

Ossification of flipper bones in bottlenose dolphins (*Tursiops truncatus*)

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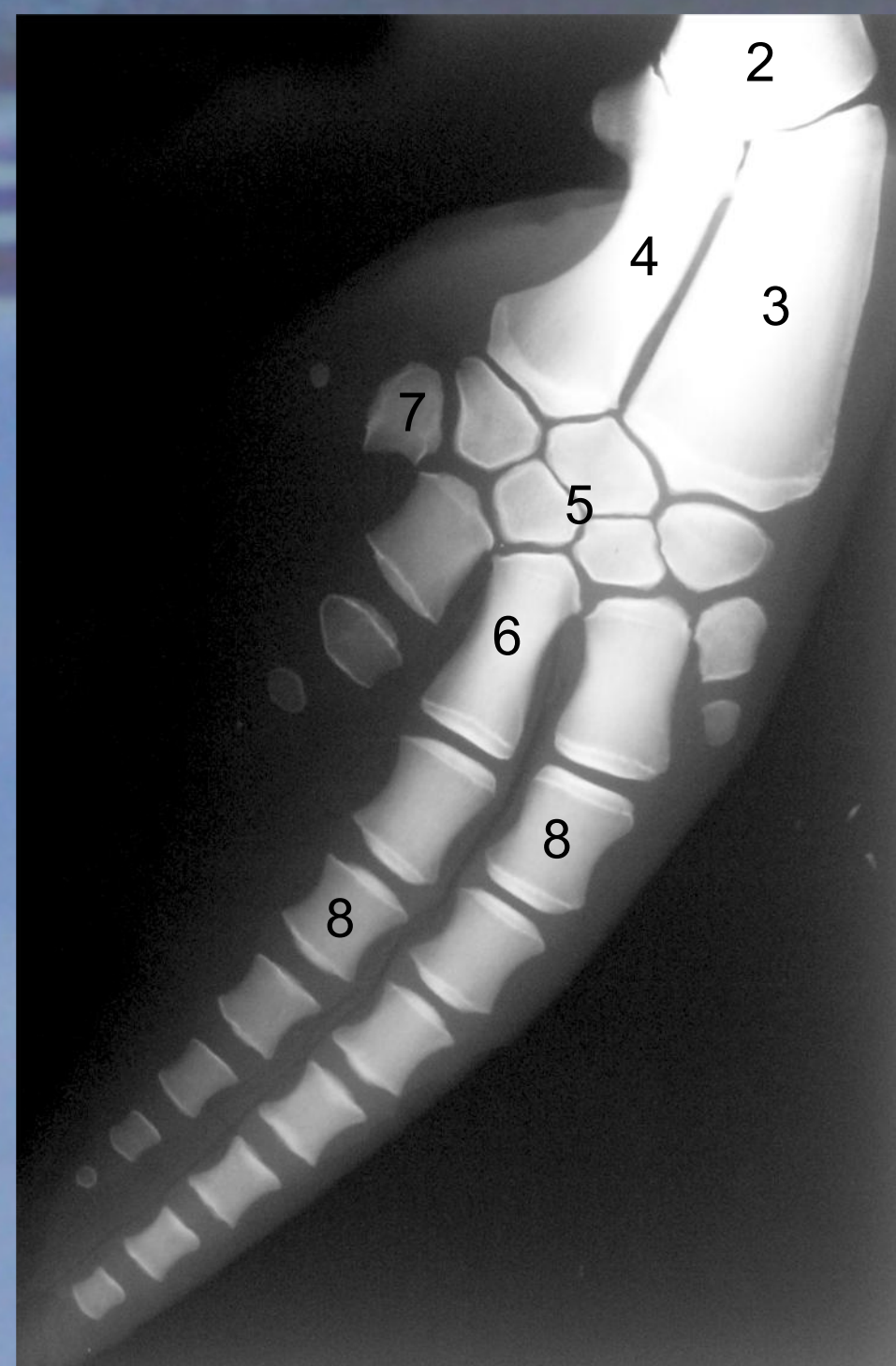
Introduction:

- ↪ bottlenose dolphin (*Tursiops truncatus*) is the only resident cetacean species in the Adriatic Sea
- ↪ estimated population size: 250 animals in the Croatian part of the Adriatic Sea
- ↪ hypothesis: important biological data (age, body length and body mass) of a specimen can be estimated through the ossification pattern of the flipper

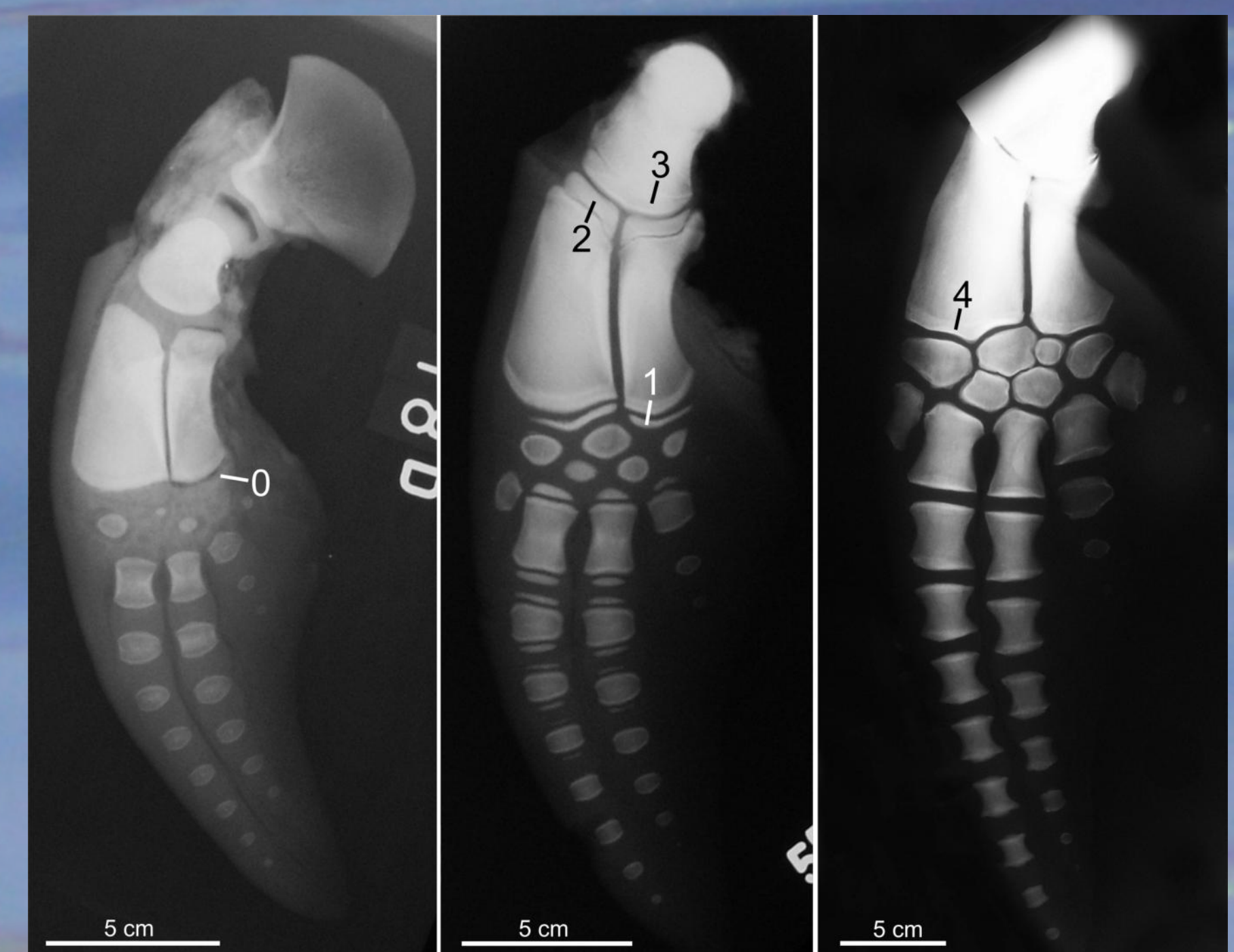
Materials and Methods:

- ↪ in order to study the ossification pattern of the bottlenose dolphin flipper, we examined 232 radiographs of the left and right flipper originating from 60 male and 57 female bottlenose dolphins with body lengths from 99 to 322 cm and age from 0 to 28 years
- ↪ the radiographs originated from bottlenose dolphins found dead from October 1990 to January 2010. Ossification centers of flipper bones were identified and their fusion was evaluated according to Galatius et al. (2006). (Table 1)

Stage	Definition
0	Epiphysis unossified.
1	No ankylosis. Epiphysis is free or has a latitudinal width significantly smaller than that of the adjacent metaphysis.
2	Initial ankylosis. Epiphysis loosely attached to the metaphysis.
3	Progressing ankylosis. Epiphysis fused to the bone showing clear radiodense physal line traversing the width of the bone.
4	Complete ankylosis. Epiphysis fused to the bone showing less than 50% of the physal line.

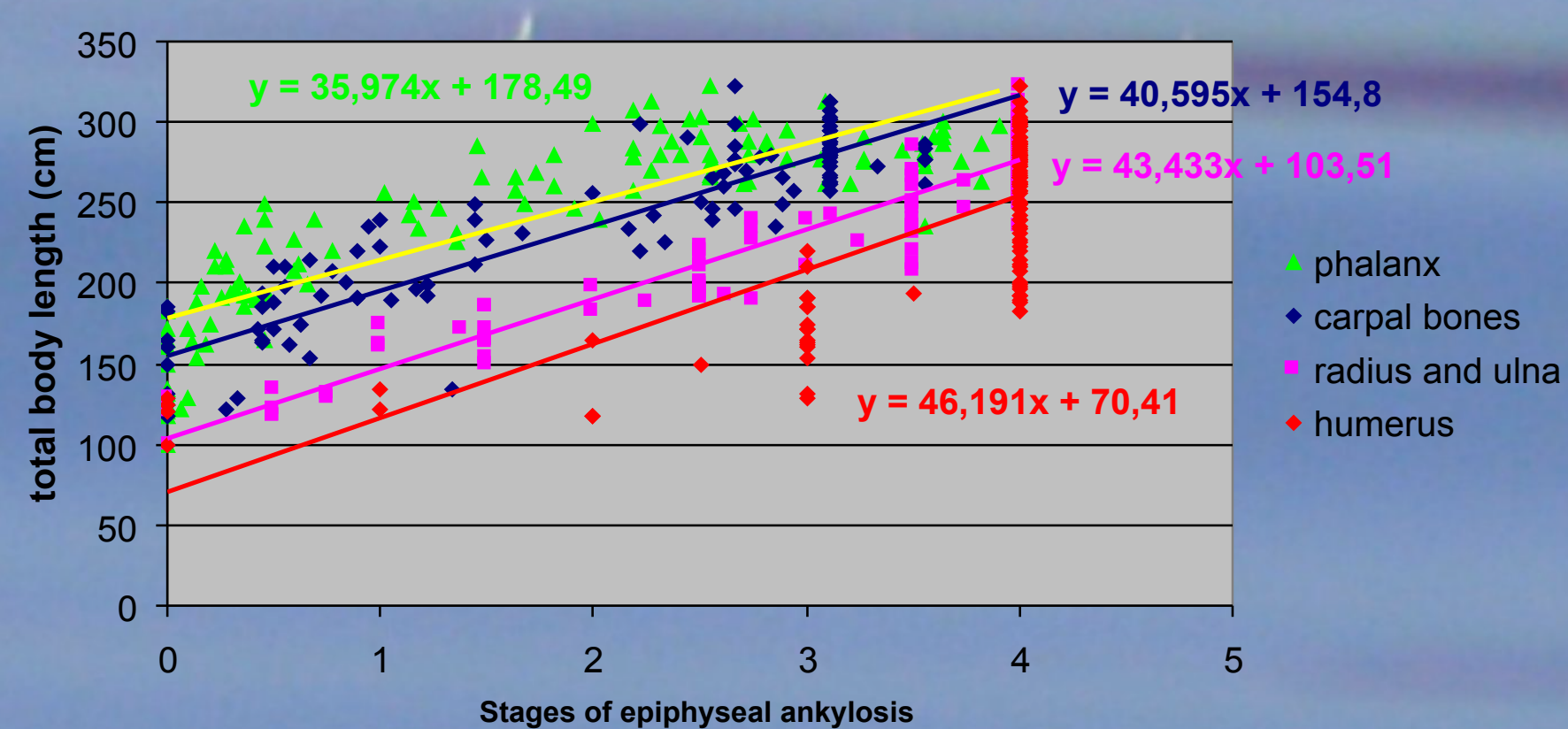


Position of the flipper bones in the bottlenose dolphin: scapula (1), humerus (2), radius (3), ulna (4), carpal bones (5), 3rd metacarpal bone (6), 5th metacarpal bone (7), phalanx (8)

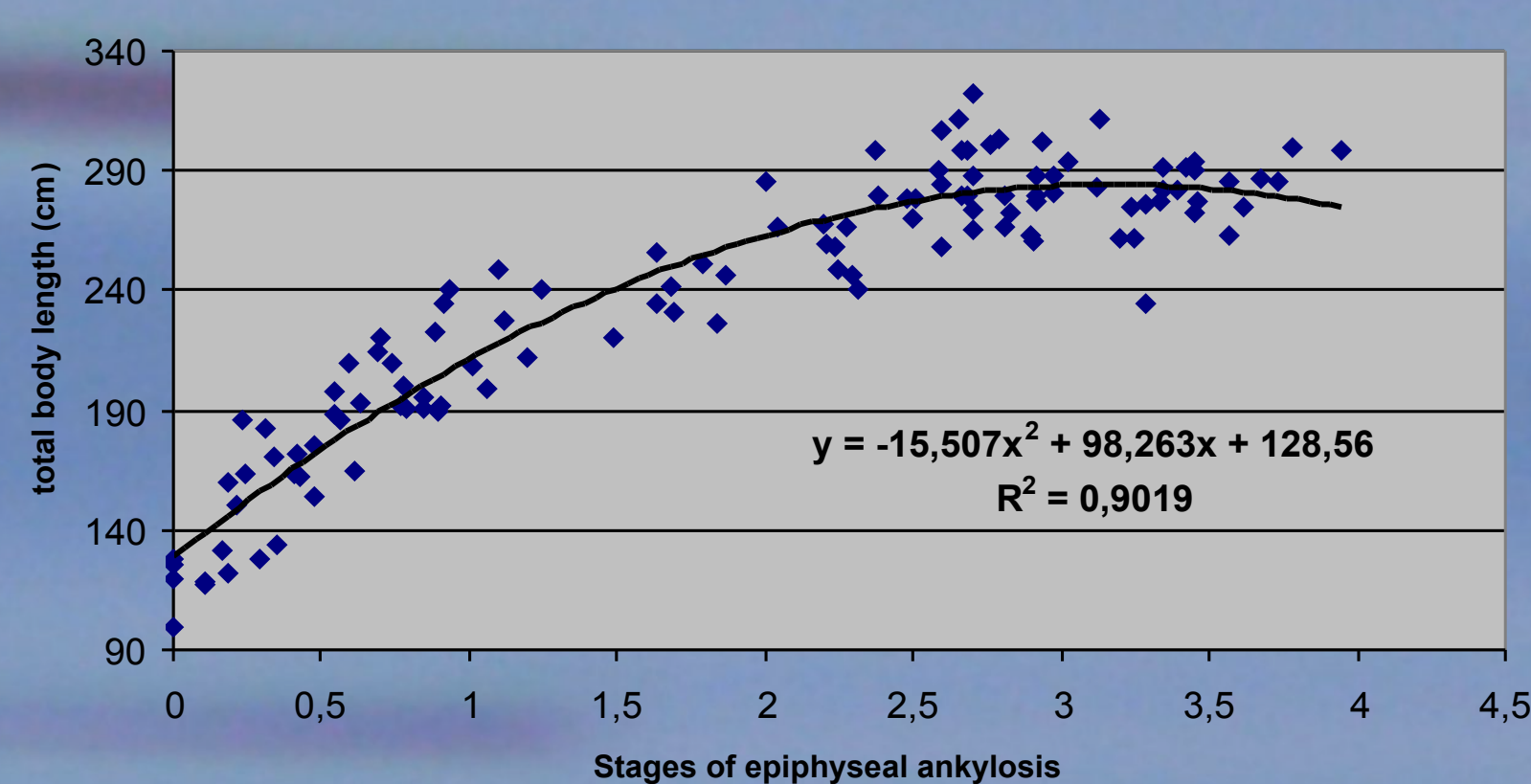


Stages of epiphyseal ankylosis in the flipper. Numbers correspond to the ankylosis stage ranging from 0 to 4

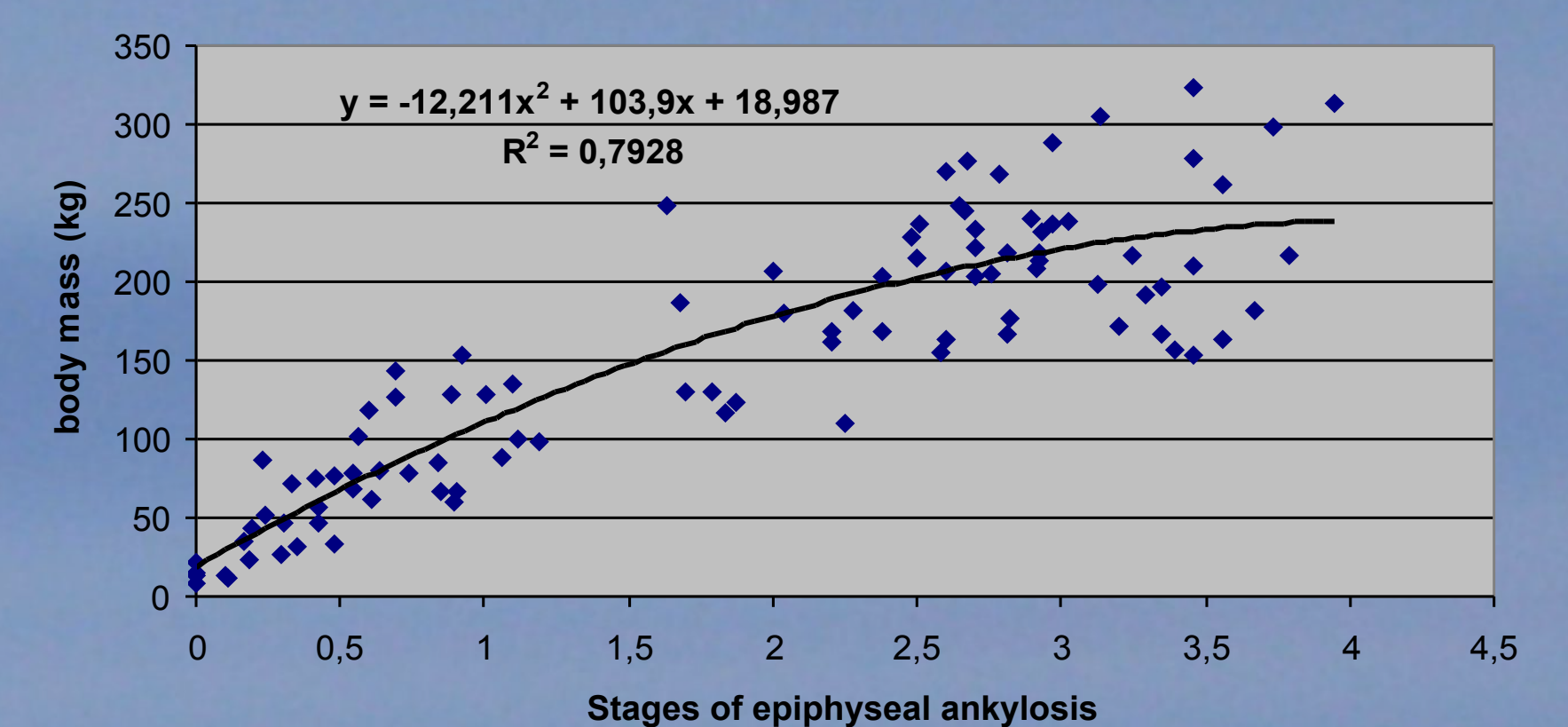
Results and discussion:



Correlation of total body length of the bottlenose dolphin and mean ankylosis stage of each flipper bone (x-mean ankylosis stage, y-total body length in cm)



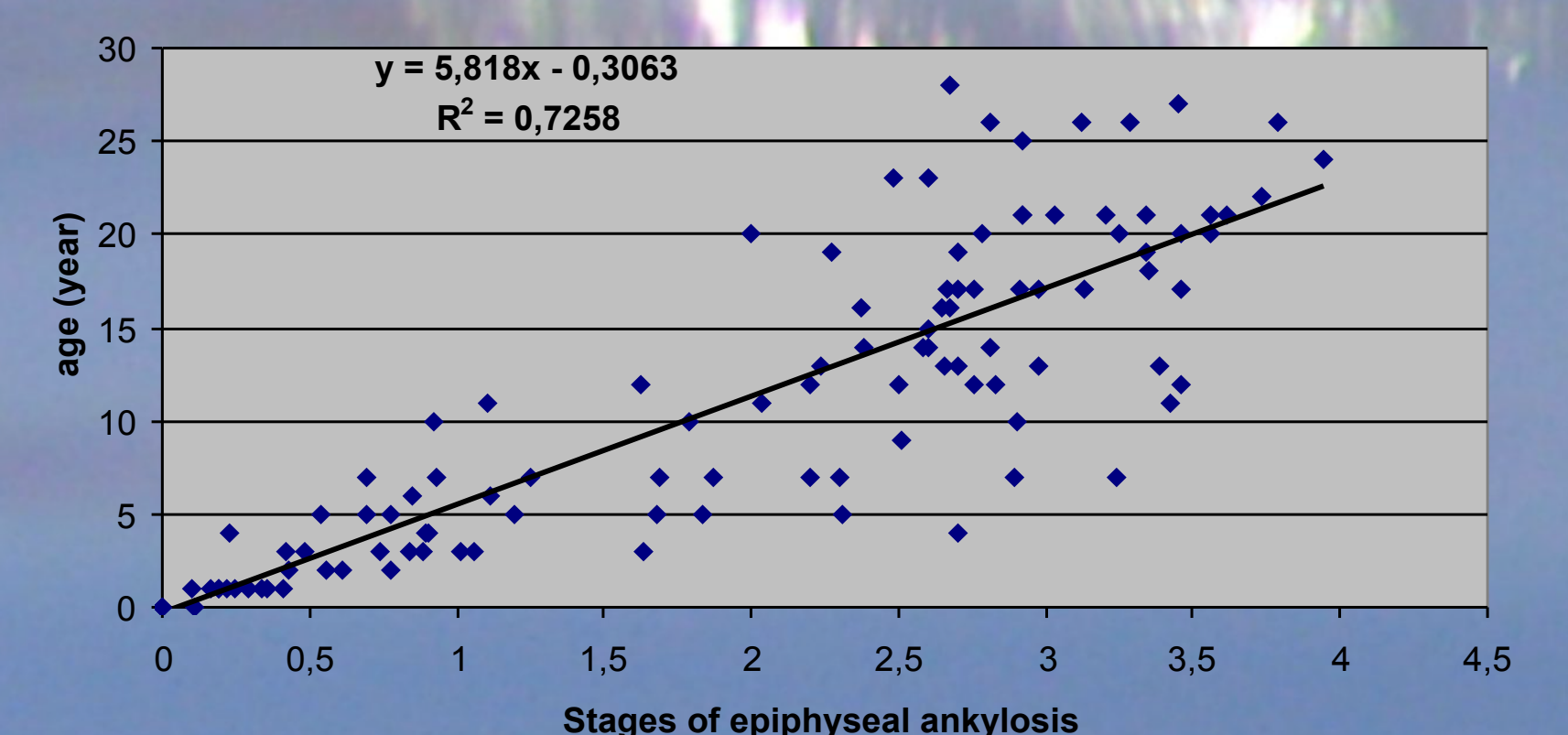
Correlation of total body length of the bottlenose dolphin and mean flipper ankylosis stage of a specimen (x-mean ankylosis stage, y-total body length in cm, R-correlation)



Correlation of body mass of the bottlenose dolphin and mean flipper ankylosis stage of a specimen (x-mean ankylosis stage, y-total body length in cm, R-correlation)

Conclusions:

- ↪ ossification process extends from proximal to distal bones of the flipper
- ↪ ankylosis stage of flipper bones can be used in the estimation of important biological data (age, body length and body mass) of bottlenose dolphins.
- ↪ high variability in the number and fusion of carpal bones was observed, probably with no influence on the function of the flipper.



Correlation of age of the bottlenose dolphin and mean flipper ankylosis stage of a specimen (x-mean ankylosis stage, y-total body length in cm, R-correlation)