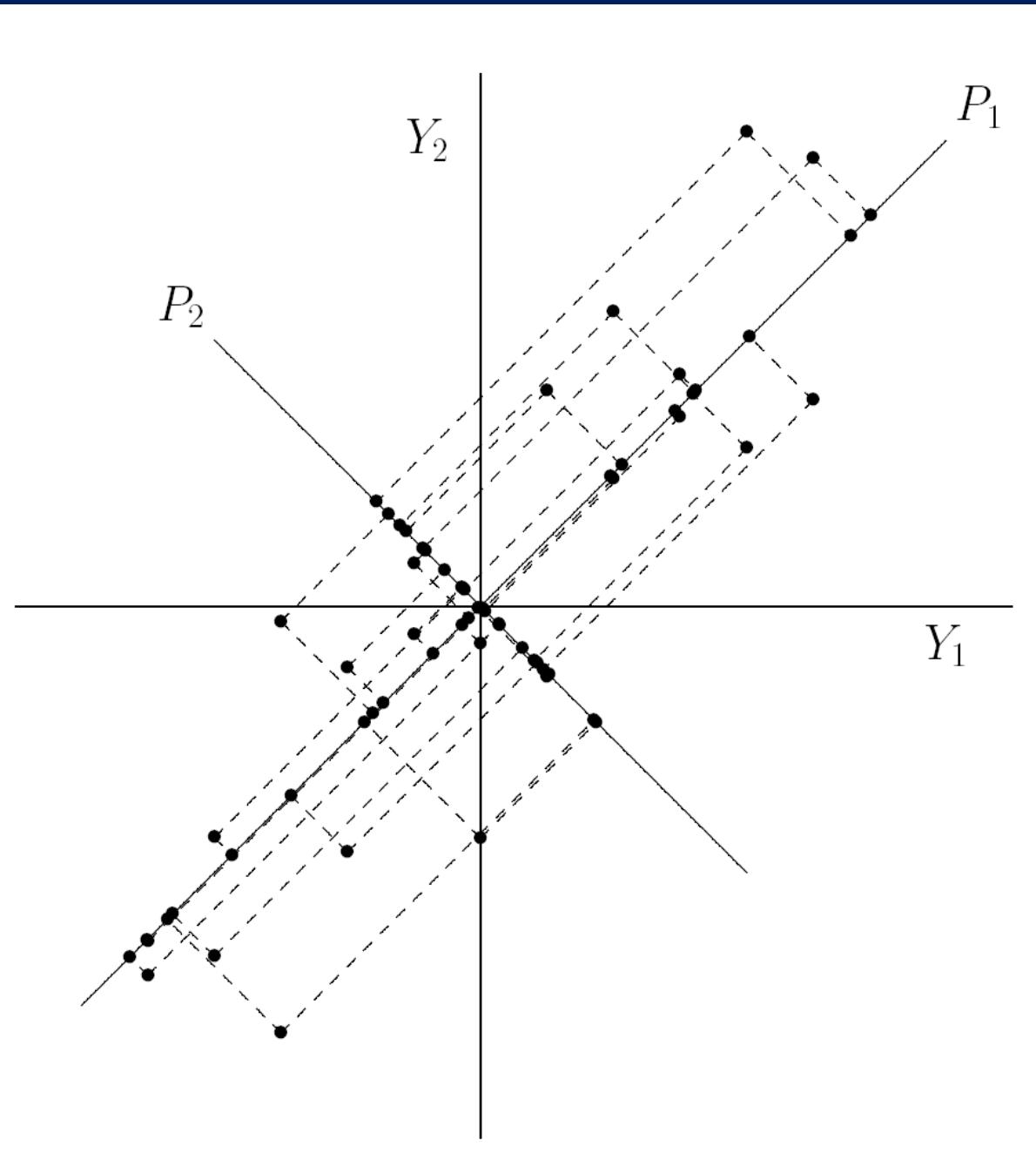


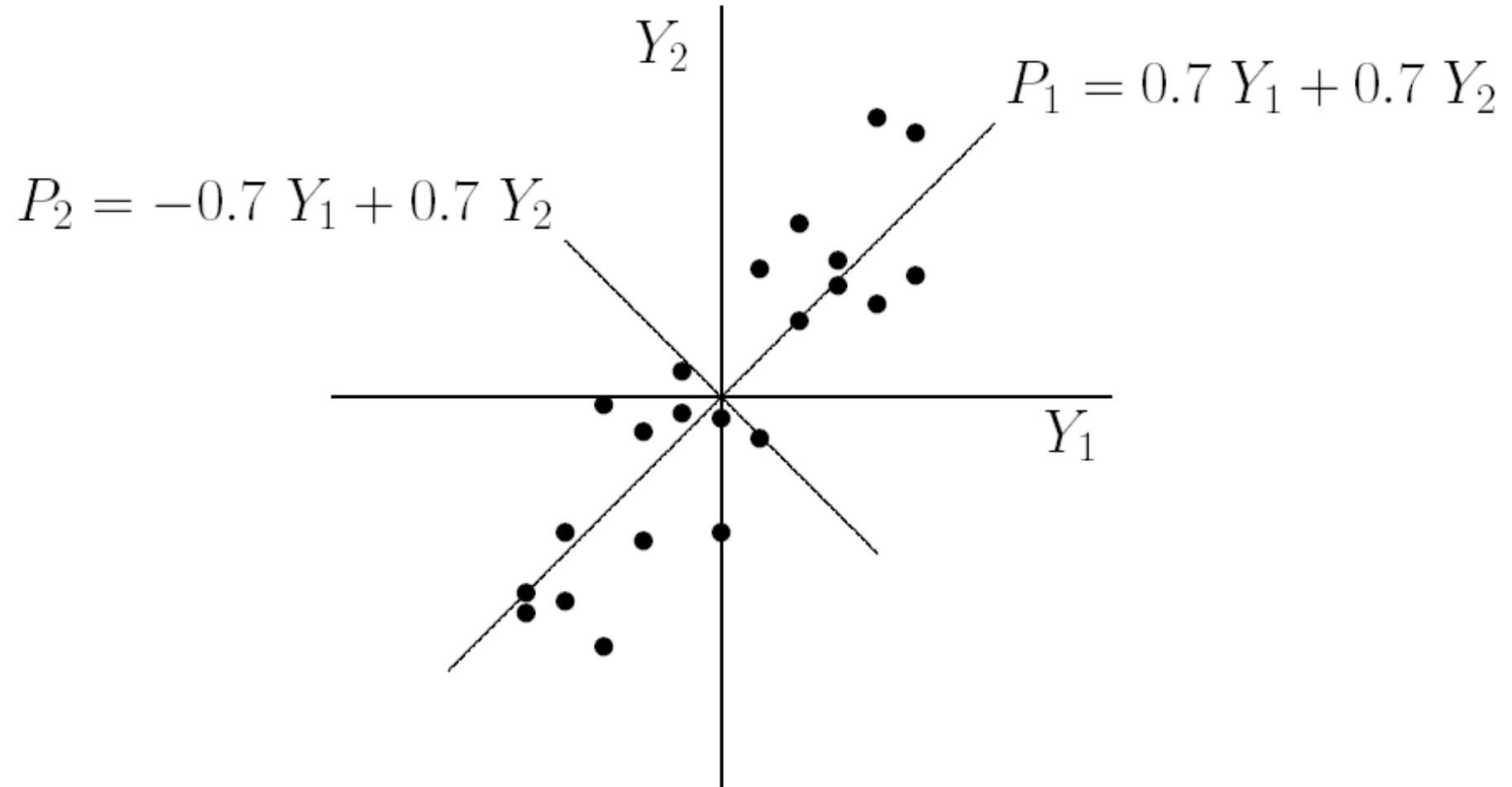
X_2 X_1 





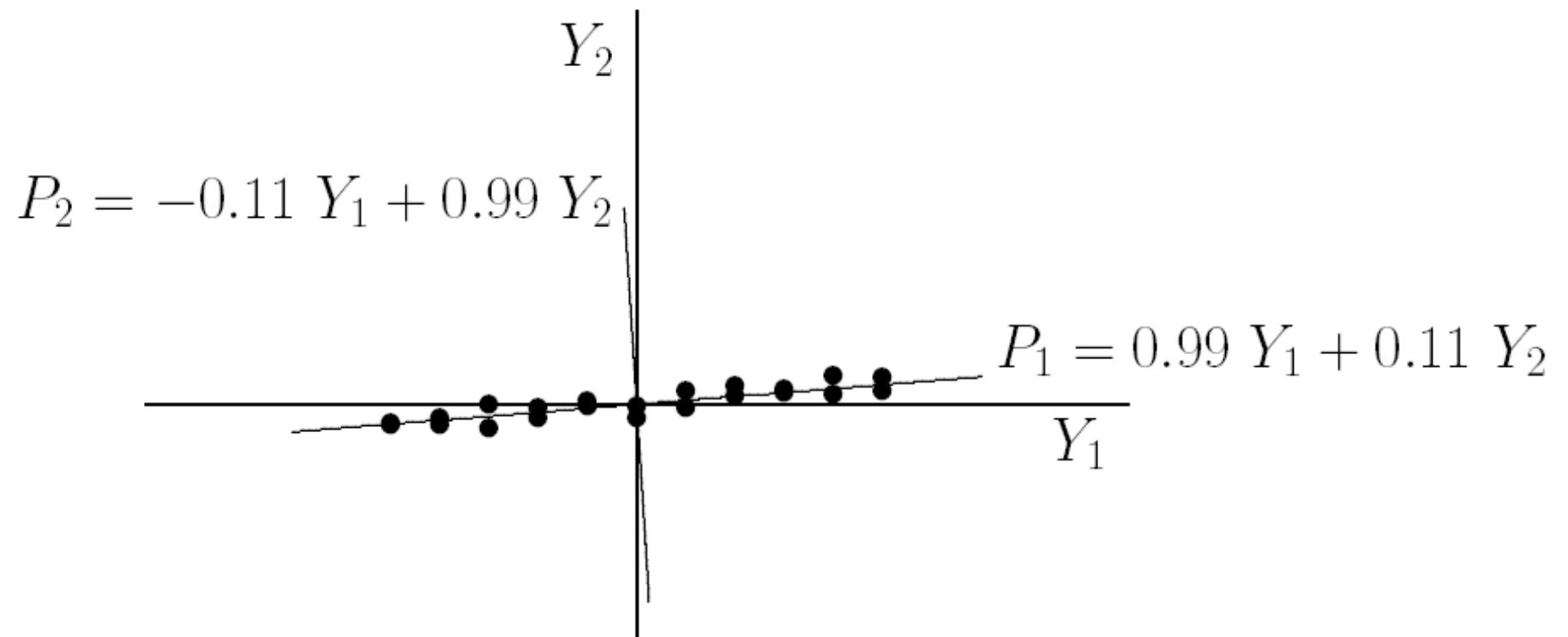






$$P_1 = a_1 Y_1 + a_2 Y_2$$

$$P_2 = b_1 Y_1 + b_2 Y_2$$



$$P_2 = -0.99 Y_1 + 0.11 Y_2$$

$$Y_2 \quad P_1 = 0.11 Y_1 + 0.99 Y_2$$

Y_2

Y_1



30,5

31,7

34,2

30,9

32,0

33,3

33,5

32,9

30,9

33,7

32,1

32,4

32,8

36,2