

# Intelligent Web-based Whole Body Visualization for Anatomy Education

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**Introduction.** Few subjects are as foundational to the practice of medicine as gross anatomy, yet few subjects are as resource-intensive to teach. The expense of cadavers, the high cost of maintaining lab spaces, and the increasing scarcity of the highly qualified expertise to teach the subject is driving the creation of software-based virtual methods of delivering instructional content to a willing population of technology-savvy students.

There exists a collection of software-based solutions for anatomy instruction which have each contributed unique features facilitating the adoption of rich, digital learning environments. Biolucida [1], a 3D Virtual Realty based anatomy scene generator, takes another step toward promoting anatomy instruction *in silico* by allowing authors to create custom scenes and interactive lessons, including audio narration. Biolucida also includes the ability to use intelligent queries to build scenes, with the assistance of the Foundational Model of Anatomy [2]. The FMA knowledgebase enables scene construction via queries such as “construct a scene from structures that are continuous with the aorta” rather than using a traditional line-item approach. While the functionality of Biolucida has allowed for the creation of novel interactive content, the system has suffered from an acute lack of 3D models. In this report, we describe a process of applying intelligent scene generation to a newly acquired complete set of 3D models representing the whole human body.



Figure A

**Methods.** We obtained a 3D surface-model set of the whole human male body from Zygote [3], consisting of five original files, each with a large number of anatomical objects separated by internal names. Using 3D Studio Max, we visually examined these models, and created a spreadsheet with correspondences between these internal names and names from the FMA. We then parsed the 4 original files to create a set of 693 models, each with filenames matching entities from the FMA. These models were loaded into the Biolucida 3D model database. The Biolucida application was then used to create the scenes shown in figures A and B.

**Results and Future Directions.** Figures A and B show the end result of scenes built within the Biolucida system using its knowledge-based framework and 3D model database populated with the aforementioned Zygote primitives. In the near future, we plan to use these scenes as the framework for graphical/spatial data access and for the visualization of biomedical datasets, such as gene expression information.

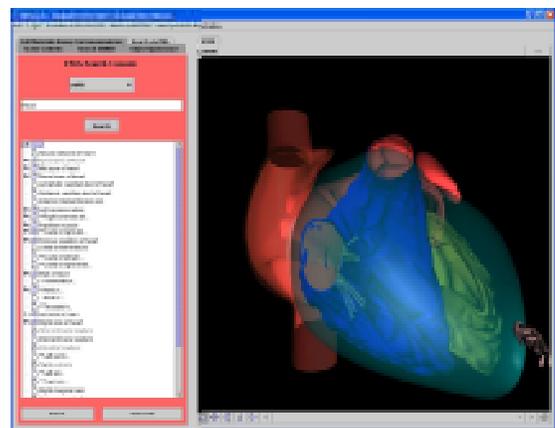


Figure B

## References

1. Warren, Wayne and Brinkley, James F (2005) Knowledge-Based, Interactive, Custom Anatomical Scene Creation for Medical Education: The Biolucida System. Proc. AMIA Symp. 789-793.
2. Rosse, Cornelius and Shapiro, Linda G and Brinkley, James F (1998) The Digital Anatomist Foundational Model: Principles for Defining and Structuring Its Concept Domain. Proc AMIA Symp. 820-824.
3. Models from zygote can be found at <http://www.zygote.com/>