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# L'hippocampe sous toutes ces formes: voyage au centre du cerveau

Claire Cury

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INSTITUT DES NEUROSCIENCES CLINIQUES DE RENNES

L'avenir en tête

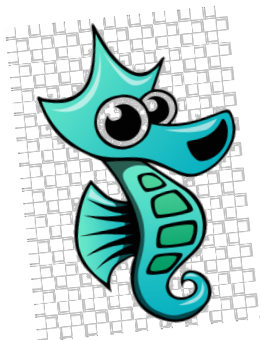


EN EUROPE ET DANS PLUS DE 120 VILLES EN FRANCE

11 ————— 17 MARS



# L'hippocampe sous toutes ces formes: voyage au centre du cerveau



## Claire Cury, PhD

CHU Rennes, amphi CCP  
14 Mars 2019



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Empenn, Inria-IRISA, Rennes





Formation initiale en math-informatique pour le traitement d'image



Doctorat en anatomie numérique pour l'étude de la variabilité anatomique de l'hippocampe (2015)



Post-doctorat, détection précoce de changements de formes dans la démence FT



Post-doctorat, en traitement du signal EEG et IRMf pour le neurofeedback.



**ANATOMIE NUMÉRIQUE:** Créer des outils et méthodes pour modéliser et analyser la variabilité anatomique de structures biologique d'intérêts

- **Volume**
- **Forme**

Doctorat en **ANATOMIE NUMÉRIQUE** pour l'étude de la variabilité anatomique de l'hippocampe (2015)

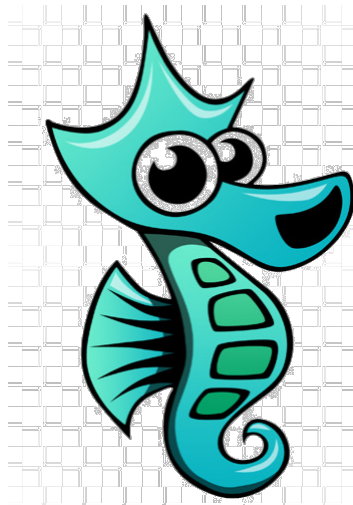


**ANALYSE DE FORME:** Mieux comprendre les différences entre population normale et pathologique, pour proposer des biomarqueurs.

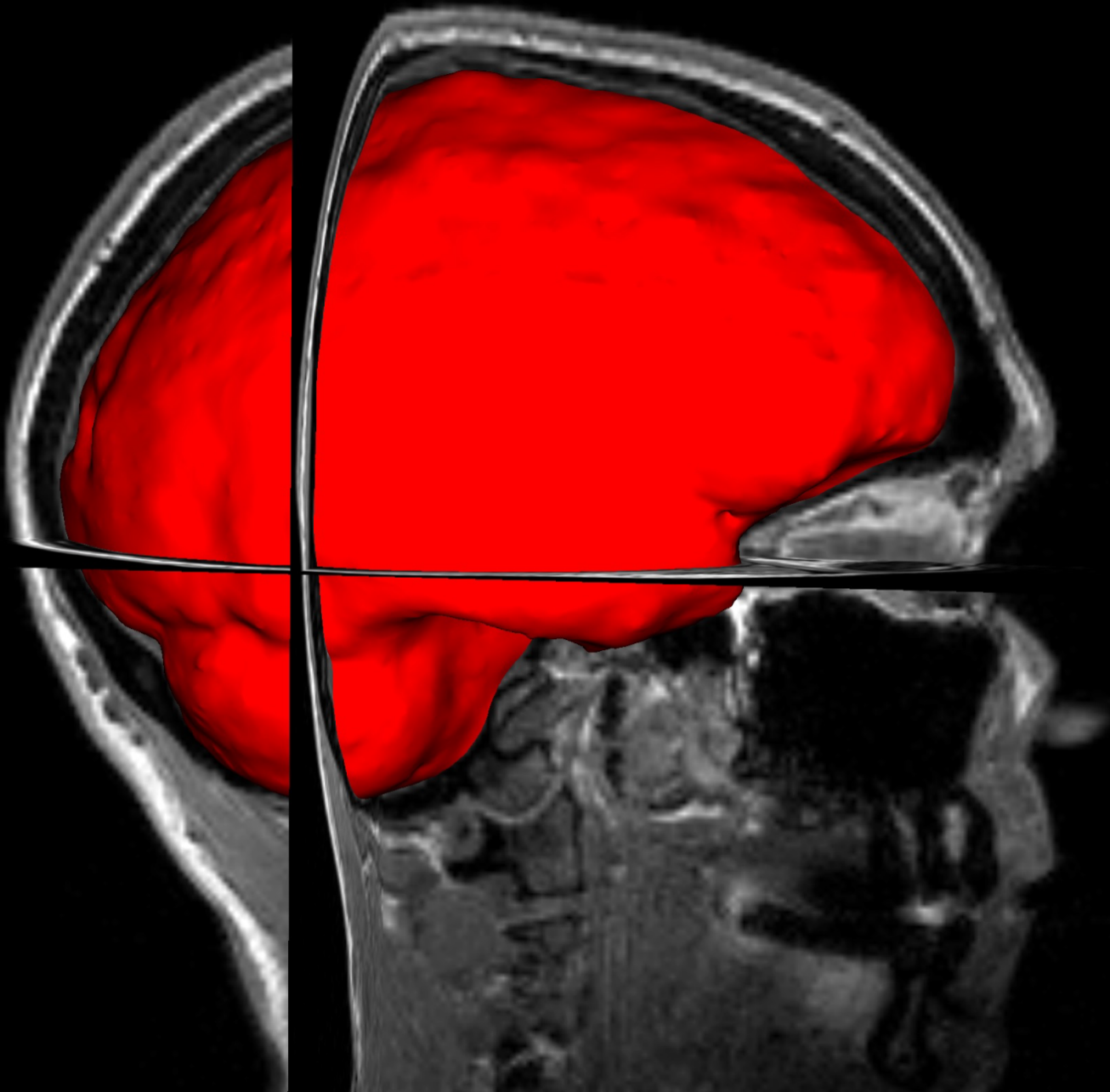


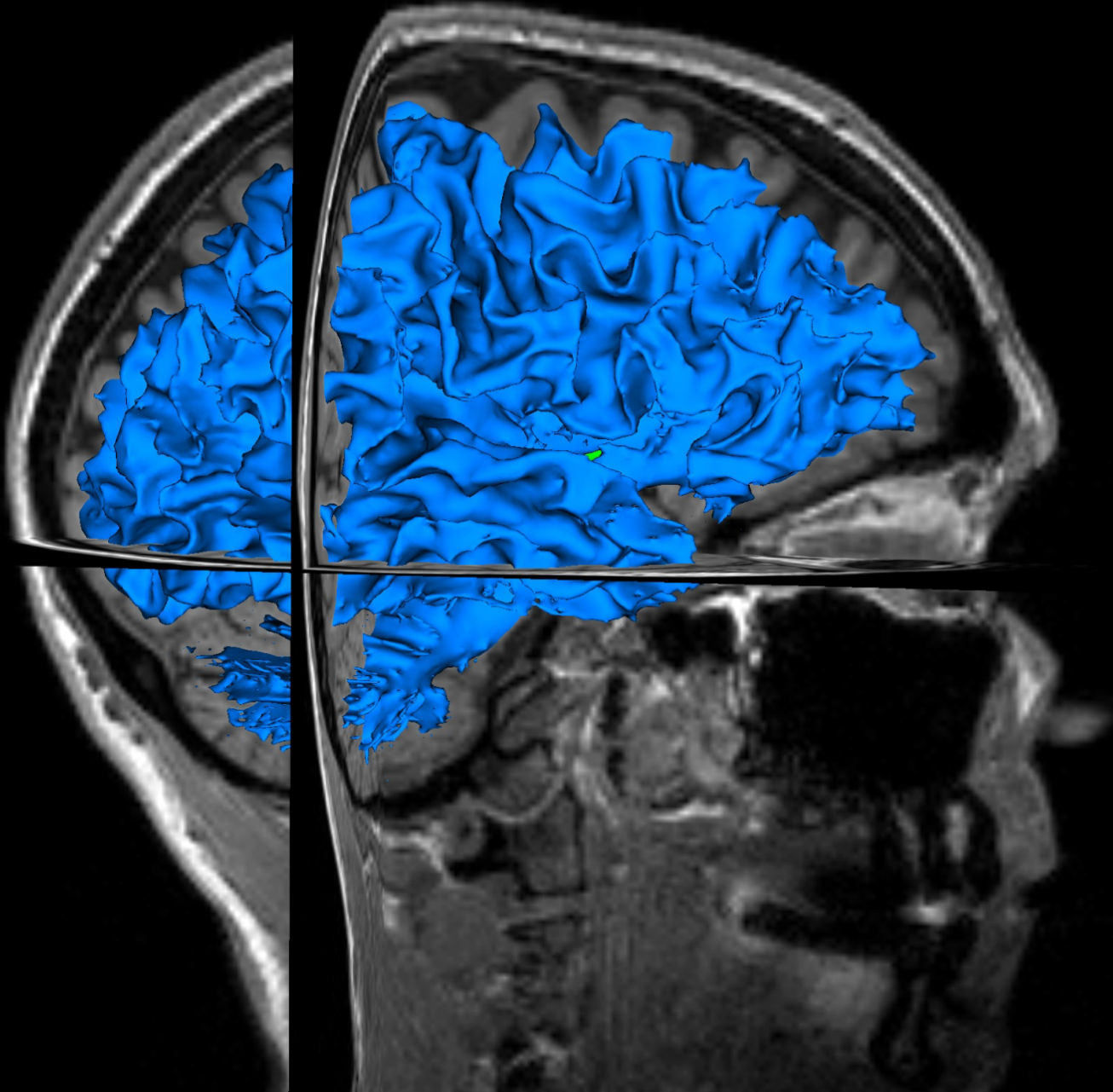
# L'HIPPOCAMPE

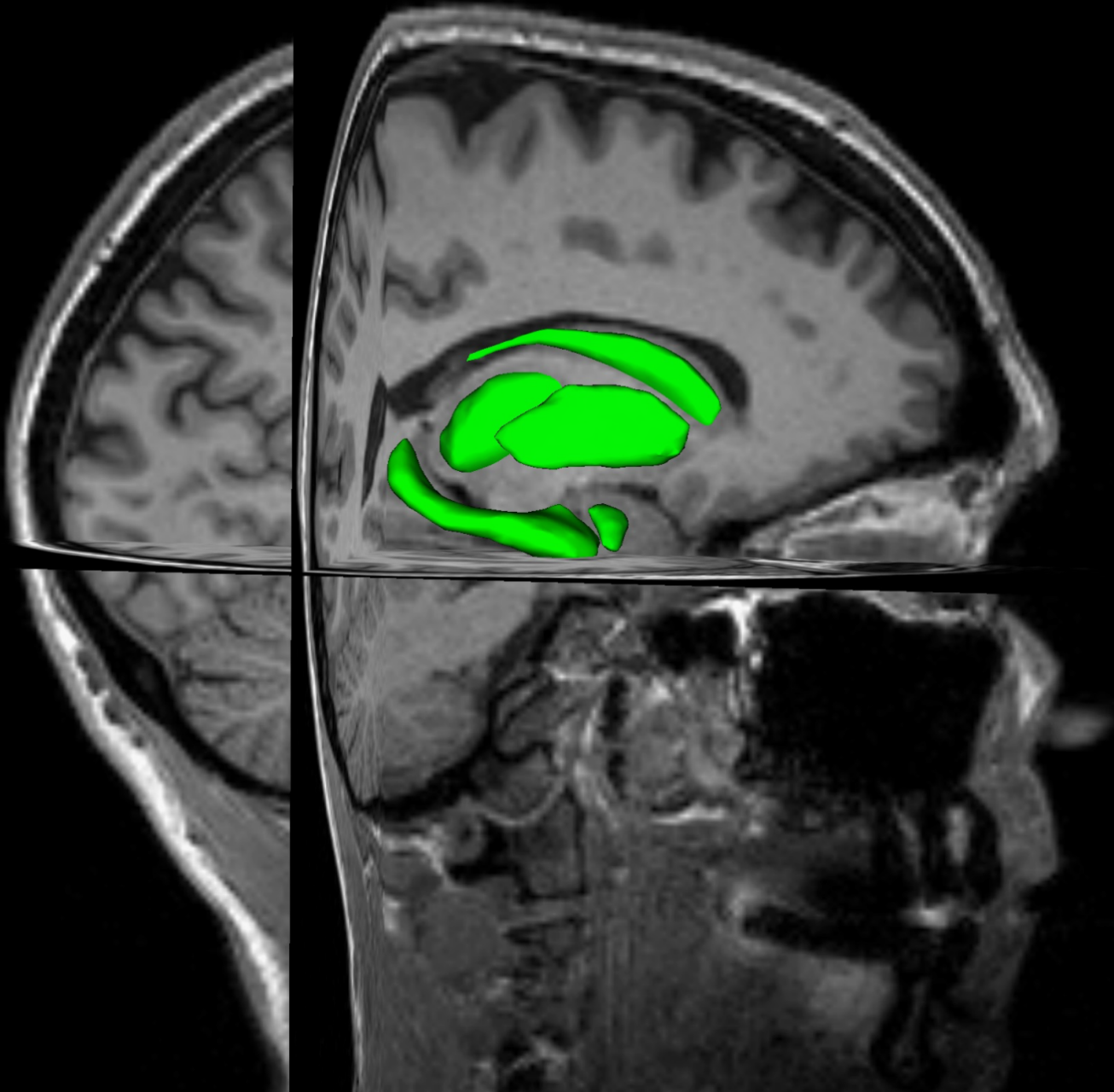
ANATOMIQUE



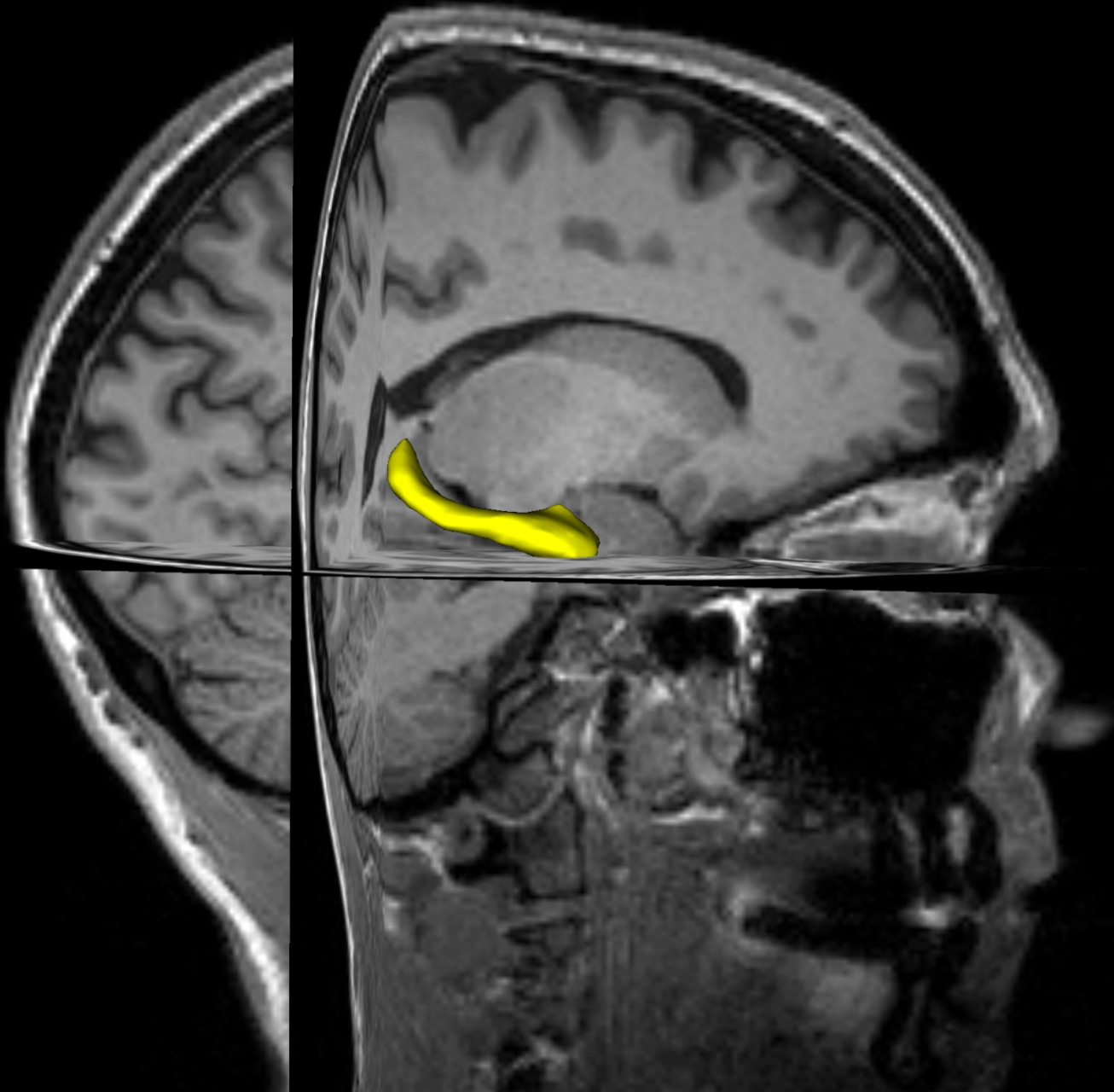
NUMÉRIQUE



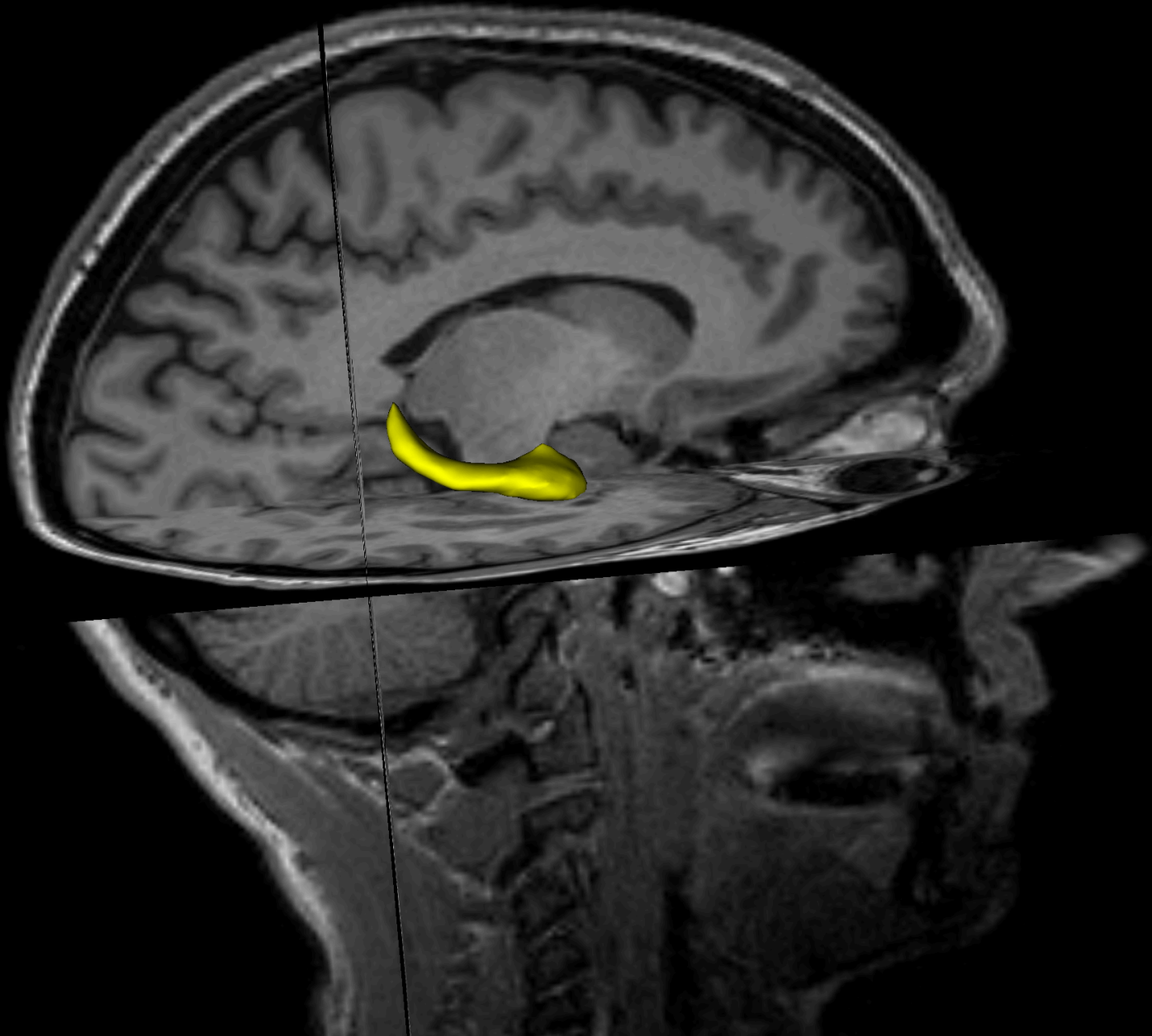












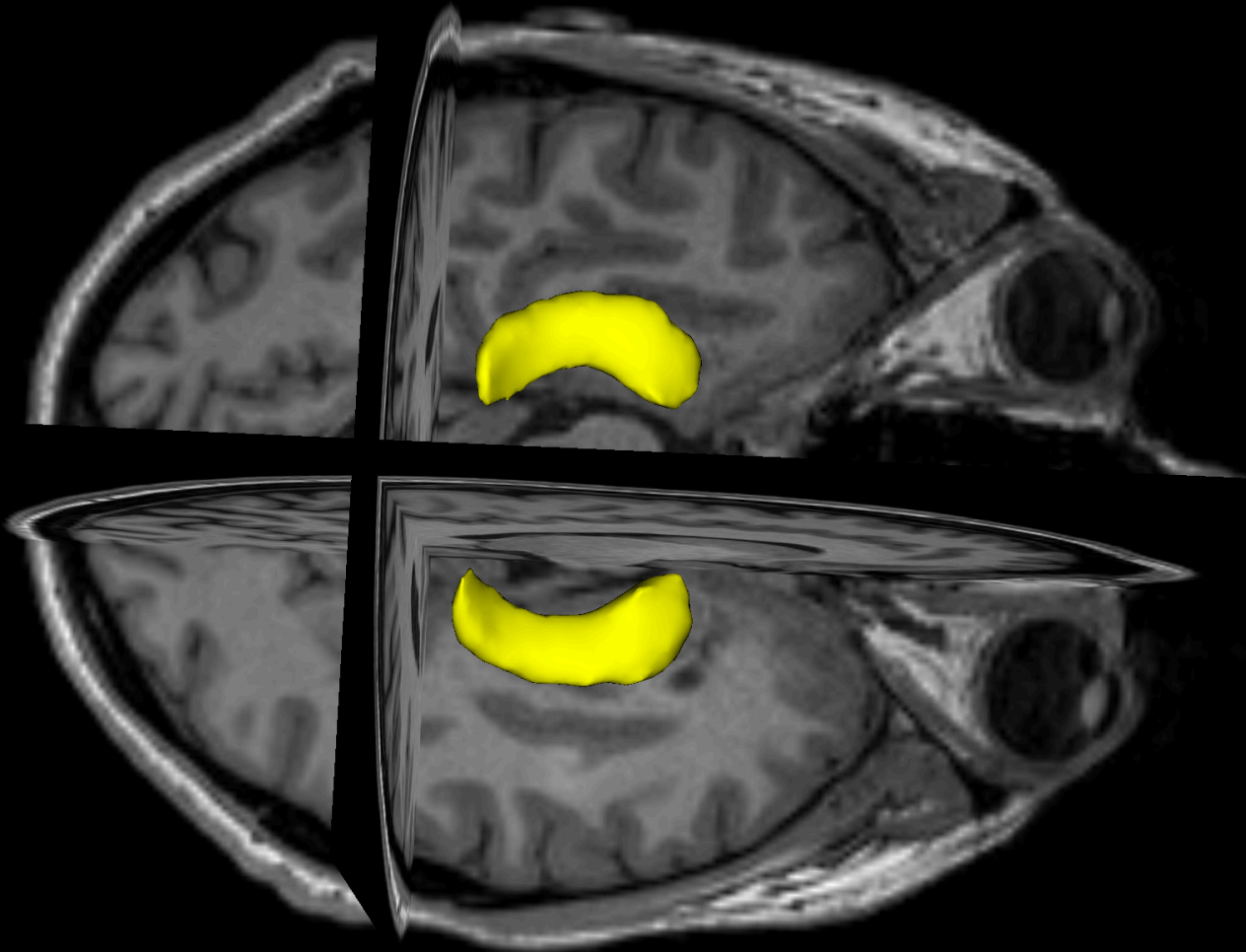
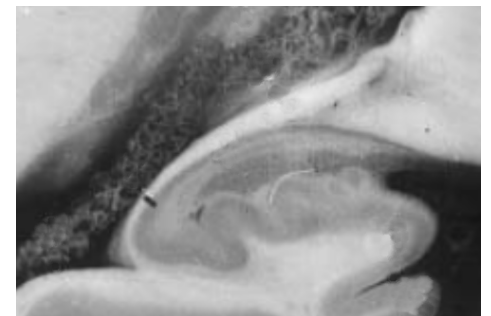
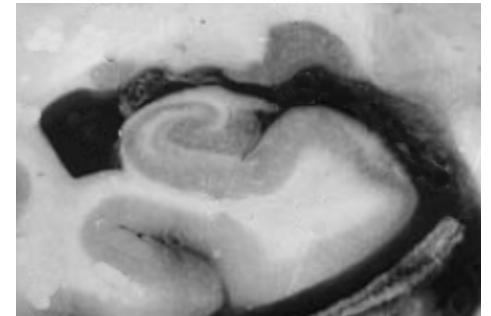
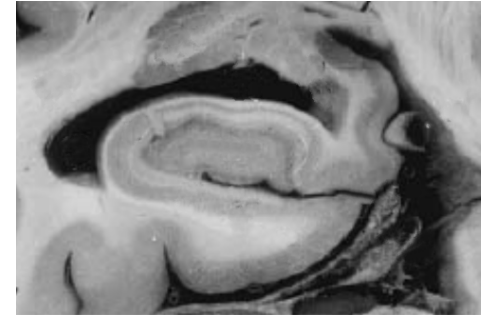
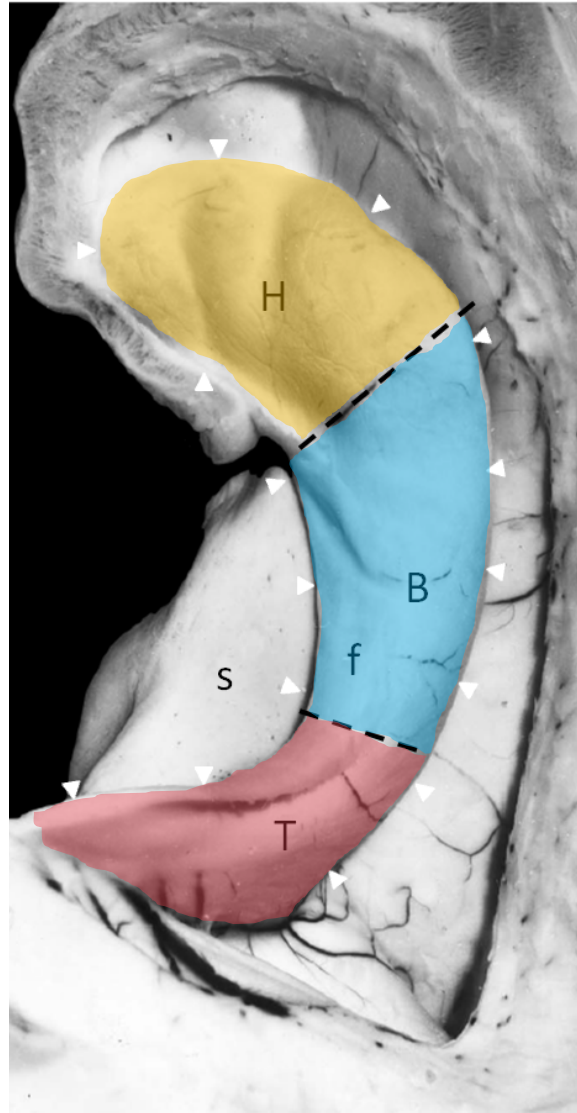
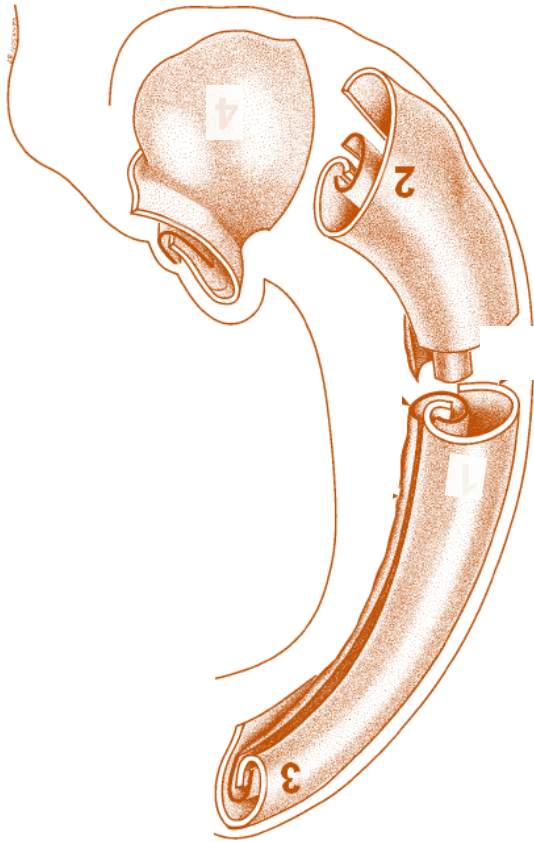
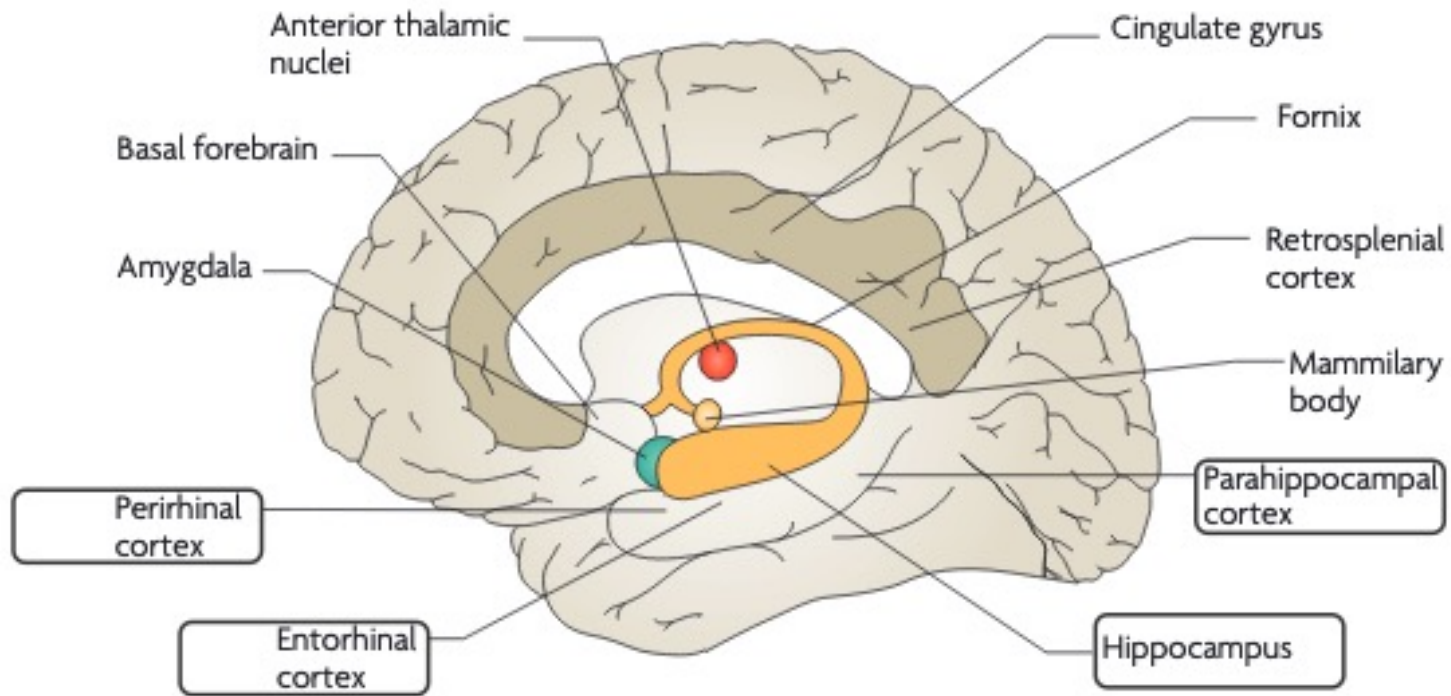




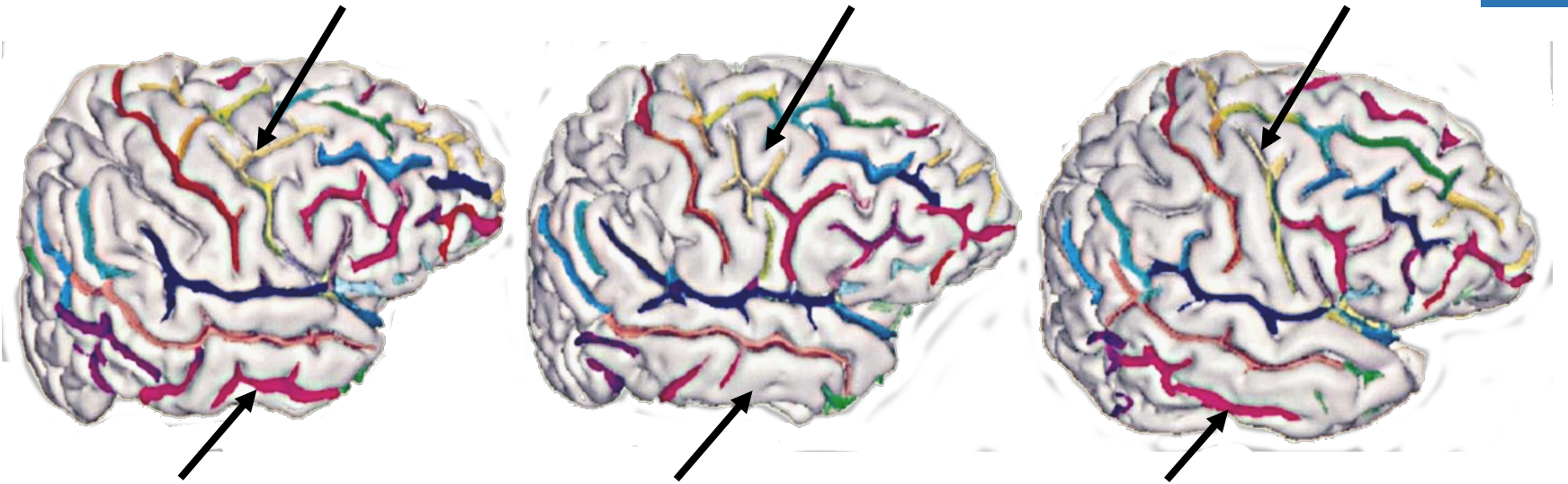
Image: The hippocampus book



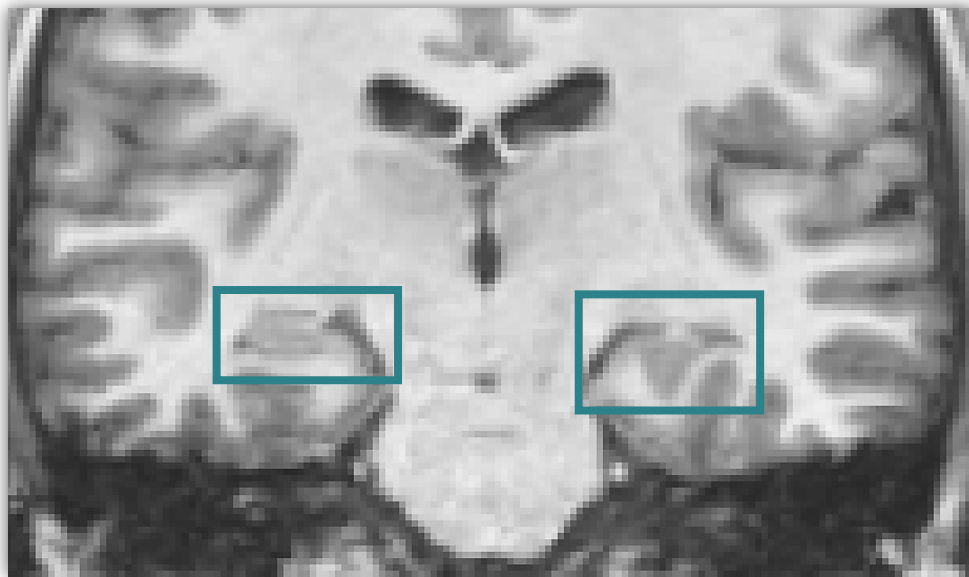






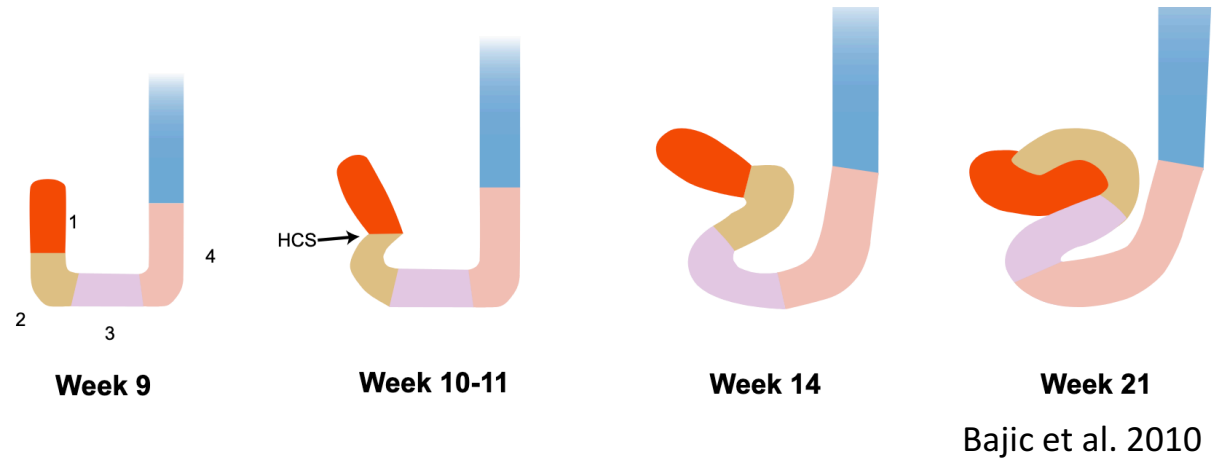


Rivière et al., Medical Image Analysis (2001)



# DÉVELOPPEMENT ET INVERSIONS DE L'HIPPOCAMPE

25 SA. Rados et al. (2006)



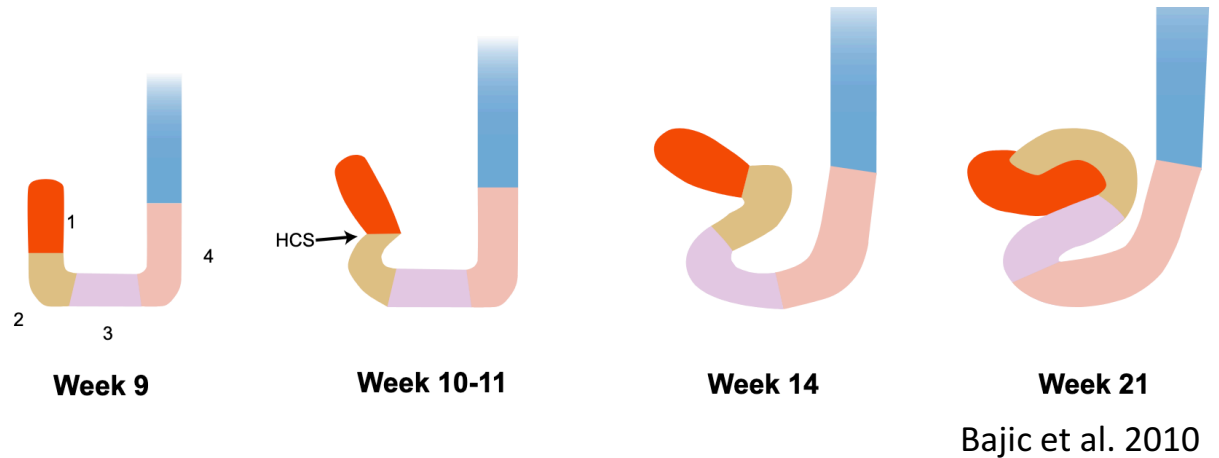
- Enroulement et inversion durant le développement
- Hippocampes verticaux (Righini et al. 2006) et ronds chez (Bajic et al. 2010):
  - 50% des fœtus de 23-24 SA
  - 24% des fœtus de 25-28 SA
  - 14% des fœtus de 29-36 SA

(Image: Bajic et al., 2010)



# DÉVELOPPEMENT ET INVERSIONS DE L'HIPPOCAMPE

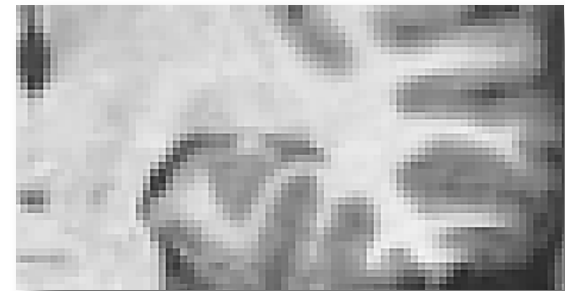
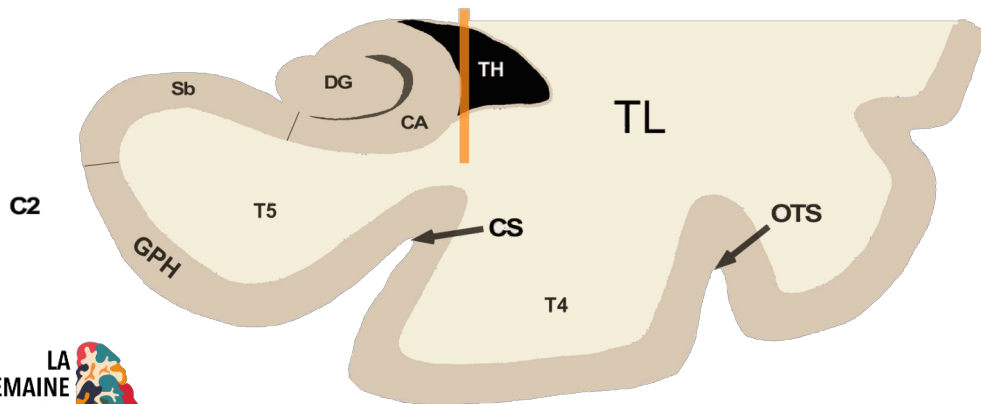
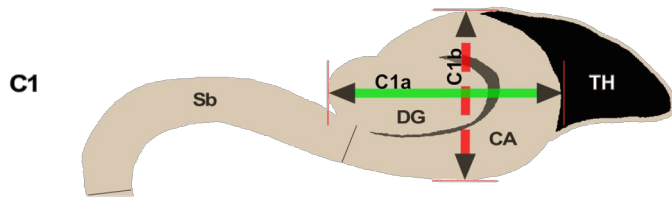
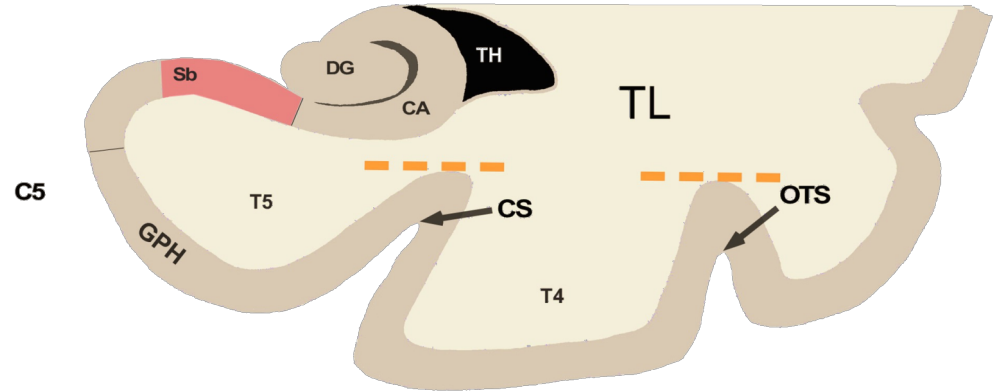
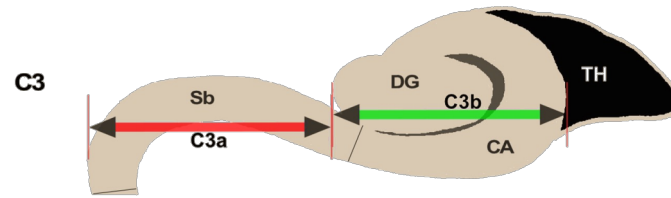
Image: Rados et al., 2006



- Enroulement et inversion durant le développement
- Hippocampes verticaux (Righini et al. 2006) et ronds chez (Bajic et al. 2010):
  - 50% des fœtus de 23-24 SA
  - 24% des fœtus de 25-28 SA
  - 14% des fœtus de 29-36 SA

(Image: Bajic et al., 2010)

# CARACTÉRISATION DES INVERSIONS INCOMPLÈTES DE L'HIPPOCAMPE

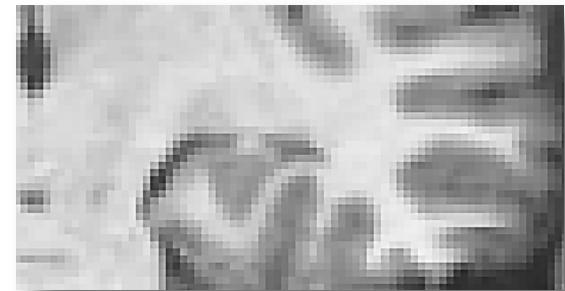


Cury et al. *Frontiers in Neuroanatomy*, 2015

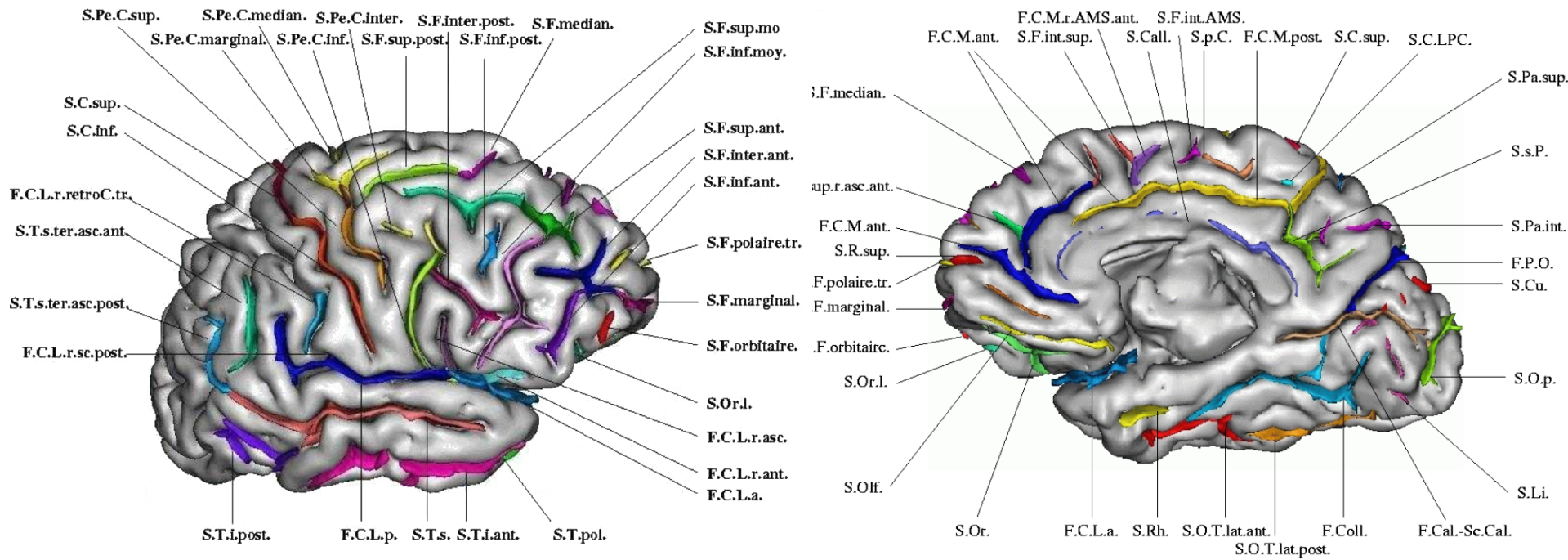


- Base de données **imagen**
  - 8 centres européens
  - Plus de 2000 adolescents sains (14 ans)

CO	No IHI	Partial IHI	IHI
Left	70.9%	11.9%	<b>17.1%</b>
Right	84.6%	9.0%	<b>6.5%</b>

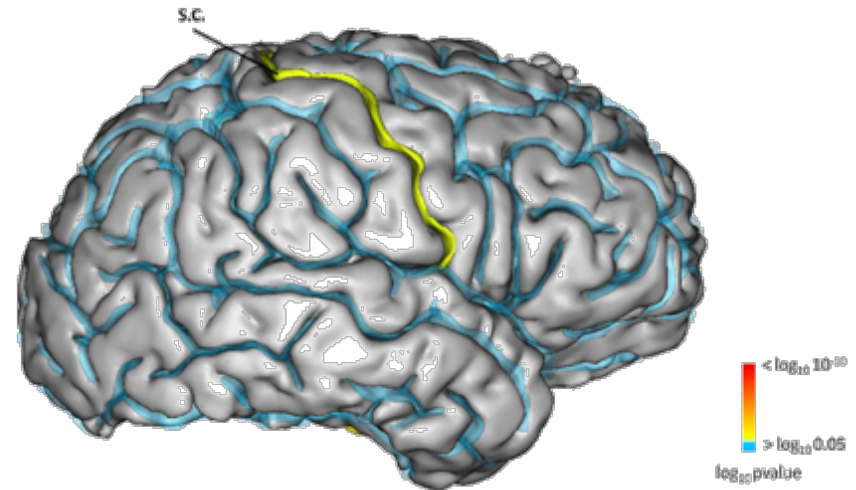
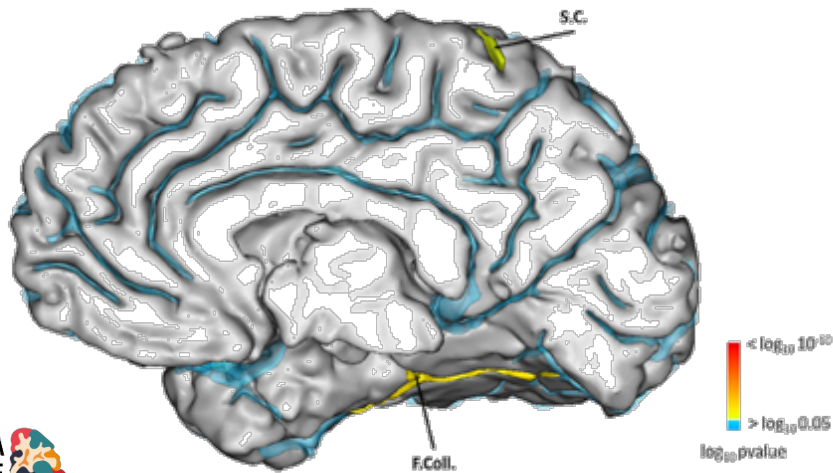
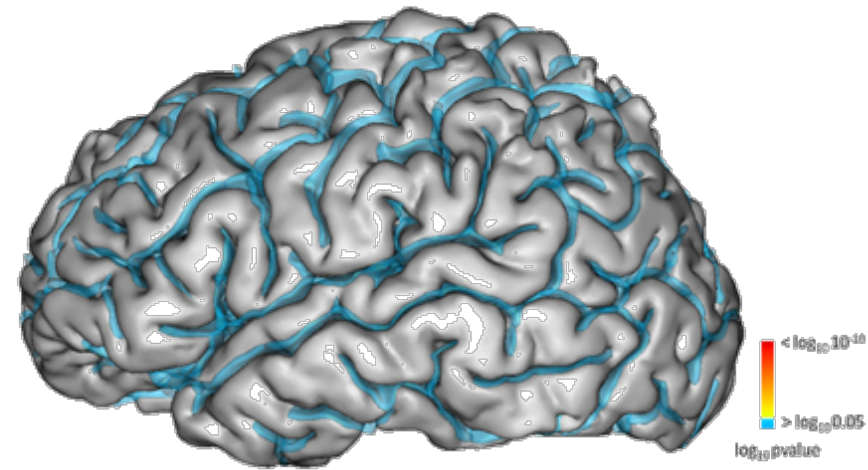
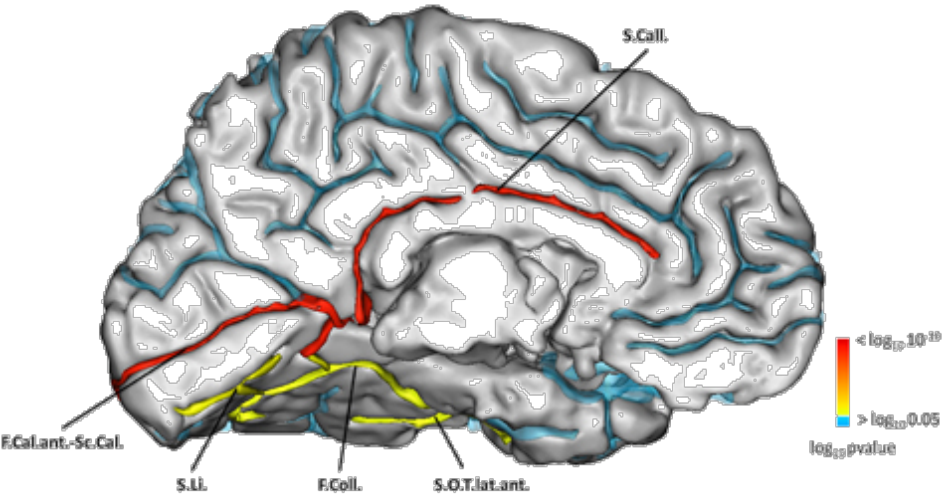


- Base de données
  - 8 centres européens
  - Plus de 2000 adolescents sains

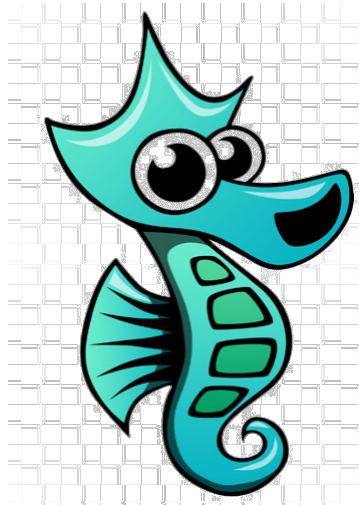




- Base de données
  - 8 centres européens
  - Plus de 2000 adolescents sains



*ETUDIER LA VARIABILITÉ ANATOMIQUE  
DE L'HIPPOCAMPE À PARTIR DE  
GRANDES BASES DE DONNÉES.*



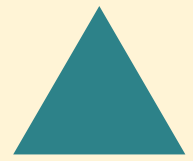
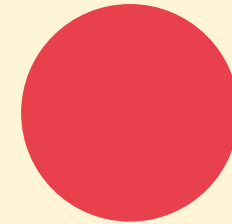
ANALYSE  
NUMÉRIQUE

# COMMENT ANALYSER UNE FORME ?

VOLUME

DIFFÉRENCE

FORME

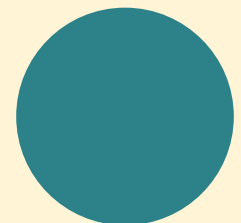
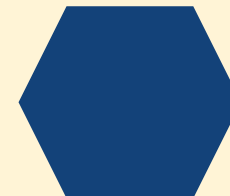


VOLUME

MOYENNE

FORME

= 3



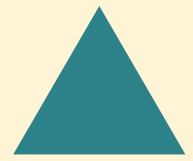
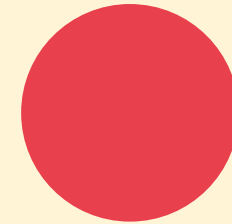


# COMMENT ANALYSER UNE FORME ?

VOLUME

DIFFÉRENCE

FORME

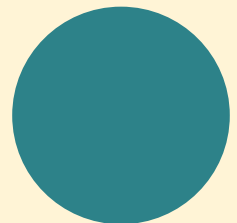


VOLUME

MOYENNE

FORME

= 3



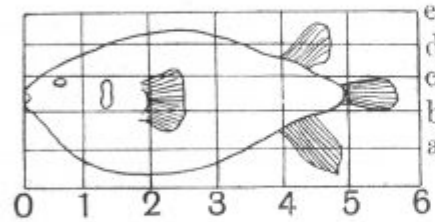
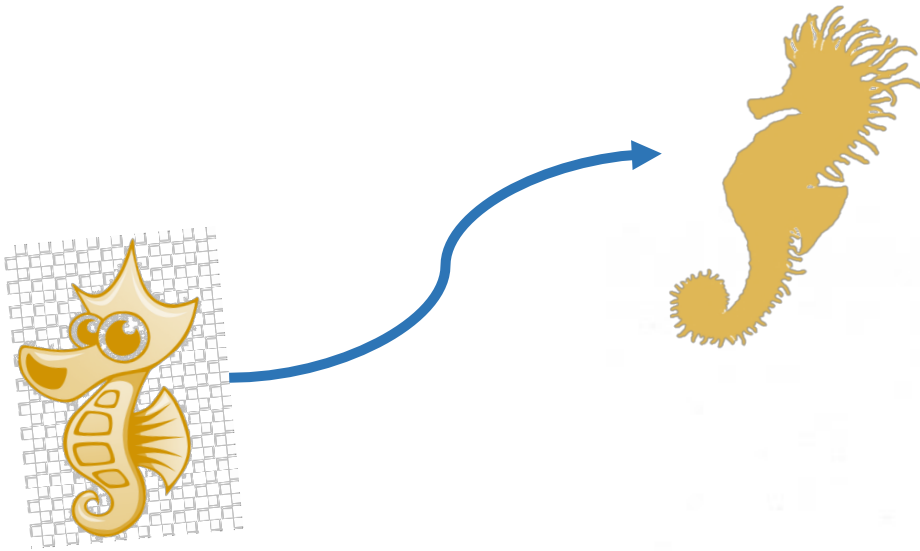


Fig. 381. *Diodon*.

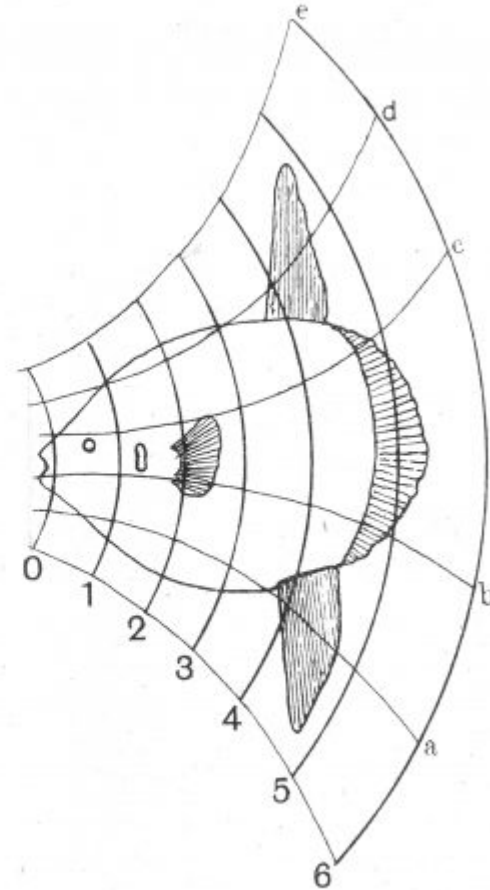


Fig. 382. *Orthogoriscus*.

D'arcy Thompson, 1917: On growth and Forms. Trouvé et al. 1998

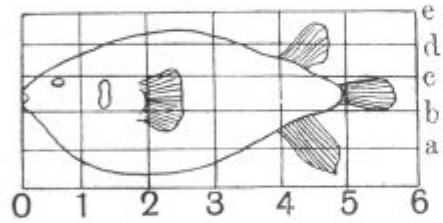
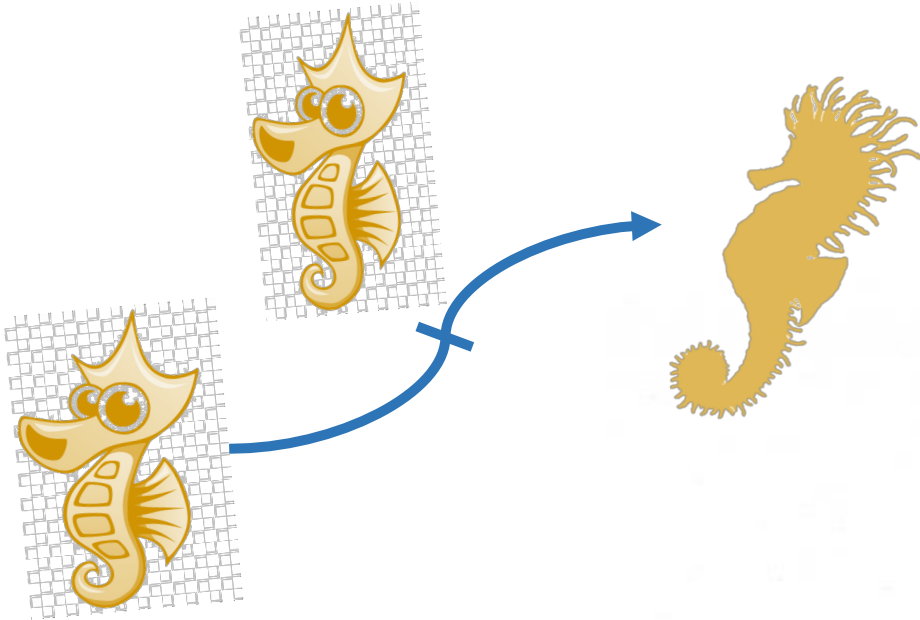


Fig. 381. *Diodon*.

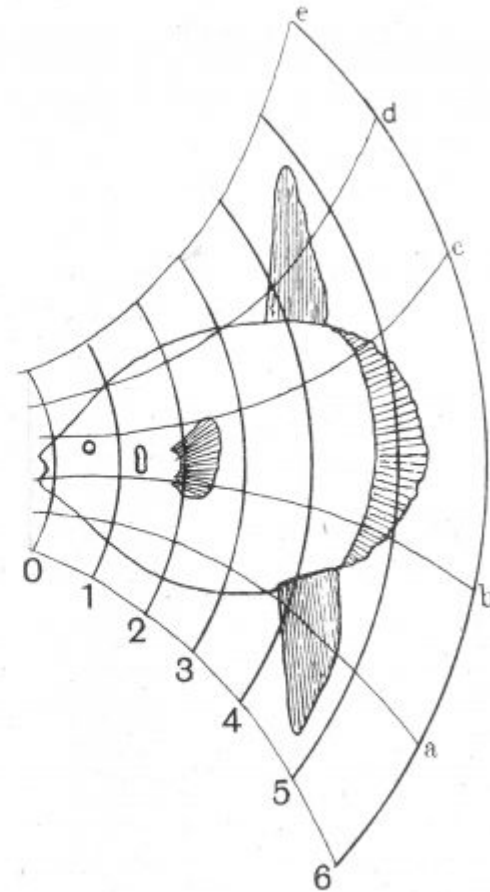


Fig. 382. *Orthogoriscus*.

D'arcy Thompson, 1917: On growth and Forms. Trouvé et al. 1998

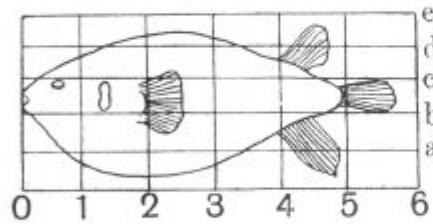
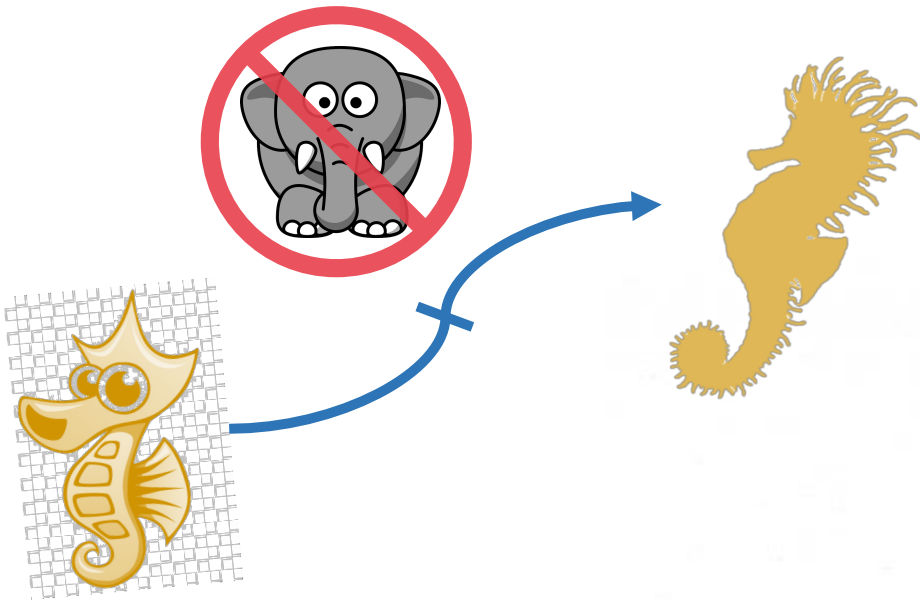


Fig. 381. *Diodon*.

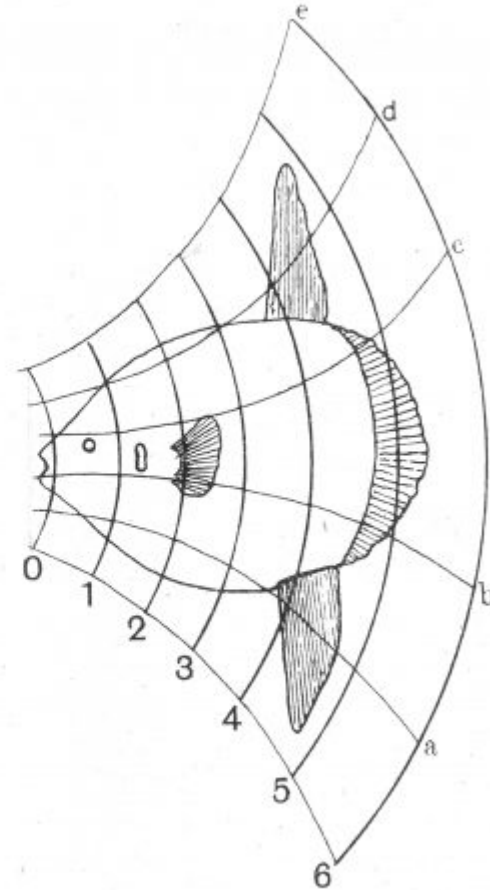
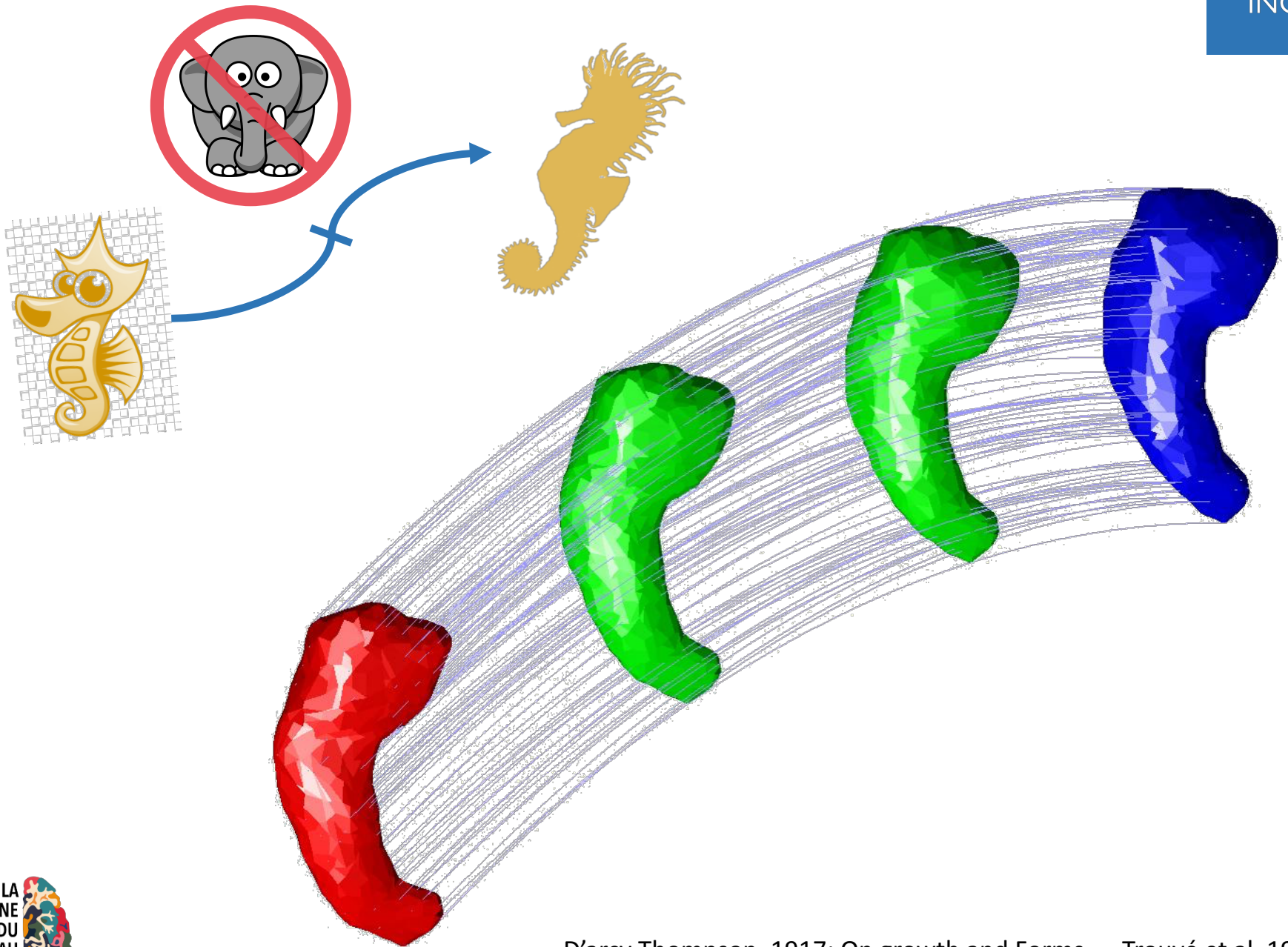


Fig. 382. *Orthogoriscus*.

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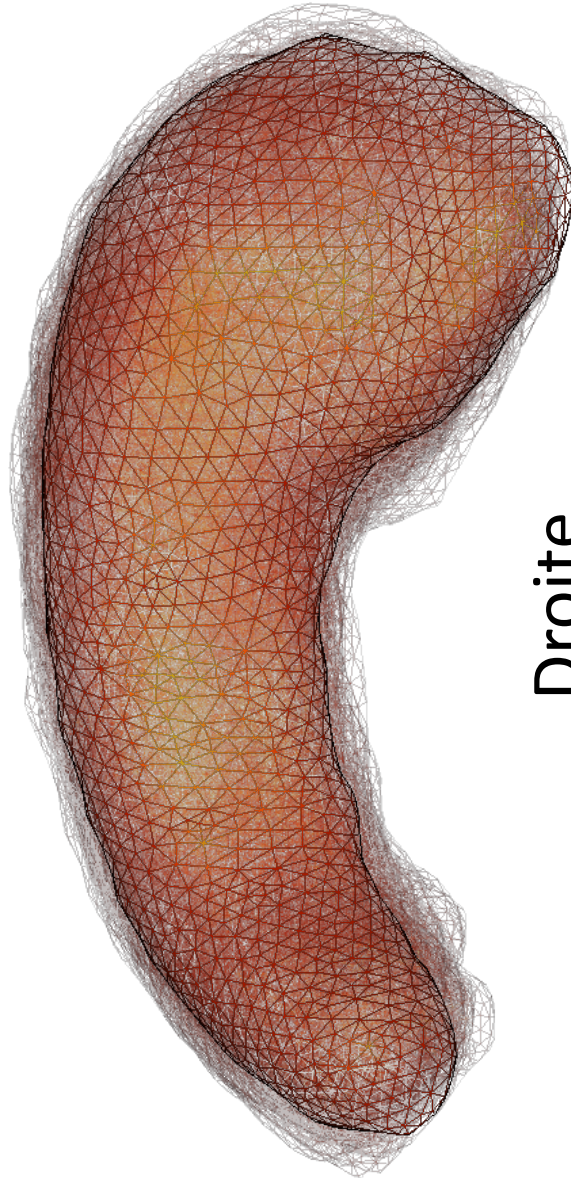


D'arcy Thompson, 1917: On growth and Forms. Trouvé et al. 1998

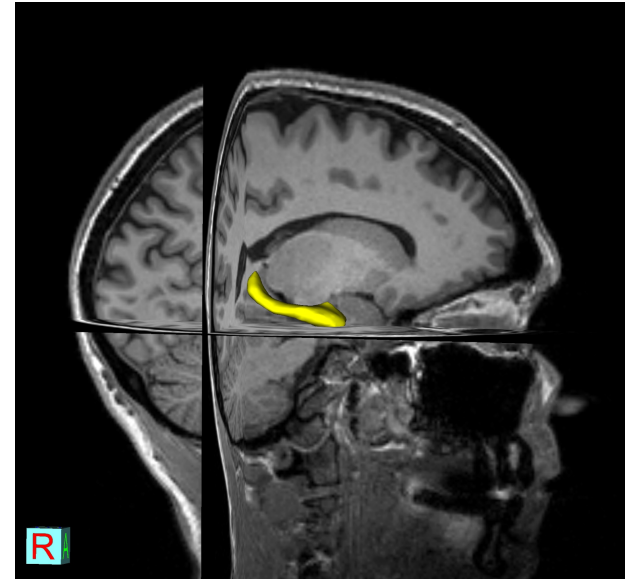


Avant

Gauche

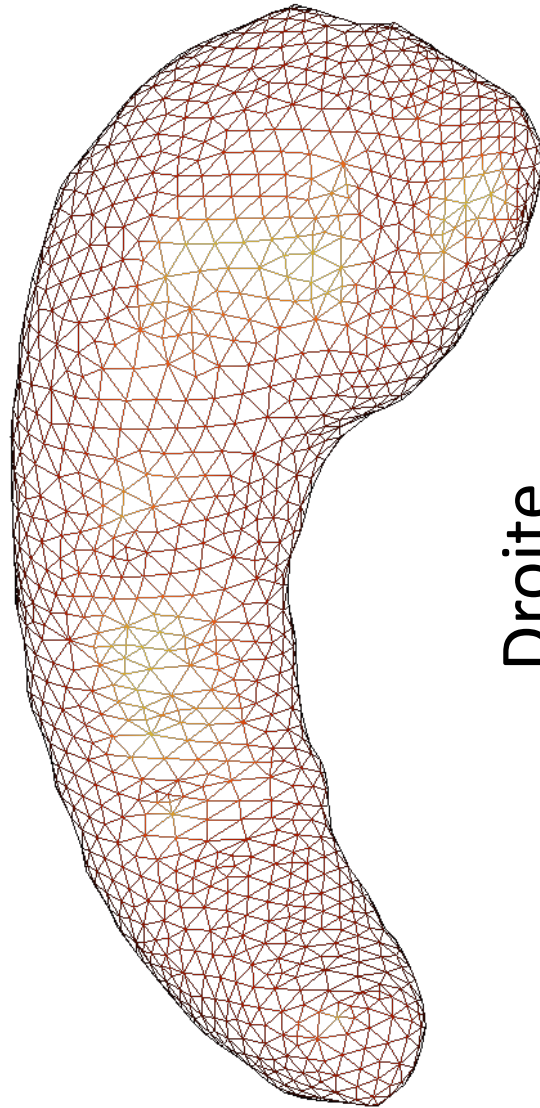


Droite

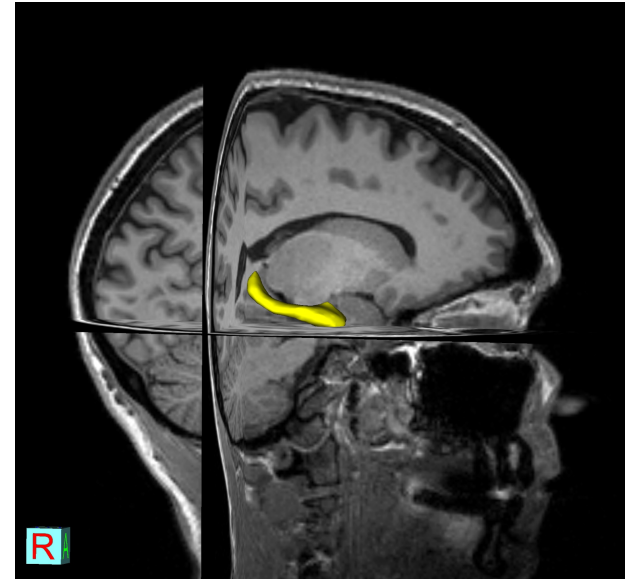


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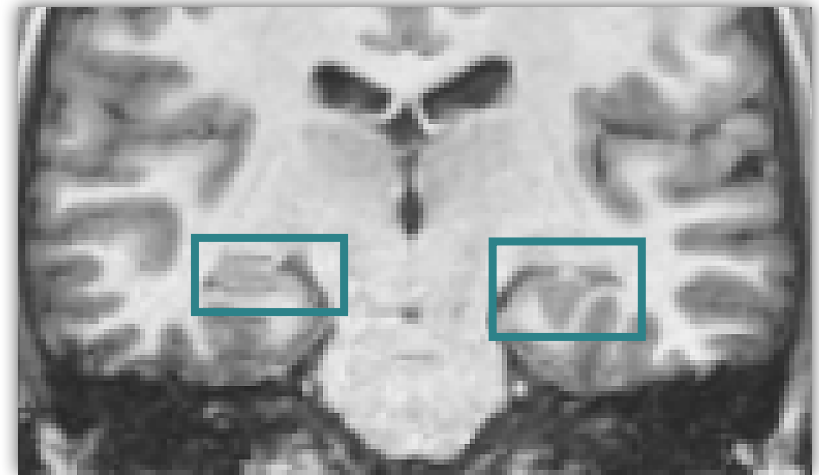
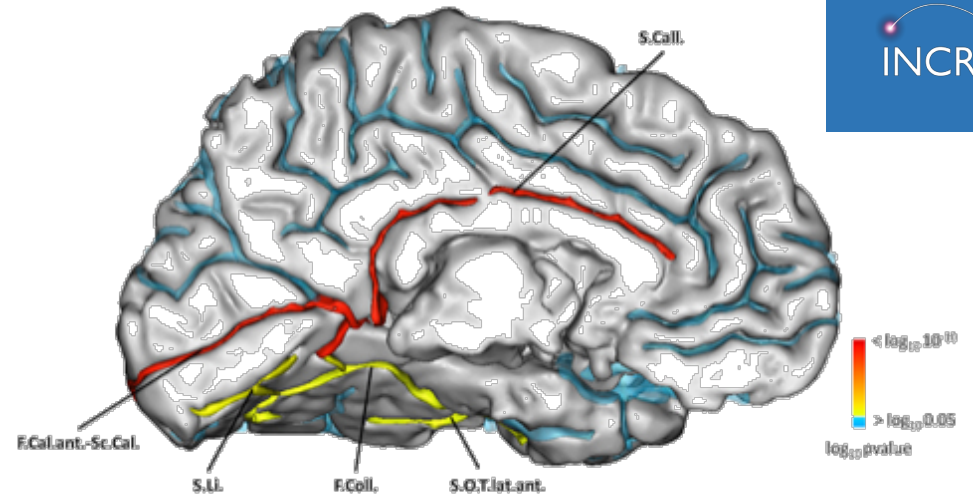
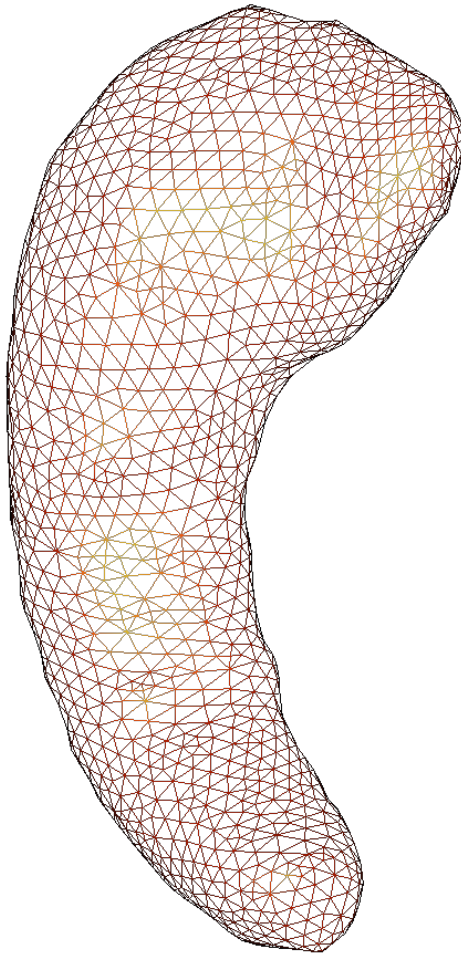
Gauche



Droite



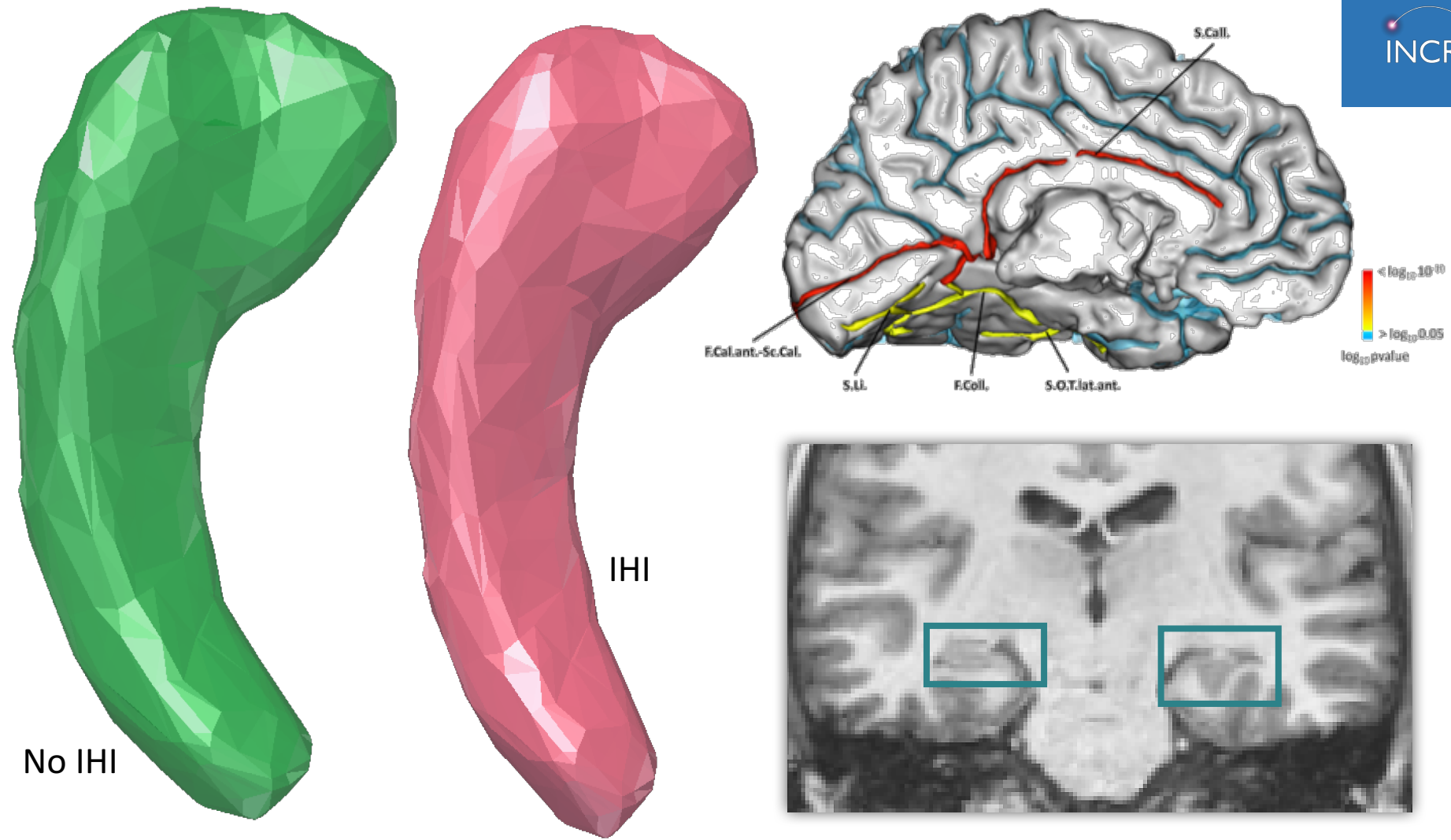




Mise en évidence d'un lien entre des paramètres géométriques avec des paramètres anatomiques.

Géométrie prédit 70% des paramètres IHI

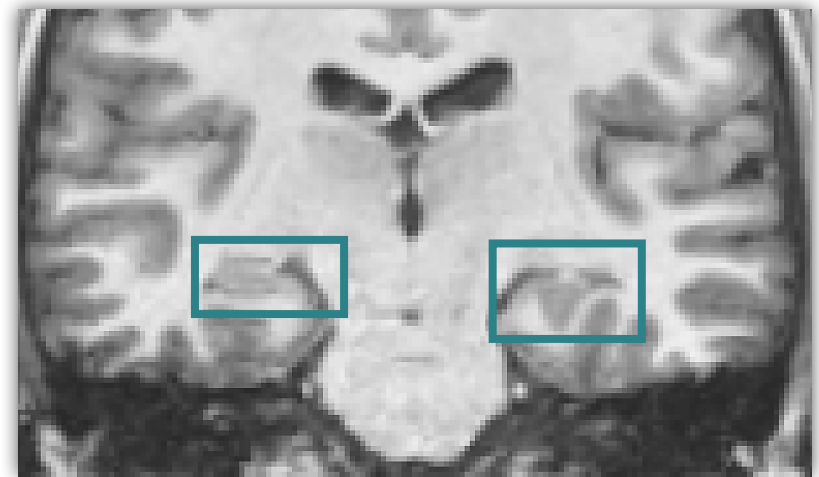
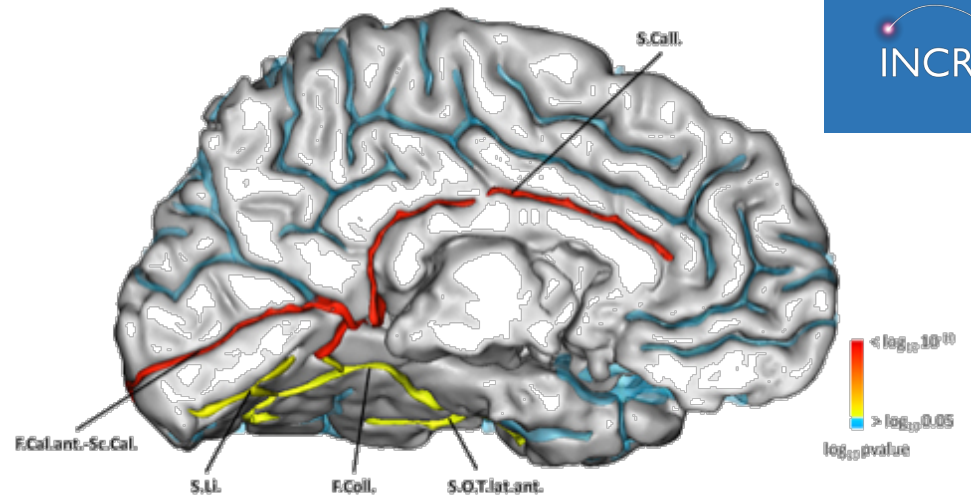
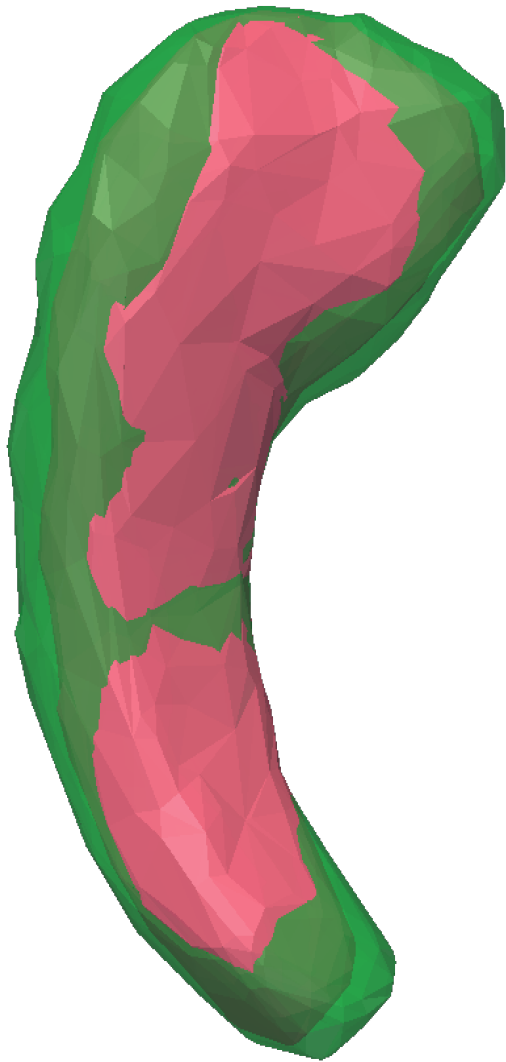
Cury et al. 2018



Mise en évidence d'un lien entre des paramètres géométriques avec des paramètres anatomiques.

Géométrie seule prédit 70% des paramètres IHI

Cury et al. 2018



Mise en évidence d'un lien entre des paramètres géométriques avec des paramètres anatomiques.

Géométrie seule prédit 70% des paramètres IHI

Cury et al. 2018



**MERCI DE VOTRE ATTENTION !**

