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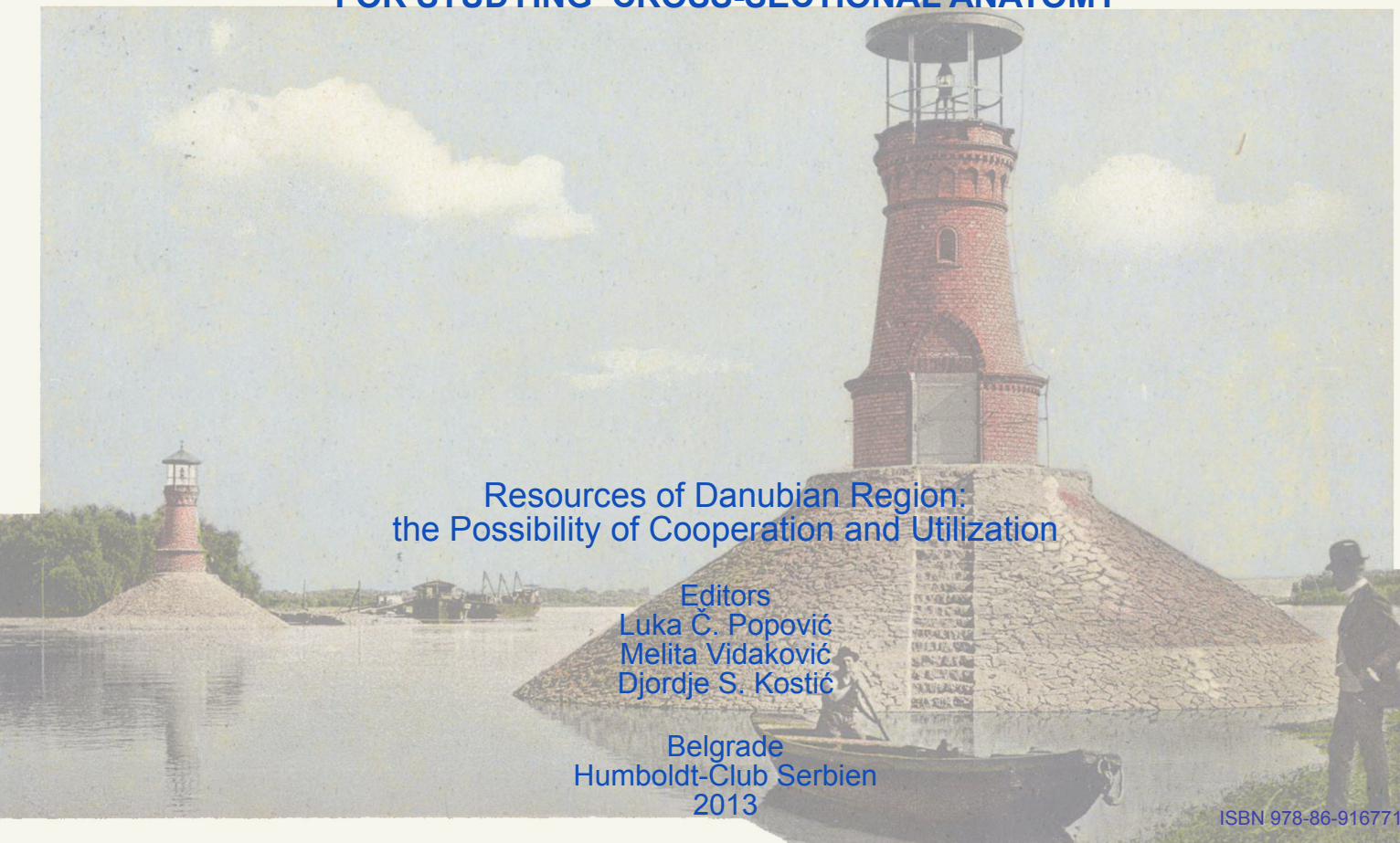
BODY EXPLORER 3.0: AN INTERACTIVE MULTILINGUAL WEB SYSTEM FOR STUDYING CROSS-SECTIONAL ANATOMY



Resources of Danubian Region:
the Possibility of Cooperation and Utilization

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Abstract. In order to facilitate successful interpretation of the anatomical structures, the web version of our interactive program on the cross-sectional anatomy, termed Body Explorer was launched. It enables multiple users to easily and comprehensively navigate in real-time through the virtual human body and to achieve interpretive excellence in 13 languages. Our multilingual approach will facilitate a successful communication not only within the anatomical community but also in many other medical disciplines worldwide. The program will improve the health professional education by providing new services for teachers and students, and opportunities for physicians in their pursuit of advanced training in cross-sectional studies.
Keywords: Cross-sectional anatomy; Computed tomography; Human anatomical terminology; Image slicing; Magnetic resonance imaging; Medical imaging; Sectional photographs; Sonography; Virtual human body

Introduction

Sectional techniques such as computed tomography, magnetic resonance imaging and sonography are widely used in the medical field. The first attempt to create a complete, anatomically detailed, representation of the normal male and female human bodies was the Human Visible Project (1989-1995) which was run by the U.S. National Library of Medicine under the direction of Michael J. Ackerman. The project offered a detailed data set of cross-sectional photographs of the human body (Ackerman et al., 1995). In June 1998 the Visible Human Web Server was developed and started offering slicing services (Hersch et al., 2000). The slice server provides a virtual anatomic construction kit on the web using the Visible Human dataset that allows discovering the human body slice by slice in real-time.

In order to facilitate successful interpretation of the anatomical structures, in 1997 we created our first interactive program on the cross-sectional anatomy of the Visible Human Male, termed Body Explorer (Fig. 1). It contained 285 high-resolution sectional photographs of a human body and approximately 10 000 anatomical labels in Latin and English. The terminology was in accordance with the Terminologia Anatomica, the internationally accepted standard for human anatomical terminology since 1998 (Allen, 2009). Several European countries use Latin for medical communication. More or less precise translations of the Terminologia Anatomica exist in Spanish, Japanese and Arabic but not in other languages. Body Explorer 1.0 was a useful tool for learning, teaching purposes and review by students, teachers and

physicians, and provided a basis for imaging techniques. This PC version went out of stock in a few months.

In 2001 the completely revised CD-ROM based second edition of the program was launched (Fig. 2). This version was already multilingual and included five additional European languages – German, French, Italian, Spanish and Portuguese. Body Explorer 2.0 was also a multi-user version (designated for 20 users) that provided unique access to around 2000 labeled sectional images with more than 13000 anatomical labels from the "Visible Human Project". It contained important additional information, like images of the female pelvis. The system was versatile, Mac/Windows-compatible and the disk worked well on a personal computer (Kirk, 2001).

Body Explorer Web System

The plans of a web edition of our program began in 2010 and were completed in 2013. The web interface is operational at *http://www.body-explorer.net*. The novel web viewer Body Explorer 3.0 features more than 2000 high resolution tomographic images of the human body at different levels and enables users to easily and comprehensively navigate through it, to have in display relevant sections and to achieve interpretive excellence in 13 different languages, including Latin, English, German, French, Italian, Spanish, Portuguese, Bulgarian, Russian, Turkish, Arabic, Japanese and Chinese. In addition, further language versions such as Czech, Hungarian and Romanian were also recently included, and a Serbo-Croatian one is under way. Such a multilingual approach is one of the main advantages of our program that allows successful communication in many medical disciplines worldwide. Furthermore, the software enables the users to display a fully labeled data set of human cross-sectional anatomy on the Java-based platform (Fig. 3), zoom-in and zoom-out options, a possibility to superimpose other planes of sections, a visual selection of any desired section level at sagittal or coronal planes (Fig. 4, 5) or by key-word search, and many other extra functions offered by the Java applets. The data sets originate from two bodies (a male and a female) that were donated for scientific research or medical use and were later included into the Visible Human project to obtain digitized images of the sliced cadavers (Ackerman et al., 1995).

Conclusions

The web version of Body Explorer is a useful educational and research tool for human cross-sectional anatomy (Lazarov et al., 2011). It is designed to improve the health professional education by providing valuable services for teachers and students in discovering the fascinating world of the human body and limitless opportunities for physicians in their pursuit of advanced training in cross-sectional studies. To get into the system, the users should obtain a user name and password by sending an Email to the project manager Manfred Gratzl at *gratzl@lrz.uni-muenchen.de*. We very much appreciate any feedback that we receive from our users and will be particularly grateful for suggestions to improve the quality of the program.

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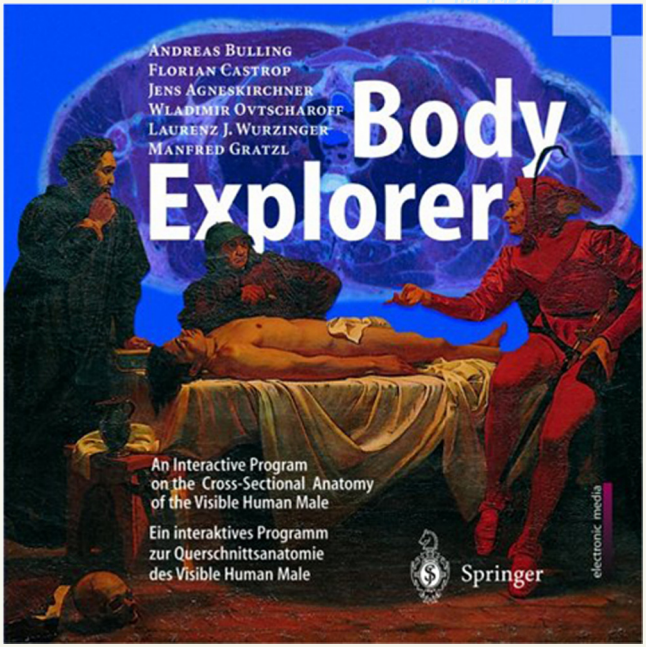

Fig. 1. The Body Explorer book cover image.

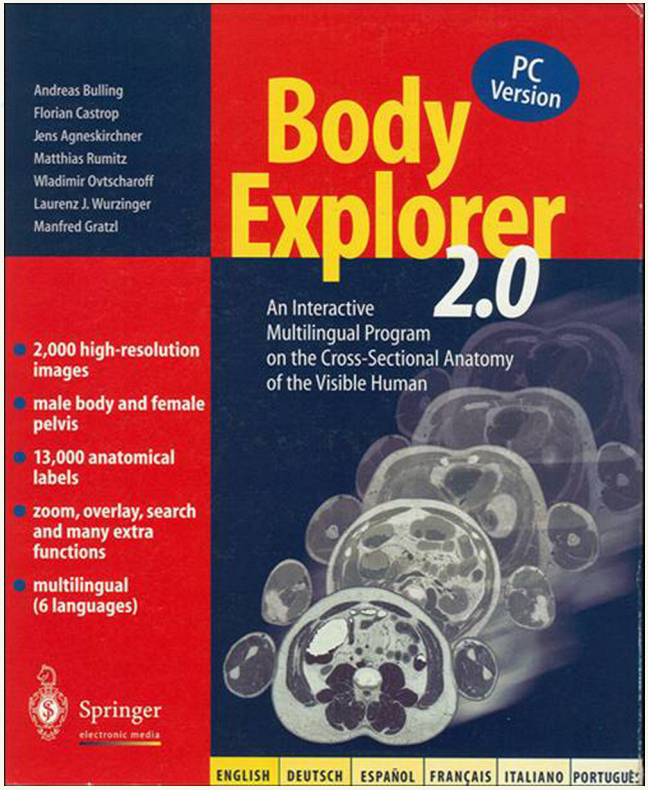

Fig. 2. The Body Explorer 2.0 cover image.

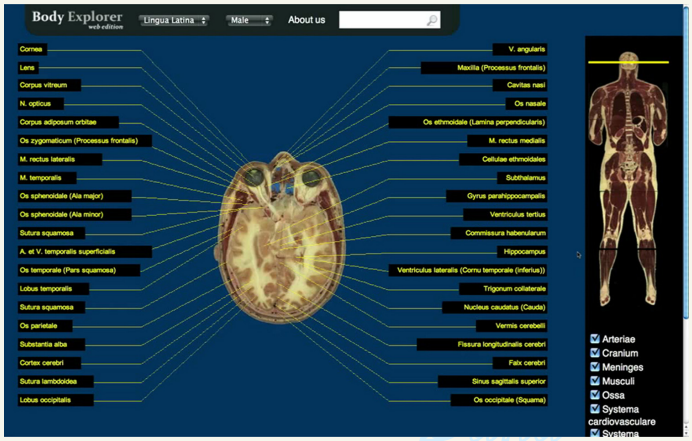

Fig. 3. The home page of the Body Explorer web site with a fully labeled cross-sectional data set from the head of a human male.

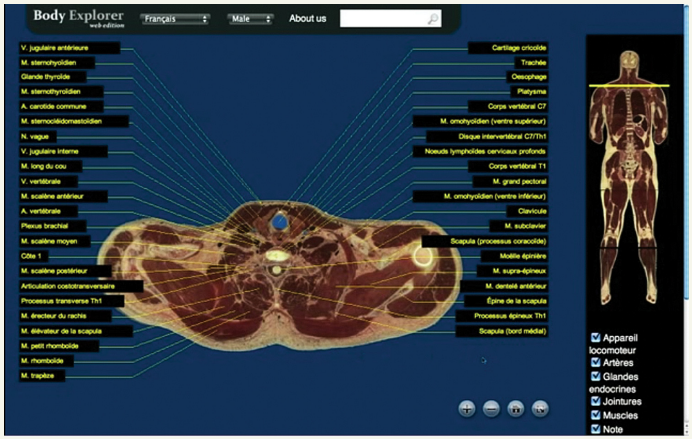

Fig. 4. A fully labeled image slice across the cervicothoracic transitional area.

Fig. 5. An image slice across the abdomen of a human male, including the upper limbs.