# My Corporis Fabrica: Making Anatomy Easy

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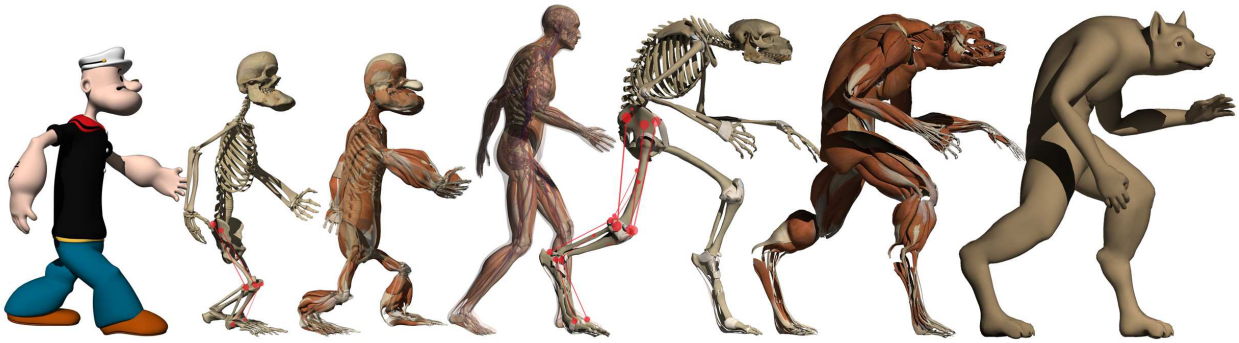

**Figure 1:** *Based on the skin of a character (left), MyCorporisFabrica helps modeling and simulating the corresponding anatomical model.*

Characters with precise internal anatomy are important in film and visual effects, as well as in medical applications. However, setting up detailed anatomical models has been a difficult task, especially for simulation. We demonstrate MyCorporisFabrica [MyCF ], the first assistant tool for modeling and simulating anatomical structures such as bones, muscles, viscera and fat tissues. Using a novel ontology-centered knowledge base, it helps selecting anatomical entities based on their type or their contribution to physiological functions. The resulting 3D model can be automatically transfered to an arbitrary humanoid character in a similar pose, only defined by its skin. This allows to quickly generate anatomical models for a large range of target characters, while maintaining anatomical consistency. Finally, the knowledge base also contains mechanical data used to set up a choice of mechanical models of the selected entities, which we export to a simulator. This dramatically eases biomechanical modeling and makes it possible for non-expert users to enter that field. We demonstrate this technology and detail a practical example.

## 1 Navigation

MyCF contains anatomical entities represented by 3D meshes that are organized according to an ontology of the anatomy [Palombi et al. 2009] derived from the *de facto* standard FMA (Foundation Model of Anatomy ontology). MyCF ontology complements FMA by including also physiological functions, and by allowing to coherently integrate the anatomical knowledge with 3D geometrical data and biomechanical parameters. Anatomical entities are for example the femur and the liver, while physiological functions are the knee flexion and the digestion. The relationships between entities and functions, such as that the femur participates to the knee flexion, are made explicit by means of relations. These relations are exploited to retrieve the anatomical entities that participate to the physiological functions taking place in the simulation. The ontology is expressed using the Semantic Web data language RDF. This framework allows the user to naturally perform powerful SPARQL queries, and is easily extensible. Navigating the ontology permits to explore both graphically and semantically the human anatomy, and provides a valuable complement to the traditional teaching of anatomy.

## 2 Modeling

Modeling anatomy using MyCF consists in selecting anatomical entities, and instanciating them on a character. Standard selections such as head, right arm or torso, including the associated Muscles, Bones and Organs, are provided. The user can also create his own selections. A unique feature of MyCF is to help composing selections based on anatomical functions, for instance the knee flexion, as shown in the video [MyCF ]. The user selects entities in the results of the requests, and the viewer displays the corresponding 3D models. Graphical selection by picking is also proposed. The selection can be geometrically warped to a given character based on its skin, using Anatomy Transfer [Dicko et al. 2013]. Personalized geometrical models can also be used if available.

## 3 Simulation

We have complemented the ontology with mechanical data, including attach points and material parameters. These are exported along with a choice of geometrical models, and translated to SOFA simulation files for interactive simulation [SOFA ].

## References

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