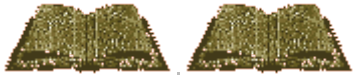
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Software/Multimedia Review Section



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VIRTUAL REALITY AS GOOD AS REAL

VOXEL-MAN 3D-Navigator: Brain and Skull, Regional, Functional, and Radiological Anatomy (Windows Version) *by* Karl Heinz Höhne, Universitätskrankenhaus Eppendorf, Hamburg, Germany, 2nd Version 2001, 2 CD-ROMs with red/green spectacles, 280 g, booklet 24 pp
Springer-Verlag, GmbH & Co.KG, Tiergartenstrasse 17, D-69121 Heidelberg, Germany; ISBN 3-540-14910-4. Price: DM 150.68, sFr 129.92, £ 56.40, $ 69.95

VOXEL-MAN 3D-Navigator: Inner Organs. Regional, Systemic and Radiological Anatomy (Windows Version) *by* Karl Heinz Höhne, Universitätskrankenhaus Eppendorf, Hamburg, Germany, 2nd Version 2001, 3 CD-ROMs with red/green spectacles, 320 g, booklet 24 pp
Springer-Verlag, GmbH & Co.KG, Tiergartenstrasse 17, D-69121 Heidelberg, Germany; ISBN 3-540-14759-4. Price: DM 150.68, sFr 129.92, £ 56.40, $ 69.95

System requirements: Windows 95/98/ME or NT 4.0/2000 on PC. Minimum configuration: CPU Pentium 233 MHz (recommended 400 MHz or more), Windows9x; ME: 64 MB RAM (recommended 96 MB or more), Windows NT/2000:96 MB RAM (recommended 128 MB or more), 120 MB hard disk space, screen resolution 600x800 pixels (recommended 1024x768 pixels or more), 8xCD-ROM drive (recommended 16x or more)

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Have you ever wondered how interesting anatomy could have been, if you had the freedom to dissect a human at your own will? How easy it would have been to learn anatomy, if you had an unlimited supply of human bodies, which you could dissect over and over again? Of if you went wrong somewhere, you had the freedom to reassemble the body and begin dissection all over once again? I must be joking, you would say. How could this ever be possible? This would be a dream come true, many would say.

Believe it or not, it is possible now!

Welcome to the amazing world of Voxel-Man 3D Navigator CDs, which make this - and much more - possible for you. Now you could not only do the abovementioned tasks, but do as varied tasks as do an ultrasound scan of the body at millions of different angles, look through the GIT as if you were sitting at the tip of an endoscope, cut through the body at any level and see the cross section there, or for that matter rotate any organ of the body at any angle and view it from any vantage point. All this - and more - at the click of a mouse!

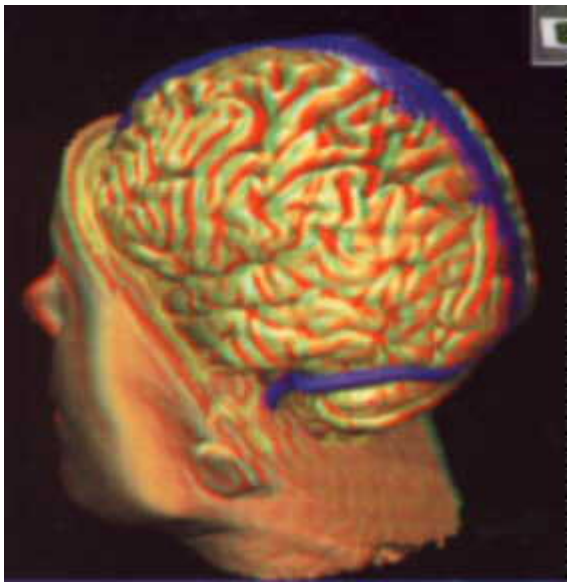
Figure 1: One of the several 3D pictures you can find in these CDs. Click the picture to enlarge (in a new window), and then view them through a 3D glass. If you don't have a 3D glass, read the text to follow instructions



View this book on Amazon

Voxel-Man comes in two *avatars*, a 2 CD collection depicting brain and skull, and a 3 CD collection depicting most of the inner organs residing in thorax and abdomen. The collections come with a handy set of 3-D glasses - elegantly mounted on a light cardboard frame. You can see most views in either of the two modes - mono or 3D. For the mono version, you wouldn't need the glasses though. The views are too good in the mono mode too, but when you put on the glasses and look at them in 3-D, you are taken to a very different world altogether. If you don't believe me, try this simple experiment. I am reproducing here two 3-D photographs from the CDs. If you click on them, you can see an enlarged version too. I would recommend viewing them in an enlarged version, so click on the pictures, and wait for them to load fully. Now put on 3-D glasses if you have them (borrow them from your child, if he has got them!). If you don't have 3-D glasses, do this simple chore: keep a green transparent paper over your RIGHT eye, and a red transparent paper over the LEFT eye (this arrangement won't work the other way round!), and now look at these two photographs. In the photograph of the skull on the right, where you see a small cut-out, you would feel almost as if you could poke your finger inside that large gap. In the other photo of the skull with the brain - on the left - the brain bulges out so prominently, you would think you could pick it up in your hand. Try one trick which I used successfully. Keep staring at the figures for some length of time. After a few seconds, the images would tend to grow in depth, and you would see a very very realistic version indeed.

Figure 2: Another 3D picture from these CDs. Click the picture to enlarge. Please read the caption of Figure 1 for rest of the details.



See what I mean! The whole CDs are full of such photographs. These are just two of them. But first of all a little bit about installation. I have given the system requirements above, but an additional interesting thing is that you must set the virtual memory of your system to at least 50 MB. If you don't do that, you would not be able to see anything. Doing this is fairly simple - Click, Start -> Settings -> Control Panel -> System -> Performance -> Virtual Memory. Now click on the radio button saying "let me specify my own virtual memory settings", and set it to 50 MB (I set it to 60 MB though - I think it gives better performance).

The other thing which you must do is set your system resolution to at least 1024x768 pixels or more. This was not a problem with me, since I anyway work at 1600x1200 pixels (this journal is designed at this latter resolution!). In case your system is having lesser resolution than this, you must set it to the specified figure.

Figure 3: The installation of Voxelman 3D.



Another fine point, which I discovered while exploring these CDs. The set on Brain and Skull comes in two CDs. If you have just one CD drive, the system would ask you to change CDs off and on, which can be irritating. So if you have two CD drives (as I have), keep one CD of the set in each drive. That way the system would automatically take data from whatever CD it wants, and wouldn't bother you with repeated requests to change CD. This however does not work with inner organ CDs, because they come in a set of 3, but by hit and trial, I learnt to press the right buttons, so it does not ask for changing CDs for a long time.

And now comes the installation process. It is quite simple, and painless and is quite similar to the various other softwares. One of the interfaces that you encounter while installing this CD is shown on the right.

Now when you have set up everything, you are on your way to this fantastic voyage of human body - in 3 D. The home page of Brain and Skull shows two windows - One devoted to Brain, and the other to Skull. Each of these windows if further divided into several sub-windows. In brain for instance, you see (i)3D anatomy (ii) Areas (iii) Cross sections and (iv) Magnetic Resonance Imaging. In the window on skull you see (i) 3D anatomy (ii) X-ray/CT (iii) vessels and (iv) simulations.

Figure 4: One of the simple animations from this CD. This shows how you can dissect - and then reassemble - the head!



In most of these windows, you see a small figure of 3D glasses at the bottom. This indicates that that particular section can be viewed in both modes - mono as well as 3D. If you want to see them in 3D, put on the glasses, and click the 3D glass icon. If you click away from 3D glasses, you would be taken to the mono version of the same sequence.

...In 3D anatomy sections, you can rotate the brain and skull almost in any direction - horizontally or vertically - and then freeze it in any given posture. Not only that, by clicking on "Add-Remove" buttons, you can add and remove layers of tissue from the brain and skull...

In 3D anatomy sections, you can rotate the brain and skull almost in any direction - horizontally or vertically - and then freeze it in any given posture. Not only that, by clicking on "Add-Remove" buttons, you can add and remove layers of tissue from the brain and skull. For instance in one view, the first frame that I see is that of a man's face. On clicking the "remove" button, I can remove the flesh from his face, and I can see only the skull. By pressing it once more, I can even remove the skull and see the brain. At this stage, I can see the complete brain - the sagittal sinus is very prominent, I can see both eyeballs, spinal cord, carotid artery and jugular veins, and even both vertebral arteries. I can remove brain tissue in further clicks. I counted, how many times I have to click to reach the lateral ventricles, and I discovered I had to click three times (first click removes the right and left postcentral gyrus, the second removes both temporal gyri, and the third removes rest of the brain matter). As you can see, each time, a little tissue is removed, and you have got to click thrice to go up to the level of Lateral Ventricles. That is the level of sophistication this software provides you with! I am reproducing a very simple version of this dissection as an animation on the left. This could give you some idea of what I am talking about. I am giving a link at the bottom of this page for viewers who would like to see some more complex animations.

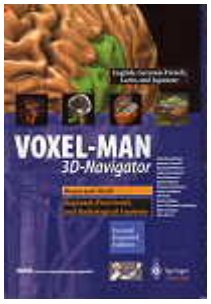
FAST FACTS

Some major highlights of Voxel-Man at a glance:

- Views are virtually unlimited. And they include exotic views such as endoscopic and stereo viewing.

- You can export user-generated image files for further use in teaching and learning, making your teaching more effective. I even made multimedia presentations from these CDs.
- Simulation of radiological imaging without restrictions for direction of view or of slice orientation.
- You can do free dissection and cutting. It allows simulation of dissection or surgery.
- Immediate access to names -both anatomical and common - descriptions and histology by clicking to as many as five modes: paint, mark, annotate, seek and describe.
- Based on as many as ten million voxels (each voxel representing volume elements of 1mm)
- A virtual boon to medical students, who can now do dissections at home, as many times as they want.

Figure 5: The Voxelman 3D CD pack



Returning to our dissection: a further three clicks are required to remove the sagittal sinus. And it is at this stage that you begin to see the caudate nucleus and thalamus. A further click removes the both thalami and insulae. The next click removes both caudate nuclei, eye balls and the optic nerves. By now you are left with just two occipital gyri. And one last click superimposes the picture of the man's face over these occipital gyri, so you exactly know their relationship with the head and face.

I counted the total number of clicks I had to make before I could go to the deepest layer. Twelve! This is indeed amazing. One gets a feeling almost as if he were dissecting the real brain in your study. And if you view them in 3D mode, the effects are simply breathtaking.

Some of the beginners might be wondering how they would be able to recognize such structures as *caudate nuclei* or for that matter *temporal gyri*, or *vertebral arteries*. Simple! Just bring the cursor to any structure you don't know and right click on it, and a pop up window will tell you the name of the structure. You can work it the other way round too. On the right hand side you see a large list depicting a number of structures. Sample these names from one of such lists: *left pyramidal tract, intracranial arteries, right internal carotid artery, right internal jugular vein, right lentiform nucleus* and so on. You can see these structures in five modes: paint, mark, annotate, seek and describe. For instance if I select the name *right lentiform nucleus* and click on "paint" button, it would immediately paint it in some prominent color (it was painted blue, when I clicked it). When I click on "seek", or "annotate", it would mark the structure with an arrow. When I click on "describe", it gives a fairly good description of the structure. When I asked it to "describe" the *right lentiform nucleus*, it gave me the following information:

Figure 6: Homepage of the Inner Organs CD pack



This lens-shaped body, which lies lateral to the anterior and posterior limbs of the internal capsule, and deep to the insular cortex, claustrum and thin fibre tracts that separate them, comprises two quite different parts. Its more lateral putamen is part of the neostriatum; its more medial globus pallidus (pallidum) is divided into an external and internal zone. At its anterior pole, the putamen is continuous with the head of the caudate nucleus as might be expected since both are neostriatum.

As you will all agree with me, this is fairly detailed. I would imagine that with information like this, students would find no difficulty in passing their examinations.

Well, I could go on and on, and I would still not be able to describe all the features of these CDs. There are views of CT scans, MRI scans and simulations. In simulations, you would be able to see the ultrasound scans from virtually an unlimited number of vantage points. I think, the best way to get acquainted with these CDs and their amazing features would be to acquire a set and try exploring yourself.

The CDs on inner organs are almost similar in ethos and content. What you can do with the brain and the skull in the first set of CDs, you can do with the inner organs, such as the heart, lungs, kidneys, liver and other organs in the second set.

Who will find these CDs of use? Anatomists, neuroanatomists, surgeons, neurosurgeons, radiologists, clinicians, pathologists, forensic pathologists and students of various branches of medicine, would be among the several people who would find these CDs useful. Students of forensic pathology can repeatedly perform dissections on this software to become familiar with the various structures. What about the others? Well, I showed these CDs to my 16 year old son, and he was so excited that he kept seeing them for almost a couple of hours. And after that, quite amazingly could discuss with me the various structures of the brain quite intelligently. I would heartily recommend these CDs not only to all medical professionals and medical students, but to all intelligent people who want to explore the human body, even if they have had no training in anatomy at all.

Order *Voxelman CDs* at a discount through this online journal by Clicking here

For more information, please visit the following sites:

VOXEL-MAN Part 1: Brain and Skull

VOXEL-MAN 3D-Navigator: Inner Organs

The Visible Human within the VOXEL-MAN Framework

Voxelman Movies