

**FILE NO. 9**

**Research  
and  
Discovery on:**

**The Sanctuary  
and  
Human Anatomy  
(Body Structure)**

## METHOD 9

### THE SANCTUARY AND HUMAN ANATOMY (BODY STRUCTURE)

#### SUGGESTED METHOD:

- Read the Biblical verses and Bible Companions commentaries in the context of Anatomy.
- Using the principle of allegory (comparison) from Galatians in the New Testament, this file shows interesting similitude between the anatomy (structure) of the sanctuary and the human body.
- The Church is also another type of sanctuary upon which the whole structure stands on the Chief Cornerstone: Jesus Christ. Illustrations from the Sanctuary and the Human Body help clarify these applications and confirm the Word of God: "Know ye not that ye are the temple of God, and that the Spirit of God dwelleth in you?" 1 Corinthians 3:16.

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FILE NO. 9  
THE SANCTUARY AND HUMAN ANATOMY  
(BODY STRUCTURE)

DEFINITION:

ANATOMY: Scientific study of the form, position and structure of the human organs. (Dictionary definition)

ALLEGORY: Representation, expression of an idea using a symbolical figure in literature. (Dictionary definition)

IT IS WRITTEN:

"For it is written, that Abraham had two sons, the one by a bondmaid, the other by a freewoman. But he who was of the bondwoman was born of the flesh; but he of the freewoman was by promise. Which things are an allegory; for these are the two covenants."  
Galatians 4:22-24.

"Now ye are the body of Christ, and members in particular."  
1 Corinthians 12:27.

"Whether therefore ye eat, or drink, or whatsoever ye do, do all to the glory of God." 1 Corinthians 10:31.

BIBLE COMPANIONS:

"...The people of God must know themselves. They must understand in regard to their own physical frames, that they may be able with the psalmist to exclaim, "I will praise Thee, for I am fearfully and wonderfully made." They should ever have the appetite in subjection to the moral and intellectual organs. The body should be servants to the mind and not the mind to the body."

Author, E. G. White

Counsels on Diet and Foods, p. 33

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**The Bible describes many parts (structure) of the human body; some as belonging to the Lord. See the following verses:**

**Head and lips:** Psalm 21:3, 4, Isaiah 6: 5-7.

**Face:** Genesis 32:20 (of God); Job 4:15; 16:16; Psalm 104:15

**Tongue:** Psalm 137:6; James 1:26

**Teeth:** Proverbs 25:19

**Hair:** Daniel 7:9 (Ancient of Days), Matthew 5:36, Luke 21:18

**Eyes:** Genesis 3:5, 6; Psalm 33:18; Matthew 6:22

**Eyelids:** Psalm 132:4; Jeremiah 9:18

**Nostrils:** Genesis 2:7; Job 27:3

**Pressure on the nose produces blood:** Proverbs 30:33

**Ears:** Nehemiah 1:6, 11; Proverbs 15:31

**Neck:** Genesis 33:4; 1 Samuel 4:18 (broken); Jeremiah 7:26

**Shoulder:** Isaiah 9:6

**Sinew and hollow of the thigh:** Genesis 32:32

**Back and hand (of the Lord):** Exodus 33: 17-23

**Finger:** Exodus 31:18 (of the Lord)

**Nails:** Daniel 4:33

**Ribs:** Genesis 2:22

**Bones and flesh:** Genesis 2:23; 29:14; Job 2:5; 10:11; 19:20; 31:22

**Bones and marrow:** Job 21:24; Hebrews 4:12

**Muscles:** Genesis 32:32; Job 10:11

**Nerves:** Job 10:11

**Bowels:** 2 Samuel 20:10; Job 20:14

**Womb:** Psalm 71:6

**Stomach:** 1 Timothy 5:23

**Heart:** Psalm 147:3

**NOTE: With a Concordance and an Anatomy book, pursue this interesting research of the different parts of the body. The structure of the earthly sanctuary was made of pillars, veils, accessories and precious stones.**

**File 09 - Appendix of Studies**

STUDY: [EFFECTS OF TELEVISION ON THE BRAIN - PART TWO](#)

(See File 09, p. 24-40)

REFERENCES:

It is written, The Bible

Exodus, Chapter 25 to 28

Bible Companions: E. G. White, Author

Patriarchs and Prophets, Chapter 30

The Great Controversy, Chapter 23

Mind, Character and Personality, Chapter 9

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## Appendix

### ALLEGORY BETWEEN THE SANCTUARY, THE HUMAN BODY AND THE CHARACTER (READ CHART HORIZONTALLY)

<b>THE SANCTUARY THE COURT:</b>	<b>THE HUMAN BODY BODY:</b>	<b>THE CHARACTER PERSONALITY:</b>
curtains	skin	personality
posts	bones	principles
altar of offerings	organs & systems	quality/talents
brazen laver	water: 70% of body	water of life: Jesus
<b>HOLY PLACE:</b>	<b>THE HEAD:</b>	<b>THE MIND:</b>
shewbread	food	Word of God
altar of incense (horn)	brain	prayer meditation
candlestick	faculty thought, reasoning, conscience	Holy-Spirit Mind of Christ
<b>MOST HOLY PLACE:</b>	<b>THE HEAD:</b>	<b>THE MIND:</b>
ark of covenant	front lobe (brain)	grace of character

The ministry of Christ in the Most Holy Place: Consists of the Perfection of Character by the eradication of the knowledge of evil (Genesis 3:15) in the sanctuary of our mind and the elimination of our repented and confessed sins in the book of records in the heavenly sanctuary.

The ministry of Christ at the Second Coming: Consists of the change of this corruptible body for the incorruptible one.

**ALLEGORIES BETWEEN THE SANCTUARY, THE HUMAN BODY AND THE BODY OF CHRIST: HIS CHURCH  
(READ CHART HORIZONTALLY)**

<b>SANCTUARY</b>	<b>HUMAN BODY</b>	<b>BODY OF CHRIST</b>
curtains	skin	unity/diversity
posts	bones	principles/doctrines
altar of offerings	body	members of church
brazen laver	water	Jesus-Christ
shewbread	nutrient	Word of God
altar of incense	brain	prayers and meditations
candlestick	mind	Holy-Spirit
ark of the covenant	divine mind	Law of God priesthood double portion ambassador of Jesus Christ

**BIBLICAL AND BIOLOGICAL NOTIONS: EASY WAY TO LEARN (READ CHART VERTICALLY)**

<b>SANCTUARY</b>	<b>HUMAN BODY</b>	<b>CHRIST CHURCH</b>
skins/jewels/stones	chemical elements	God took dust
offerings	cells (group of elements)	created man
curtain/accessory clothes	tissues (group of cells)	small group
forms the structure (anatomy)	organs (group of tissues)	formed churches
with the functions (physiology)	systems (group of organs)	around the world
Result: Sanctuary	organism (group of systems)	Church of Christ



## **ALLEGORY BETWEEN THE BIBLE AND THE SPINE (VERTEBRAL COLUMN)**

### **THE BIBLE SAYS:**

"Wisdom hath builded her house. She hath hewn her seven pillars."  
Proverbs 9: 1; 2: 6-11. Name the 7 pillars!

### **ANATOMY TEACHES THAT:** (Click to view Body Parts)

The [spine](#) is composed of 7 cervical vertebrae (cervix=neck) and supports the head, seat of the brain which is the organ of the mind, throne of divine wisdom when sanctified. They are called: atlas, axis, C3, C4, C5, C6, C7.

### **THE BIBLE SAYS:**

The moral Law of God is composed of 10 principles of freedom. Exodus 20:1-17. Name them!

And rest on 2 well known commandments as found in Luke 10:27. Name them!

### **ANATOMY TEACHES THAT:**

10 vertebrae compose the thoracic region (thorax=chest) to which are attached 20 [ribs](#) (10 on each side forming the thorax) and 2 other vertebrae to which are attached the 4 floating ribs or false ribs, for a total of 12 vertebrae. They are called: D1 to D12.

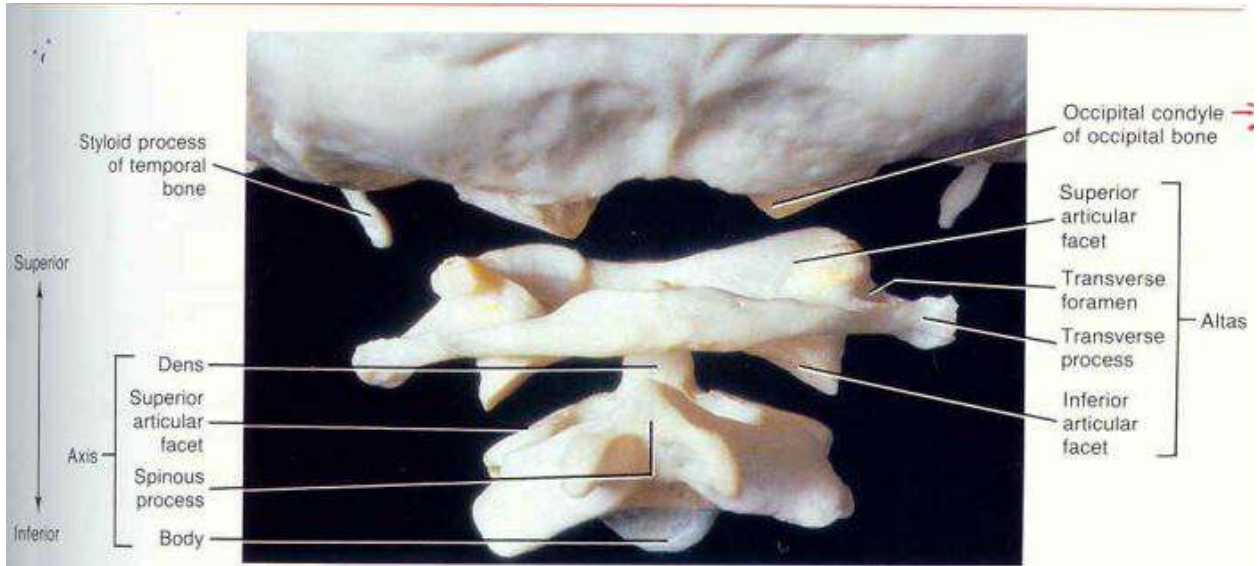
### **THE BIBLE SAYS:**

That the law of Moses is based on the five first books of the Bible called **THORAH OR PENTATEUCH**. Name them!

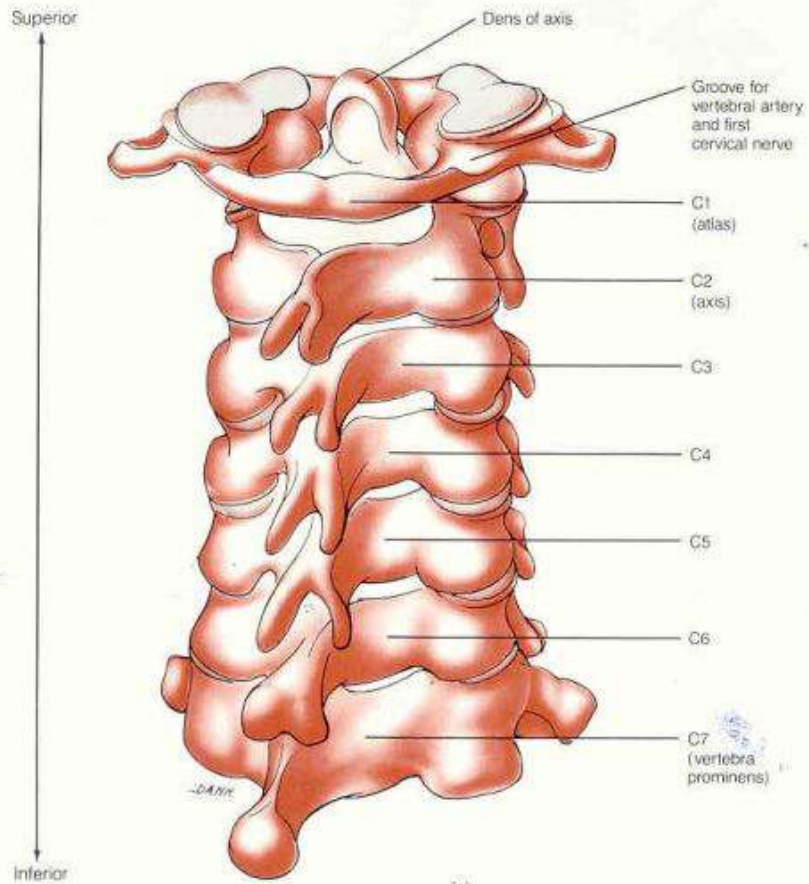
### **ANATOMY TEACHES THAT:**

The lumbar region is composed of 5 [vertebrae](#) called L1, L2, L3, L4, L5. To which we add the 5 fused vertebrae (fusion begins between 16 and 18 years of age) of the Sacrum (forming 1) and, the 3 to 5 fused vertebrae of the coccyx (fusion begins between 20 and 30 years of age) (forming 1). For a total of:  $7 + 12 + 5 + 1 + 1 = 26$

# SPINE

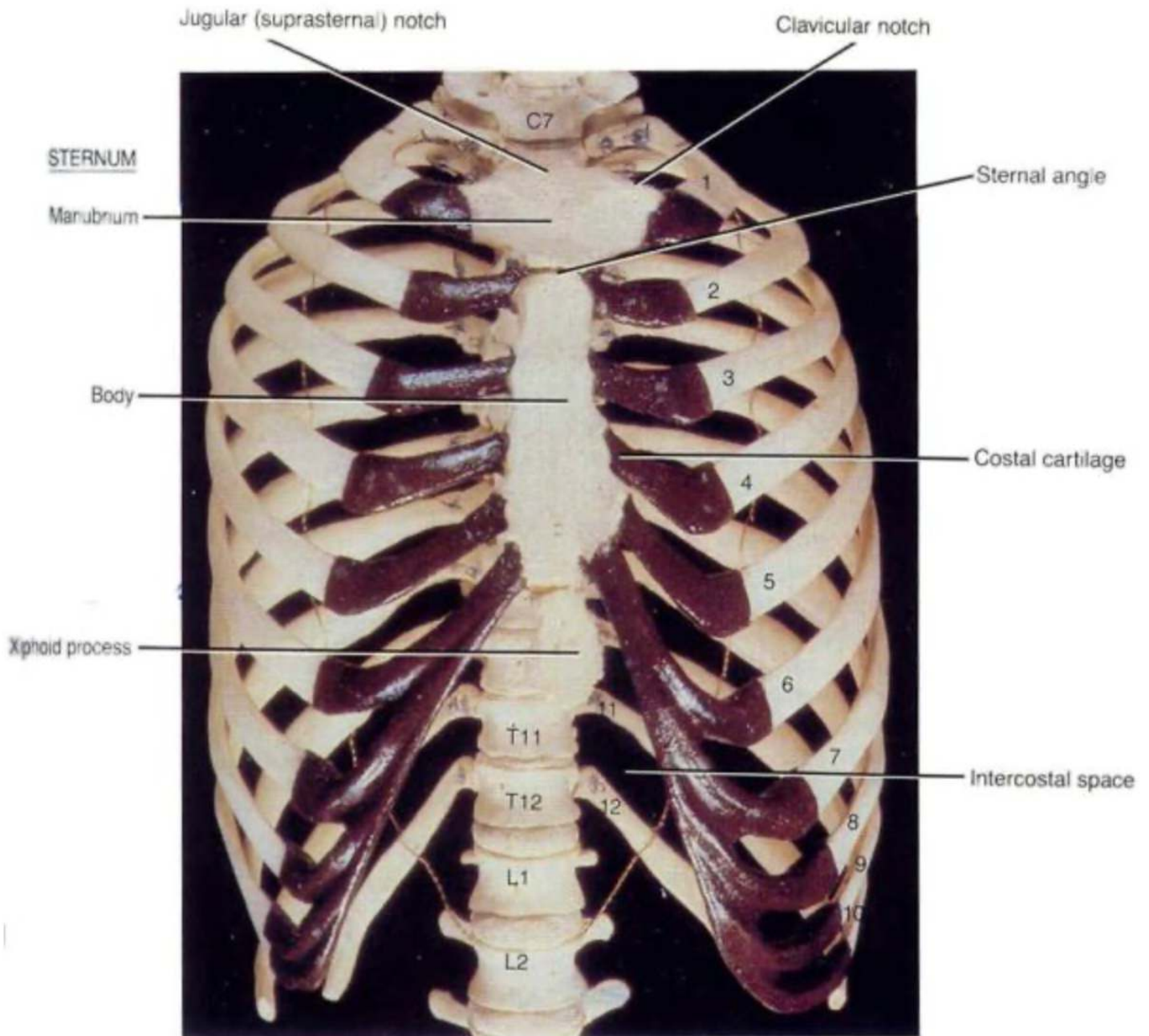


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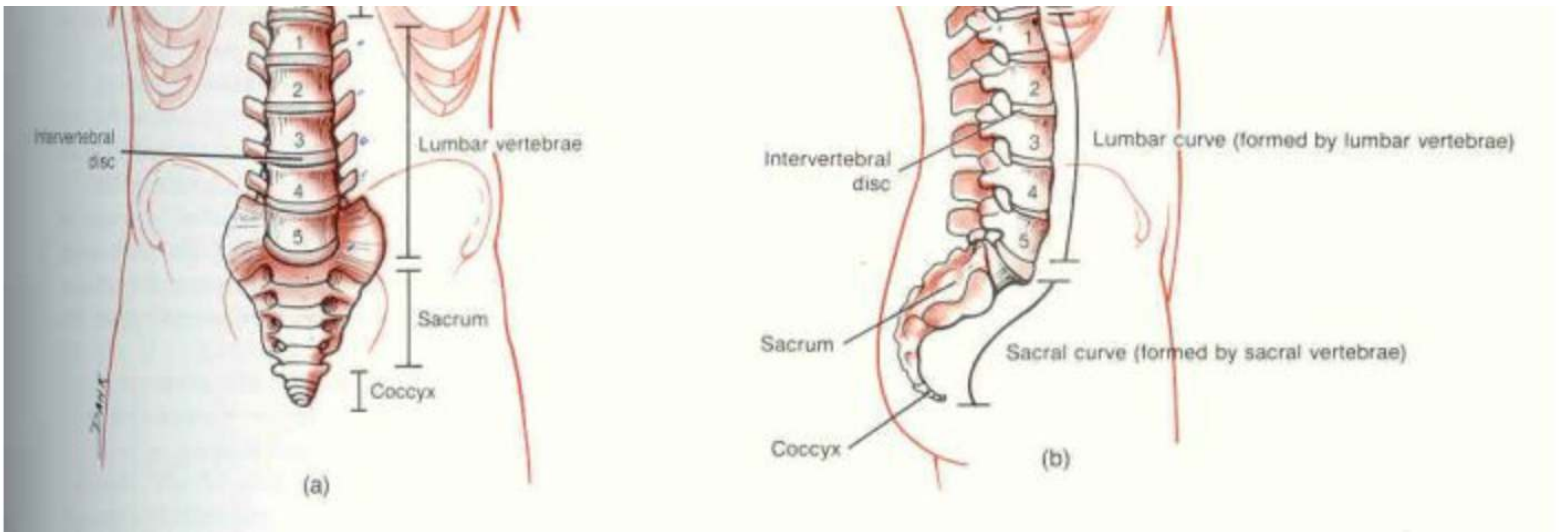


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# RIBS



# VERTEBRAE



## **ANATOMY TEACHES THAT THE BODY IS COMPOSED OF:**

(Click to view Body Parts)

### **BONES:**

206 bones ( 86 - head, thorax, hips; 120 - arms and legs)

### **MUSCLES:**

More than 600 muscles - almost half the body weight.

### **NERVES:**

12 pair of cranial nerves (originate from the brain)

31 pair of spinal nerves (emerge from the spinal cord) - the spinal cord is called HORN (power) in anatomy.

### **BLOOD:**

Composed of the plasma (liquid containing 90% of water, hormones, and metabolic waste such as urea) and other elements: red and white blood cells and platelets.

### **ORGANS:**

Skin, lungs, heart, liver, stomach, pancreas, gallbladder, urinary bladder, spleen.

### **GLANDS:**

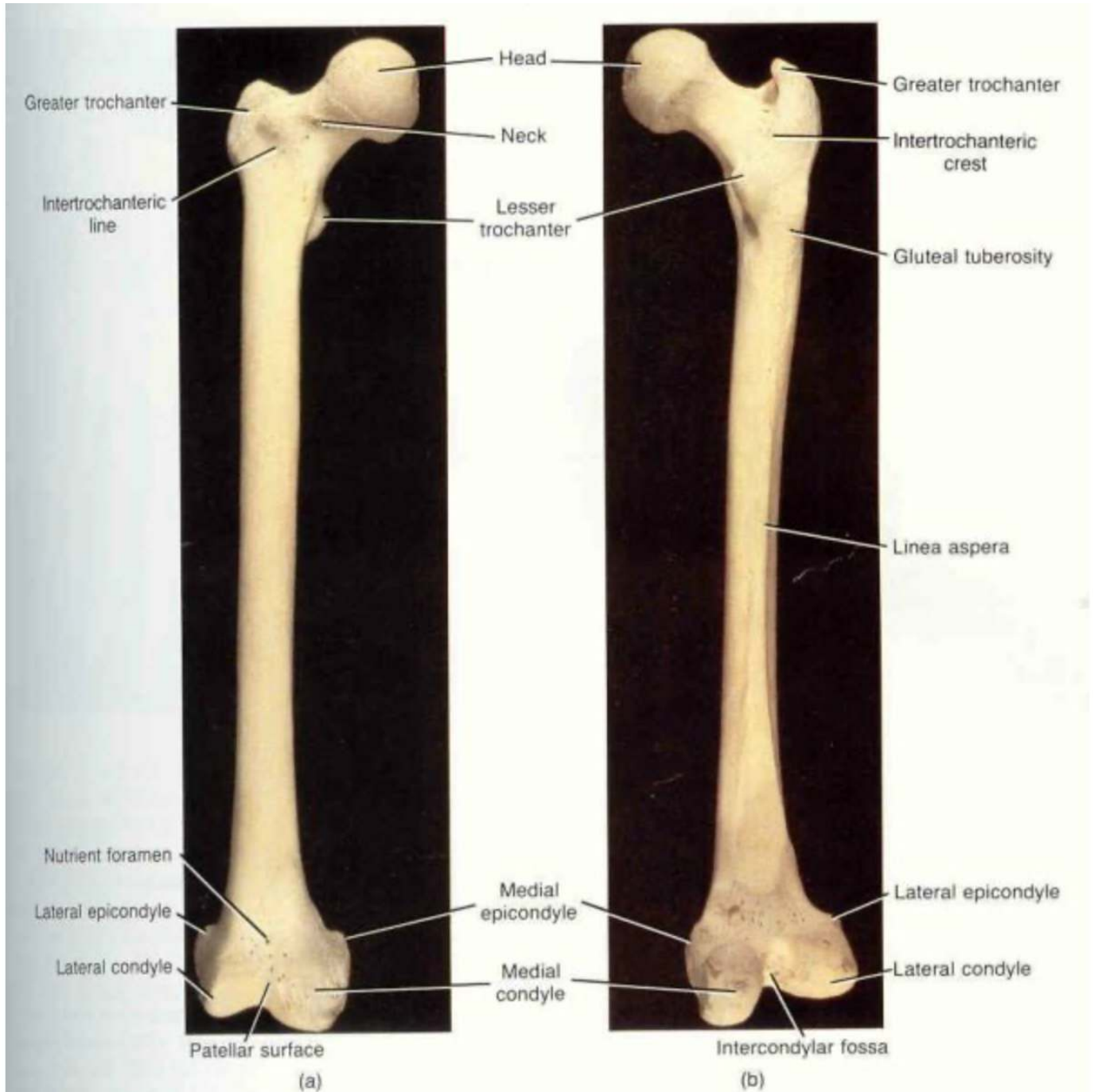
Hypophyse, thyroid, parathyroid, adrenal, pancreas, reproductive glands: man, woman.

### **SENSES:**

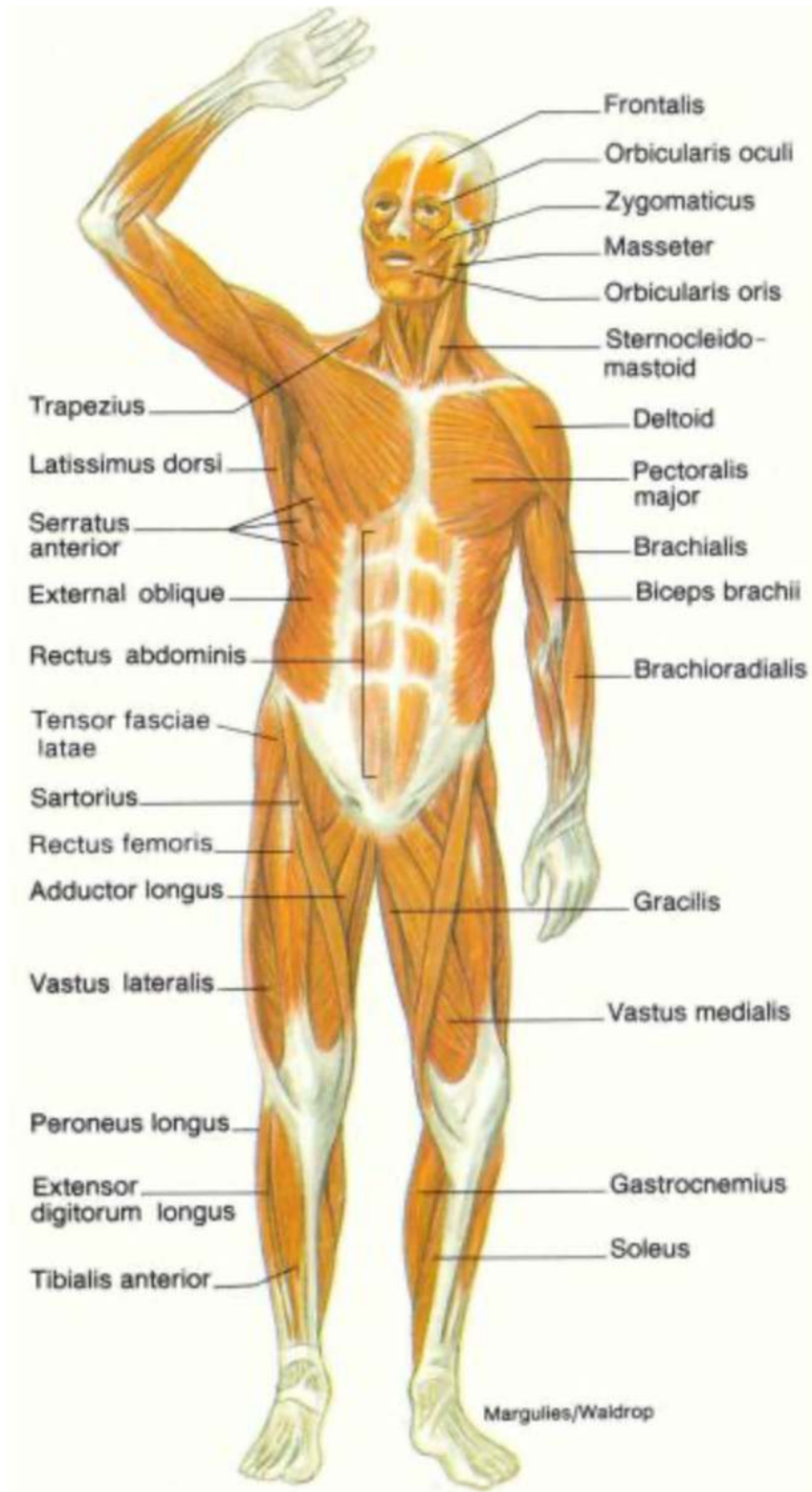
Eyes (sight), mouth (taste), ears (hearing), nose (smell), hands, feet, (touch).



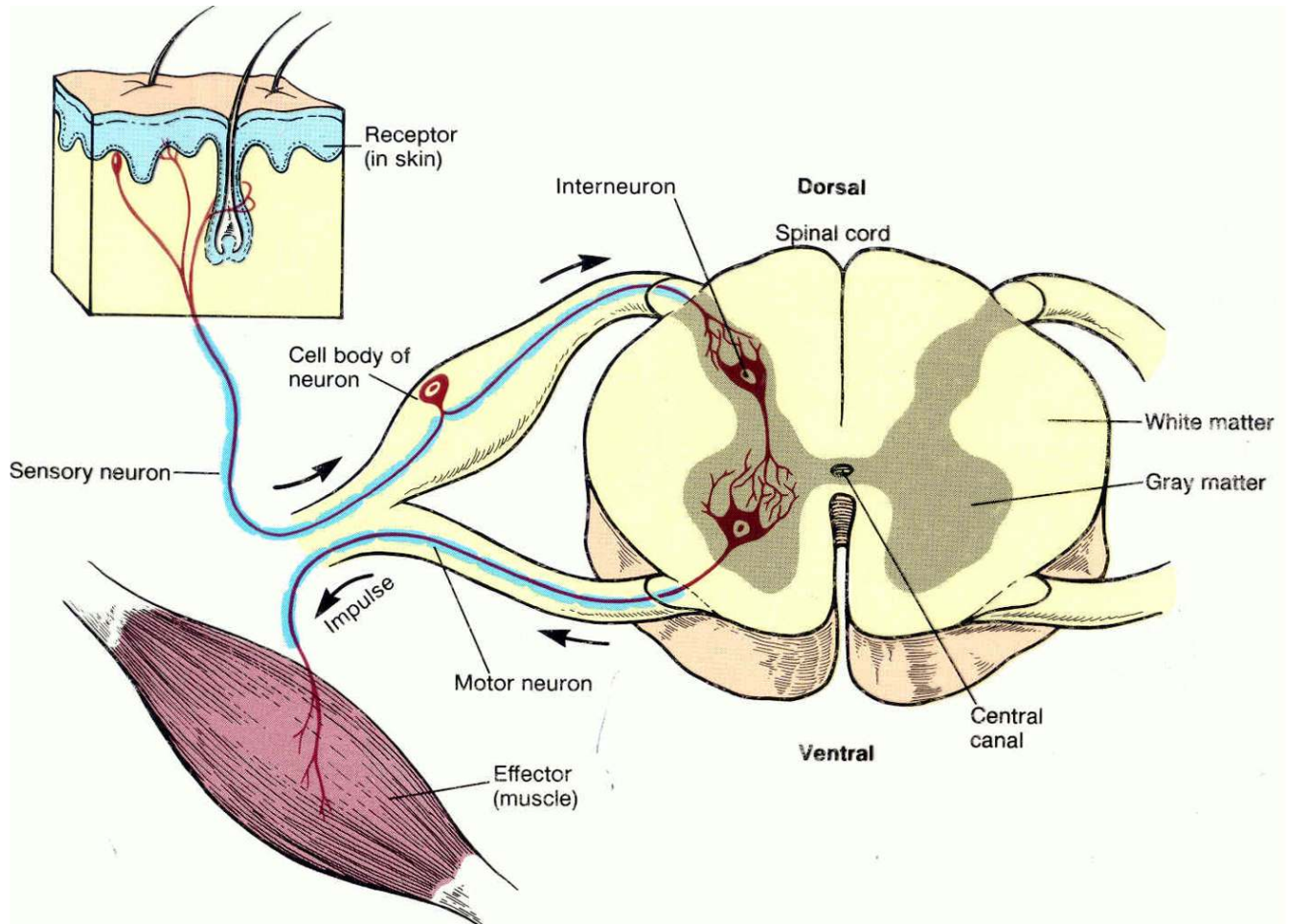
# BONES



# MUSCLES

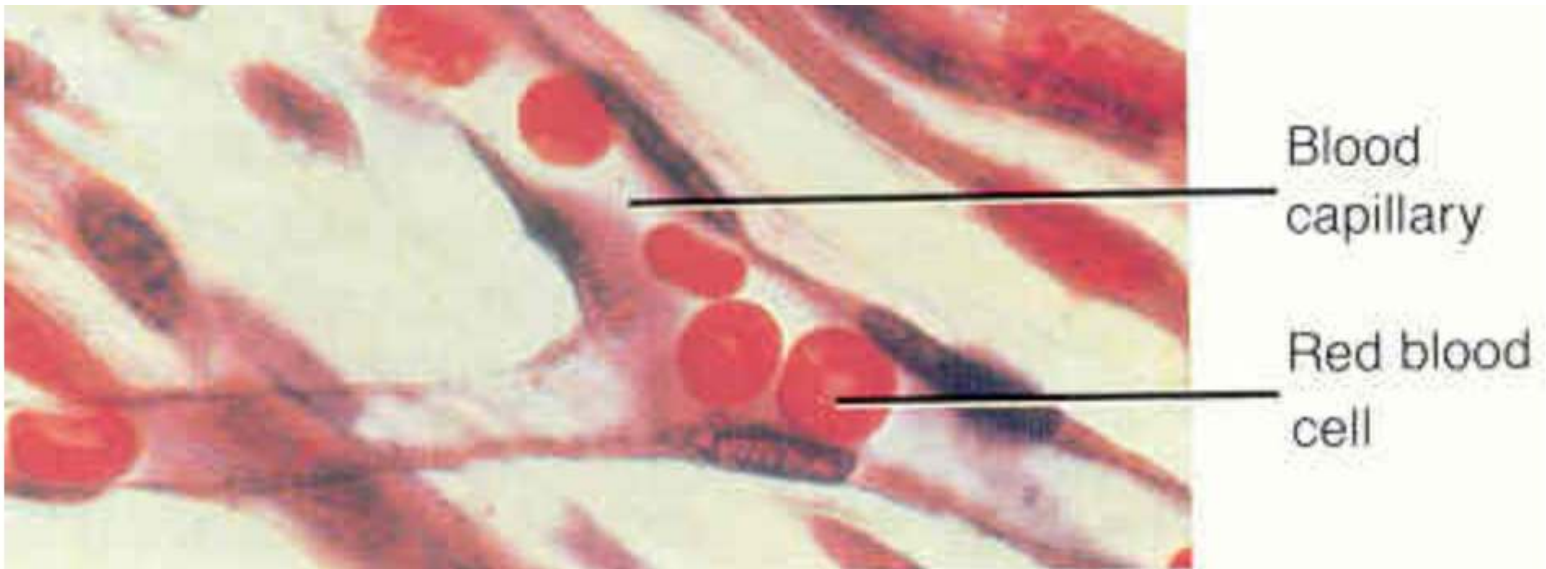


# NERVES

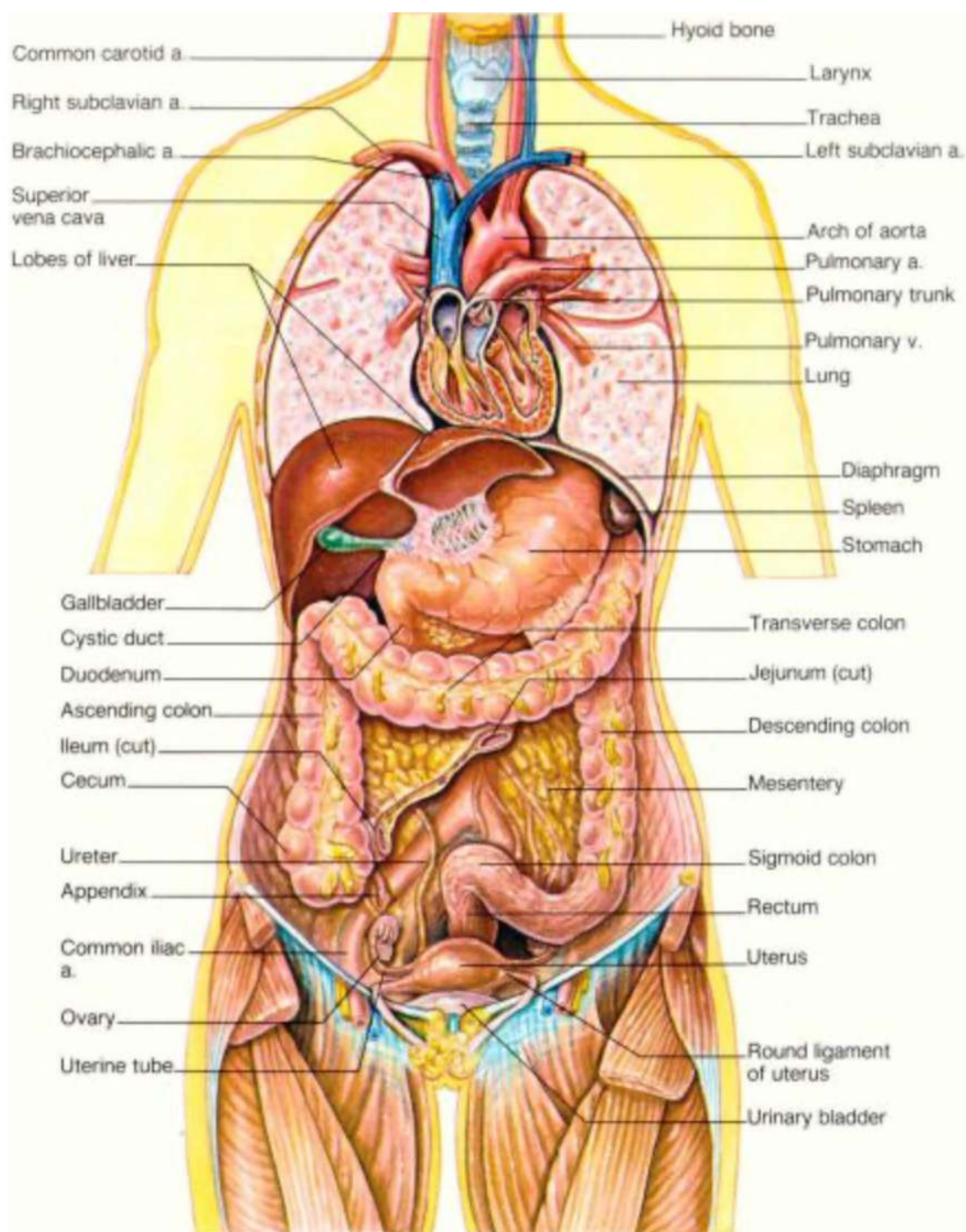




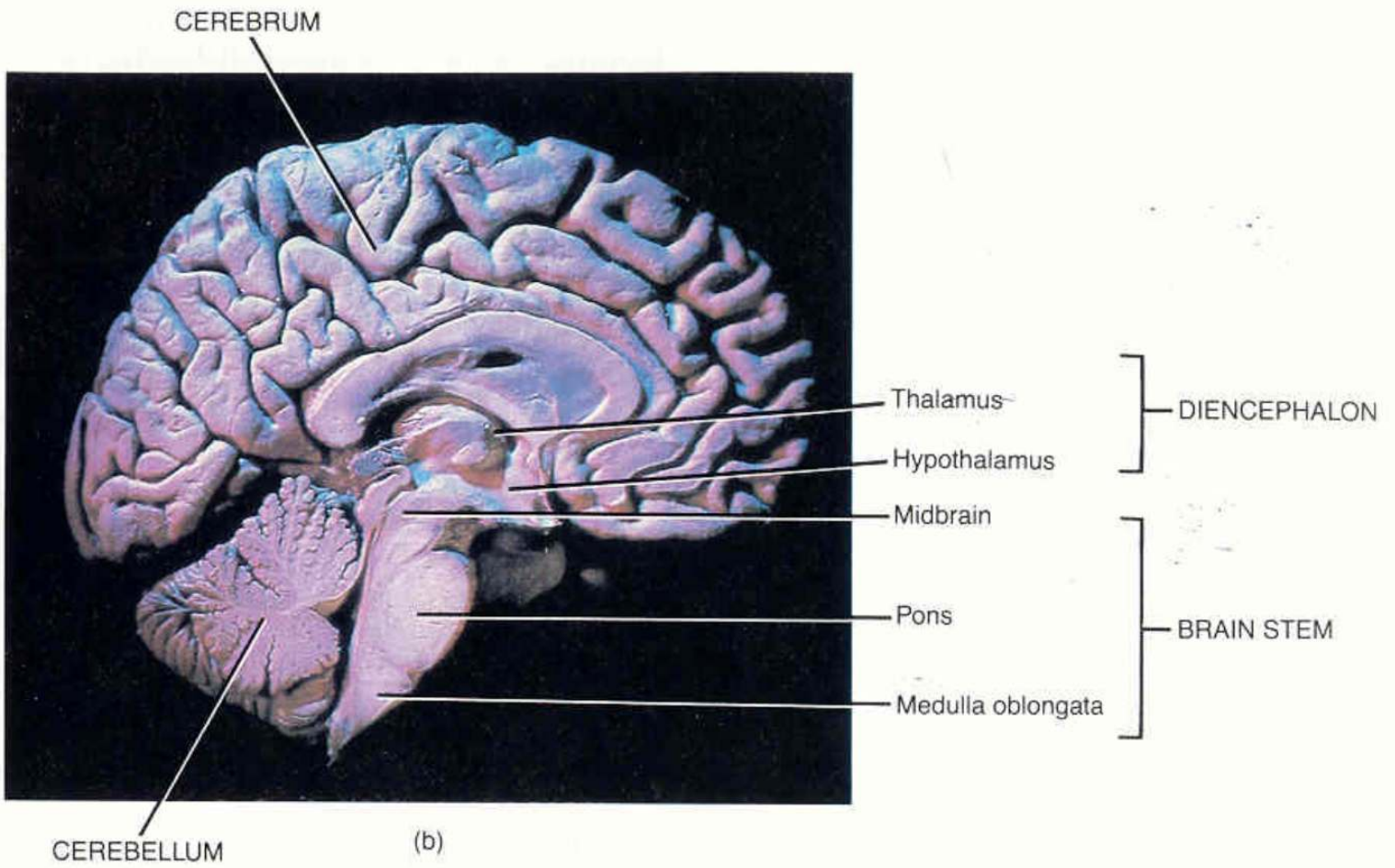
# BLOOD



# ORGANS

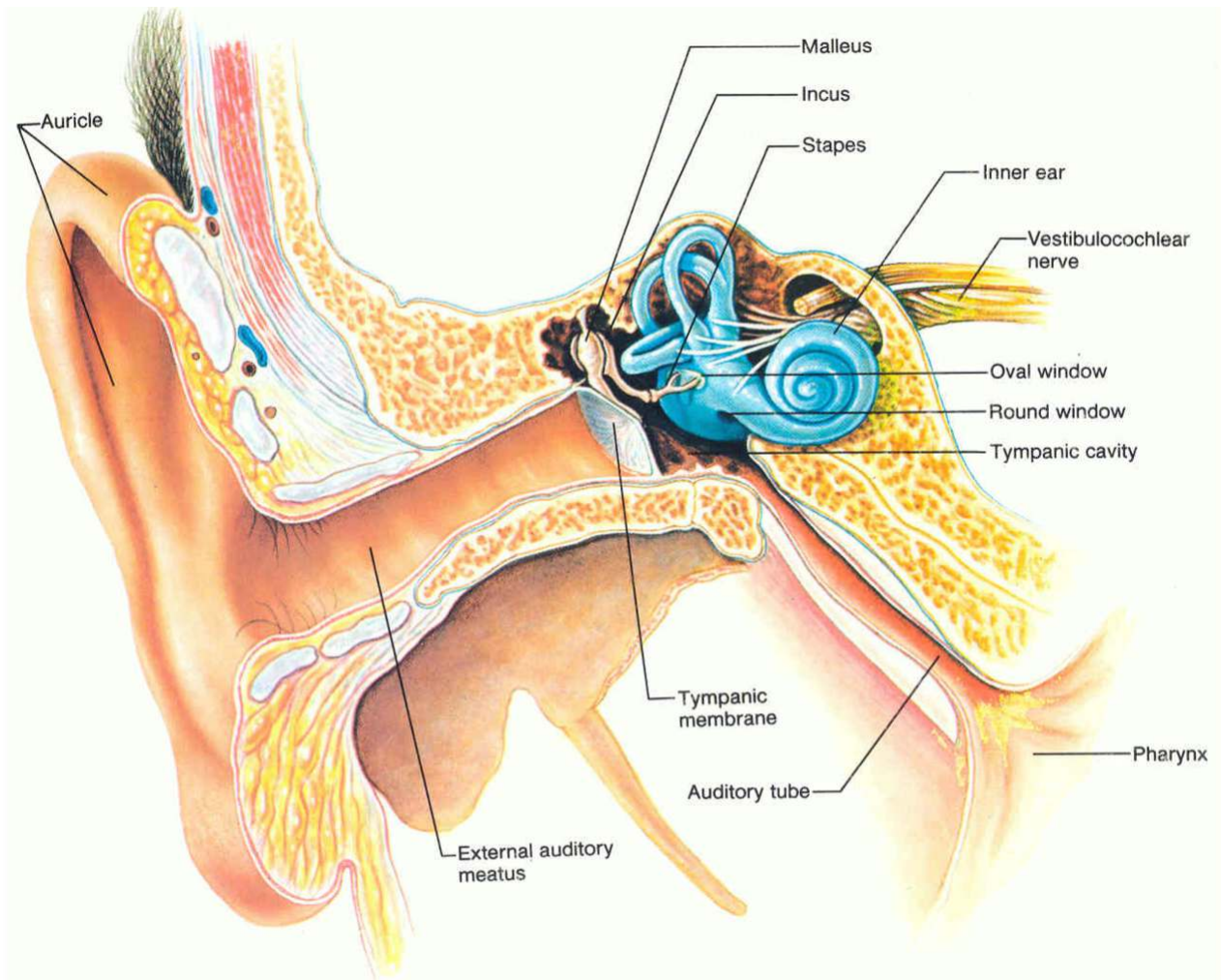


# GLANDS

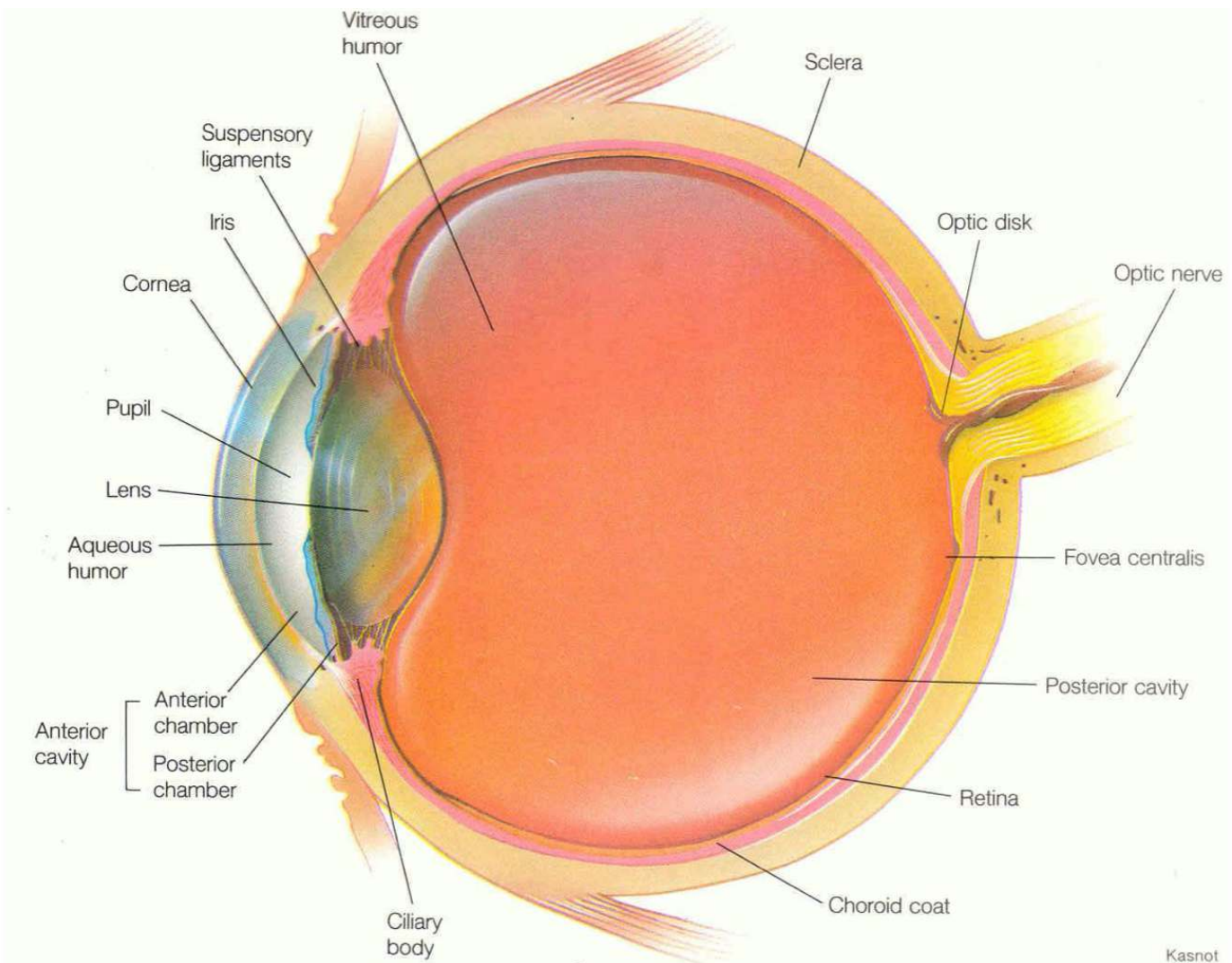




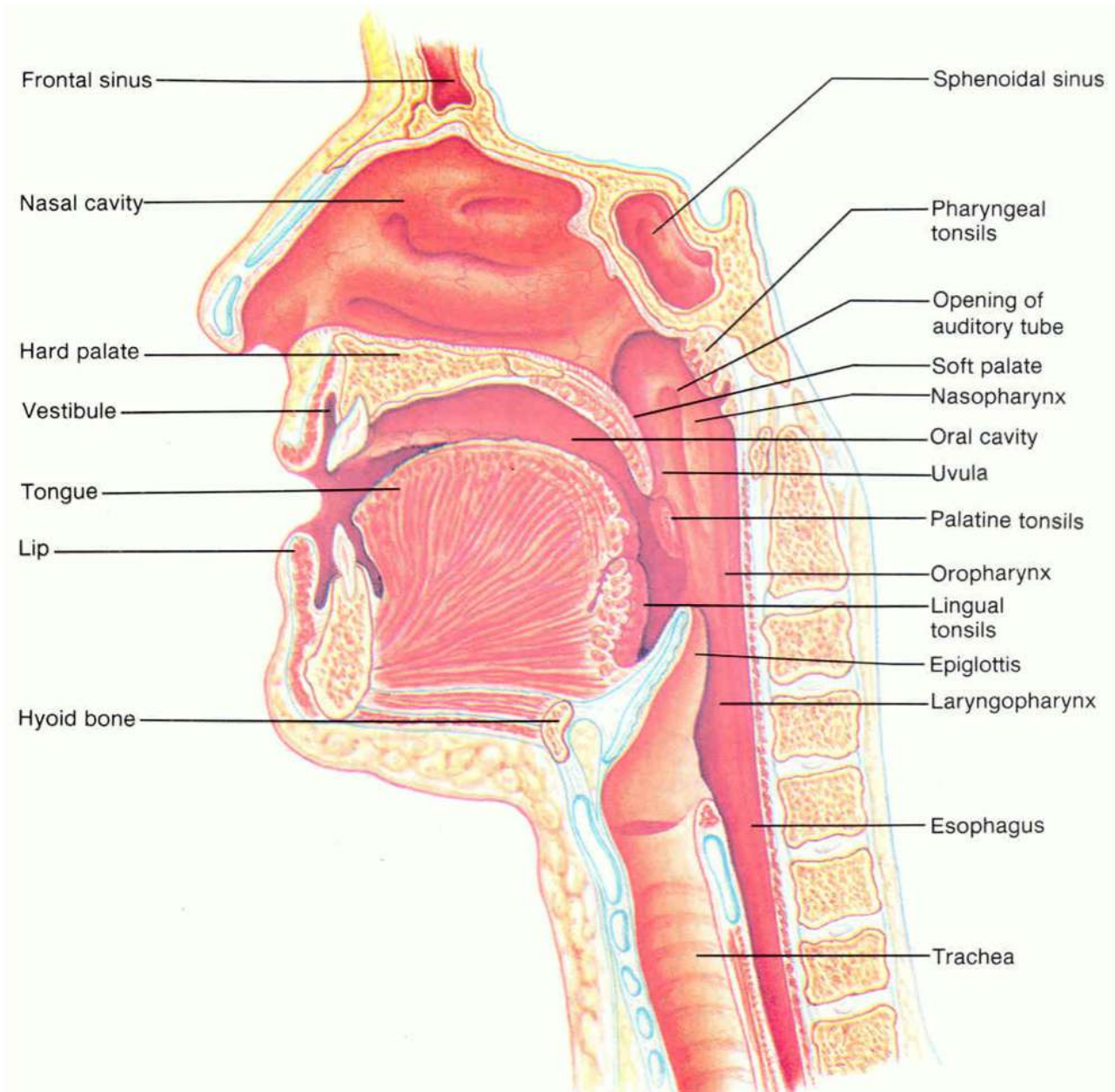
## SENSES: EARS (HEARING)



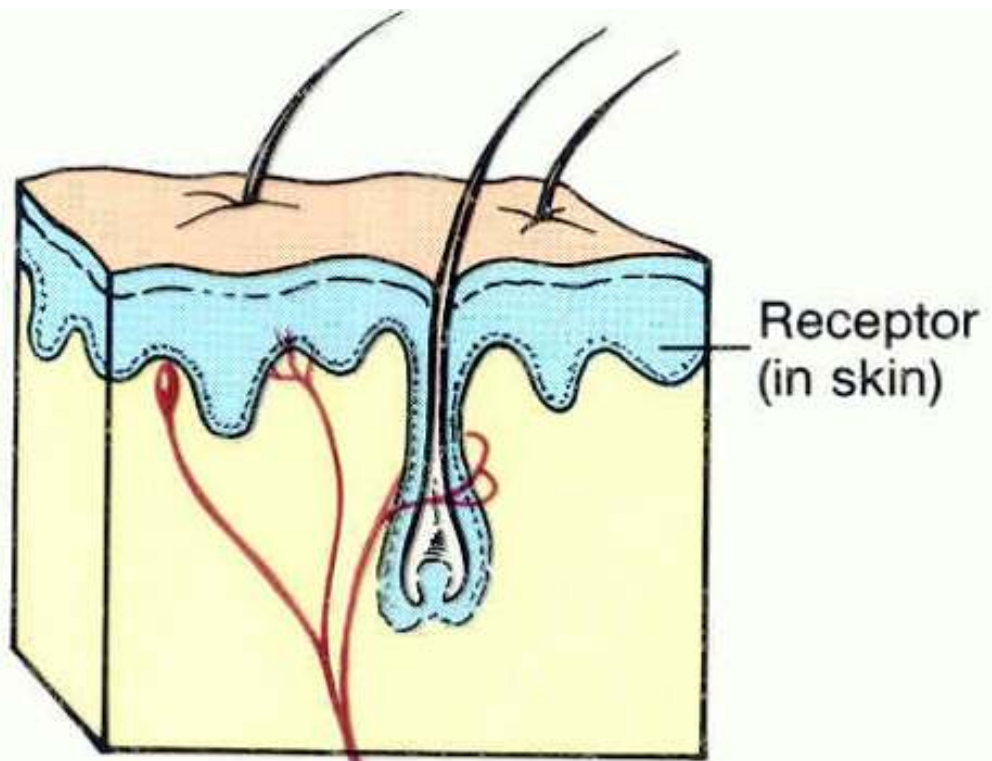
## SENSES: EYES (SEEING)



## SENSES:NOSE (SMELLING), TONGUE (TASTE)



## SENSES:SKIN (TOUCH)





# EFFECTS OF TELEVISION ON THE BRAIN

*(Continued from File 6)*

## **VI. TELEVISION: THE INVISIBLE PHENOMENON**

### **1. TELEVISION HYPNOTIC EFFECT**

If you could somehow drop all preconception of television and read this list as though people were describing some instrument you had never seen yourself, the picture you would obtain is of a machine that invades, controls and deadens the people who view it. It is not unlike the alien-operated "influencing machine" of the psychopathic fantasy.

1. "I feel hypnotized when I watch television."
2. "Television sucks my energy."
3. "I feel like it's brainwashing me."
4. "I feel like a vegetable when I'm stuck there at the tube."
5. "Television spaces me out."
6. "Television is an addiction and I'm an addict."
7. "My kids look like zombies when they're watching."
8. "TV is destroying my mind."
9. "My kids walk around like they're in a dream because of it."
10. "Television is making people stupid."
11. "Television is turning my mind to mush."
12. "If a television is on, I just can't keep my eyes off it."
13. "I feel mesmerized by it."
14. "TV is colonizing my brain."
15. "How can I get my kids off it and back into life?"

People are saying they are being hypnotized, controlled, drugged, deadened, but they do not assign validity to their own experience. Yet if there is any truth in these descriptions, we are dealing with a force that is far more powerful and subtle than Aldous Huxley's hypnopaedic machines in his book *Brave New World*. If television "hypnotizes," "brainwashes," "controls minds," "makes people stupid," "turns everyone into zombies," then you would think it would be an appropriate area of scientific inquiry. In fact, someone should call the police!

Science has a name for such collections of descriptions. They are called "anecdotal evidence" or "experiential reports." Such reports are not totally ignored by researchers, although they are not exactly taken seriously either. In the case of television, there is the problem that the symptoms are not fatal, they are subtle. Few people go to doctors complaining about



them. They therefore remain below the threshold of visibility for scientific inquiry. Even when such reports are noticed, science does not accept them as valid unless they have been put through the grinder of scientific proof. Since it is beyond science to validate exactly what is meant by "zombie" or "brainwash" or even "addiction" or even "hypnosis," these symptoms inevitably remain unproved, leaving people who need external validation at a loss.

One major result of modern science has been to make people doubt what they would otherwise accept as true from their own observation and experience. Science, medicine, psychology and economics all deeply depend on people being mystified by their own experience and blind to the strict limits of scientific method. In this country, where intervention between humans and their inner selves is so very advanced, the mystification is virtually total.

## **2. TELEVISION DIMS THE BRAIN**

Television is watched in darkened rooms. Some people leave on small lights, or daylight filters in, but it is a requirement of television viewing that the set be the brightest image in the environment or it cannot be seen well. To increase the effect, background sounds are dimmed out just as the light is. An effort is made to eliminate household noises. The point, of course, is to further the focus on the television set. Awareness of the outer environment gets in the way.

Many people watch television alone a substantial amount of the time. This eliminates yet another aspect of outer awareness. Even while watching with others, a premium is placed upon quiet. Talking interferes with attention to the set. If you like to look at people while talking, turning your head actually breaks attention. So other people are dimmed out like the light, the sounds, and the rest of the world.

Dimming out your own body is another part of the process. People choose a position for viewing that allows the maximum comfort and least motion, that is, the least awareness of the body because like awareness of external light, sound or other stimuli, awareness of your own body can detract from the focus on the television. Positions are chosen in which arms and legs will not have to be moved. One may shift weight from time to time, or go for a snack, but for most of the experience, the body is quiet.

This dimming out is also true of the internal organs. The heartbeat slows to idle, the pulse rate tends to even out, the brain wave patterns go into a smooth and steady rhythm. Thinking processes are also dimmed.

Overall, while we are watching television, our bodies are in a quieter condition over a longer period of time than in any other of life's non-sleeping experiences. This is true even for the eyes, which are widely presumed to be active during television viewing. In fact, the eyes move less while watching television than in any other experience of daily life. This is particularly so if you sit at a distance from the set or if your set is small. In such cases you take in the entire image without scanning. Even with huge television screens, the eyes do not move as much as they do when seeing a movie, where the very size of the theater screen requires eye and even head movement.

Even when you are working in an office, or reading a book, the eyes move more than they do while watching television. In offices there are always interruptions. While reading, you vary the speed at which you read, go over material and raise your eyes off the page from time to time.

In the wider world outside of the media, the eyes almost never stop moving, searching and scanning. For humans, the eyes are "feelers"; they are one of our major contacts with the world and are forever reaching and studying.

While you are watching television, in addition to the non-movement of the eyeball, there is a parallel freezing of the focusing mechanism. The eye remains at a fixed distance from the object observed for a longer period of time than in any other human experience.

Ordinarily, the process of focusing, defocusing and refocusing engages the eye nonstop all day long, even during sleeping and dreaming. But while you are watching television, no matter what is happening on the screen, however far away the action of the story is supposed to be inside the set, the set itself remains at a fixed distance and requires only an infinitesimal change in focus. The result is to flatten all information into one dimension and to put the viewer in a condition akin to unconscious staring.

However idle the eyes are during television watching, they are positively lively compared to the other senses. Sound is reduced to the extremely

narrow ranges of television audio, while smell, taste and touch are eliminated altogether.

### **3. ARTIFICIAL TOUCH AND HYPERACTIVITY**

Images on television are not real. They are not events taking place where the person who views them is sitting. The images are taking place in the television set, which then projects them into the brain of the viewer. Direct response to them would therefore be more than absurd. So whatever stimulation is felt is instantly repressed. Although seeing the images may stimulate the impulse to move, the impulse is cut off. The effect is a kind of sensory tease, to put the case generously. The human starts a process and then stops it, then starts it again, then stops it, vibrating back and forth between those two poles of action and repression, all of it without a purpose in real life.

There is mounting evidence that this back-and-forth action is a major cause of **hyperactivity**; fast movement without purpose, as though stimulated by electricity. The physical energy that is created by the images, but not used, is physically stored. Then when the set is off, it comes bursting outward in aimless, random, speedy activity. You can see it over and over again with children. They are quiet while watching. Then afterwards they become overactive, irritable and frustrated.

Dr. Matthew Dumont says that television causes hyperactive response. But Australian psychologists Merrelyn and Fred Emery, in their study of television, have gone so far as to absolutely predict that television is directly related to the increase in hyperactivity. In extreme cases the frustration inherent in the TV experience can lead to violent activity, whatever the content of the program. Artificially teased senses require resolution. It is bizarre and frightening, therefore, that many parents use television [video game, video, Internet] as a means of calming hyperactive children. It would be far better to calm them with physical exercise, sports, wrestling, hugging, bathing and a lot of direct attention that gives them wide-ranging sensory and intellectual stimulation. Changes in diet would also help. The worst thing one can do for a hyperactive child is to put him or her in front of a television set. Television activates the child at the same time that it cuts the child (or adult) off from real sensory stimulation and the opportunity for resolution.

#### 4. TELEVISION IS SENSORY DEPRAVATION

A parallel has been drawn previously between modern life and conditions of sensory deprivation. Artificial environments themselves reduce and narrow sensory experience to fit their own new confined reality. The effect and purpose of this narrowing is to increase awareness and focus upon the work, commodities, entertainment, spectacles and other drugs that society uses to keep us within its boundaries.

We can consider television to be an advance on that already prevalent condition. Sitting in darkened rooms, with the natural environment obscured, other humans dimmed out, only two senses operating, both within a very narrow range, the eyes and other body functions stilled, staring at light for hours and hours, the experience adds up to something nearer to sense deprivation than anything that has come before it. Television isolates people from the environment, from each other, and from their own senses. In such a condition, the two semi-operative senses cannot benefit from the usual mix of information that humans employ to deduce meaning from their surroundings. All meaning comes from this very narrowed information field.

We know that it is an accepted truth about sensory-deprivation conditions that subjects have no recourse but to focus on the images in their brain. And we know that in sensory-deprivation conditions, having no resources aside from mental images, the subject is unusually susceptible to suggestion.

When you are watching TV, you are experiencing mental images. As distinguished from most sense-deprivation experiments these mental images are not yours. They are someone else's. Because the rest of your capacities have been subdued and the rest of the world dimmed, these images are likely to have an extraordinary degree of influence. **Are we saying this is brainwashing or hypnosis or mind-zapping or something like it?** Well, there is no question but that someone is speaking into your mind and wants you to do something.

First, keep watching.

Second, carry the images around in your head. Third, buy something.

Fourth, tune in tomorrow.

## **VII. THE INGESTION OF ARTIFICIAL LIGHT**

### **1. FROM Starlight TO TELEVISION**

When you are watching television the major thing you are doing is looking at light. The philosopher John Brockman was the first person to put it that way, remarking that this in itself represents an enormous change in human experience. For four hours a day, human beings sit in dark rooms, their bodies stilled, gazing at light. Nothing like this has ever happened before.

Previous generations looked at starlight, firelight and moonlight, and there is no doubt that these experiences stir important feelings. There are cultures that spent time gazing at the sun, but there is no culture in all of history that has spent such enormous blocks of time, all of the people together, every day, sitting in dark rooms looking at artificial light.

### **HISTORY OF TV- Info available from Circuit City Stores, Inc., 2002**

#### **How television works: Analog to Digital**

Since 1953, the television pictures we see have been created using a standard called NTSC because it was established by the National Television Standards Committee. Using these signals, which many now refer to as analog to distinguish them from digital TV signals, the process for creating a color television picture goes something like this.

Creating a picture is the job of the chassis, or circuit board, and the picture tube. Once the chassis receives the video signal from a broadcast, VCR, or others, it amplifies and then processes separately the black and white (luminance) and color (chrominance) components of a color TV signal. The better job the chassis does processing these signals separately, the better the signal that is provided to the tube. Once the chassis is finished, the signal is sent along to the picture tube.

The electron gun at the back of the picture tube begins scanning back and forth from the top to the bottom of the screen it hits thousands of little red, green, and blue phosphorous dots called pixels through a perforated sheet of metal called a shadow mask. Amazingly, using only these three colors, these little glowing dots of color create a full color picture. Because all this is happening at the incredible rate of 30 complete frames every second, we perceive what we see to be full motion images rather than what it is: quickly changing still pictures made up of hundreds of lines and thousands of little dots.

This technology has been in action for almost half a century and now TV joins the digital era. Surprisingly, much of how analog TVs work holds true for digital TVs as well. But digital TVs differ from their analog counterparts in three major ways: format of the signals, the number of pixels, and how they are able to "paint" a picture.

- Compared to analog TV signals, which contain 525 lines of information, digital signals can be made up of as many as 1080 lines of information.
- Instead of the approximately 200,000 pixels you would find in an analog TV, some digital TVs create pictures using as many as 2 million little dots of color.
- And while all analog signals create pictures using a process called interlace scanning, digital signals can dictate that a picture be created using either interlace or progressive scanning, the latter of which gives the picture a smooth, glassy look. If you've ever wondered why the picture on your computer monitor looks so good, you've already seen progressive scan in action.

## **INTERLACING AND PROGRESSIVE**

This refers to the way in which the TV picture is put together.

Currently, the 480 lines of information that create a picture on your TV screen are put together in an odd-even pattern called interlacing. First the odd lines of the picture are placed on screen (1, 3, 5, etc.) and then the even lines (2, 4, 6, etc.). This process is done continually and so quickly (30 complete frames every second!) that we perceive them as full motion. The other way to "paint" a picture on a screen is a method called progressive scan, and it's found only on HDTVs and HDTV monitors because only digital broadcasts and sources like DVD players send a signal this way. Like computer monitors, progressive scan creates a picture by scanning the lines in order, all lines at the same time (1, 2, 3, etc.). The way the picture is created is just one factor that determines picture quality. But that one factor is a big deal when it comes to DVD players. More and more DVD players have progressive scan outputs that are designed to connect to an HDTV or HDTV monitor.

## **Pixels**

Pixels is short for "picture elements" and they are the little dots of color that make up a TV picture. In fact, one really close look at a picture in a newspaper or magazine will show you how enough dots can create a picture. Of course, there is a pretty big difference between the picture quality of a picture in a magazine and a color picture in a newspaper. One of the reasons for this is the number of dots that make up the picture. You have to look pretty closely at a magazine picture to see that it's made up of tiny dots, but the dots in a newspaper picture are much more obvious - in part because there are fewer of them. The point of this little experiment is that the more dots (or pixels on a TV screen) that make up the picture, the clearer and sharper the image.

The current traditional TVs make a picture using up to 200,000 pixels. That's a lot of little dots, but this is one of those rare instances where more is just plain better - widescreen HDTVs and HDTV monitors have up to 2 million. Those extra pixels are capable of creating a picture that's ten times sharper than any TV picture you've ever seen. If you think of traditional TVs as being a newspaper picture, and HDTVs and monitors as a photograph in a magazine, you'll have a pretty good idea of how they compare.

## **2. HOW TELEVISION WORKS: THE OLD AND THE NEW**

Television light is purposeful directed rather than ambient. It is projected into our eyes from behind the screen by cathode-ray guns which are literally aimed at us. These guns are powered by 25,000 volts in the case of color television, and about 15,000 volts in black-and-white sets.

The guns shoot electron streams at phosphors on the screen. This makes the phosphors glow, and their light projects from the screen into our eyes. It is not quite accurate to say that when we watch television we are looking at light; it is more accurate to say that light is projected into us. We are receiving light through our eyes into our bodies, far enough in to affect our endocrine system. Some physicists say that the eye does not distinguish between ambient light, which has reflected off other surfaces, and directed light, which comes straight at the eye, undeterred, but others think the difference is important.

There is another hot debate in physics on the question of whether light is particulate matter or wave energy. For our purposes, however, what needs to be appreciated is that, whether light is matter or energy, it is a thing

which is entering us. When you are watching television, you are experiencing something like lines of energy passing from cathode gun to phosphor through your eyes into your body. You are as connected to the television set as your arm would be to the electrical current in the wall about which there is the same question of wave versus particle if you had stuck a knife into the socket.

These are not metaphors. There is a concentrated passage of energy from machine to you, and none in the reverse. In this sense, the machine is literally dominant, and you are passive.

### **3. HEALTH AND LIFE**

In the 70's, John Ott was a major source for government agencies seeking evidence of the effects of X ray radiation emanating from television sets. He had been instrumental in convincing lawmakers to reduce the allowable limits of TV X rays. There was a time when fifty millirems per hour was permissible, but it was reduced to one one-hundredth of that, one half a millirem per hour. Ott still argued that even that was too high. In one celebrated series of studies, the roots of bean plants he placed in front of color television sets grew upward out of the soil. Another set of plants became monstrously large and distorted. Mice which were similarly placed developed cancerous lesions. Ott argued that any amount of X ray emanation from television was likely to be harmful to humans.

In his book "Health and Light", Ott devotes himself less to discussing X rays than he does to discussing a more subtle danger in our environment, artificial light, particularly fluorescent. In this case, his research is not directed specifically at television light but since television is fluorescent, the work is directly applicable.

While doing his time-lapse photographic work on plants, Ott made his first discoveries concerning interactions between the plants and the lights he was using for the photography. He noticed that when he changed from incandescent lighting to fluorescent, for example, plants would suddenly cease to grow in one pattern and grow in another. His time-lapse photography was able to record the change.

Also, as he changed from one fluorescent to another, similar peculiarities would appear on the film. Differences also occurred when the plants were moved from all artificial light-sources into natural light.



Ott became interested less in the photography than in these changes. He began to change the lights deliberately to see what would happen. Then he undertook microscopic photography of the plant cells to learn if it was possible to see the changes in cellular activity.

The cellular action of plants is called "the streaming of the chloroplasts." Through a microscope one can see the millions of cells moving about in an orderly pattern, resembling in some ways a traffic flow. Ott discovered that when plants were kept in sunlight, the chloroplasts would continue in their regular pattern. When the light had to pass through ordinary window glass, groups of chloroplasts would begin to "fall off the streaming pattern." Under artificial lighting, the behavior of the chloroplasts altered markedly. As Ott changed the light from incandescent to fluorescent, or from one color of fluorescent to another, the chloroplasts might move faster or more slowly, group sluggishly, or they might leap about crazily, completely out of synchrony with the prior pattern.

The results were so marked that Ott began to wonder if similar cell changes could be found among laboratory animals when they were switched from one light source to another. The science of photo-biology has discovered that humans and animals, which are made up of virtually the same chemical mixture as plants (save for chlorophyll), also react to light in various ways. We receive light through the cells of our skin, but more remarkably, we receive light through our eyes and absorb it into our cell structure. Ott was interested in determining what effect changes in light might have on a particular strain of cancer-sensitive laboratory rat; he wanted to know if differences in cancer rates resulted from differences in light sources.

They did. Pink fluorescent produced the highest rates of cancer in rats; natural daylight the lowest. In one experiment involving three hundred cancer-sensitive mice, these were the results:

#### **LIGHT SOURCE SURVIVAL RATE**

ordinary daylight 97%  
all fluorescent 88%  
white fluorescent 94%  
pink fluorescent 61 %

In another experiment involving two thousand mice, he found that those kept under pink fluorescent developed **tumors** and died, on the average, within seven and a half months. Those kept under other light sources had an average life span double that of the first group.

**Cancer** wasn't the only reaction to artificial light. When mice were kept under one particular pink fluorescent for long periods of time, their tails would literally wither and fall off.

Under a certain dark blue fluorescent, the **cholesterol** level in the blood of the mice rose sharply; male mice became **obese**, although the females did not.

Ott worked with other animals as well. A red filter placed over ordinary incandescent light was found to **weaken and rupture the heart cells** of chick embryos. A blue incandescent light placed over the cages of chinchillas **increased the number of females** in the litter; a similar light increased the female population of some fish in a tank.

Other light changes caused **aggressiveness, hyperactive behavior, aimlessness and disorientation, as well as changes in sexual patterns** among mice, rats and other animals.

In his book, and in a later three-part article in the medical journal "Eye, Ear, Nose and Throat Monthly" (July 1974), Ott spelled out how he believes light affects us. He first explains the connection between the light we receive in our eyes and our cell structure. This is the chain of events: Light passes through the eye to contact the retina. The retina has what Ott calls a "dual function." The first is the obvious one: translating the light into images by way of channels to the brain. The second, equally important function is for the light rays, aside from their role as image creators, to pass via neurochemical channels into and through the pineal and pituitary glands and therefore into the animal and human endocrine systems.

Identifying this series of connections is not original with Ott. Many researchers have found that this interaction **affects hormonal structures, sexuality, fertility, growth** and many other aspects of animal and human cell structure. Ott says the kind of light that passes through the eyes determines the reactions of human cells. His experiments on plants and animals were attempts to demonstrate that even minute changes in

wavelength spectra (what we call "color") between one kind of artificial light and another, or between natural light and artificial light, cause important biochemical alterations.

#### **4. LIGHT AND WAVELENGTHS**

Critical to understanding all of this is the term "light," which does not apply to a single, monolithic element. When we speak of "light" we ordinarily do not make distinctions between natural light or artificial light; nor do we make a distinction between what kinds of artificial light. We tend to lump all of them together. One flips the switch to "on" and what one gets is "light." When it is "on" one can see.

But there is where the similarity ends. Natural sunlight is made up of all the radiant wavelengths of energy (spectra) that fit within what we call "light." What's more, it contains them in a specific mixture. Artificial light from any source, whether incandescent or fluorescent, leaves out many segments of the spectral range contained in natural light, and it delivers an entirely different mix of spectral ingredients. Incandescent light, for example, emphasizes the portion of the spectrum near the infrared while minimizing or leaving out others. Artificial light is quite literally not the same element as natural light. To use the same term for both is to destroy understanding.

We learned in high school that plants ingest light and then convert it to energy for growth. The process is called photosynthesis. The plant literally takes light into its cells and converts it into nourishment. For a plant, light is a form of food. Ott has shown that changing the light source so that a plant ingests one set of spectral ingredients rather than another changes the nourishment and therefore the cellular and growth patterns of the plant. If you grow your own plants at home, you also know this to be true. You may not have a microscope with which to watch it, but if you move a plant nearer to the window (or farther away), it changes. Plant stores now sell special bulbs which help plants grow. When you move the plant or buy the bulb, what you are doing is changing the amount and the spectral character of the light the plant receives. You are changing its diet. Through photobiology we are finally beginning to grasp that what is true for plants seems also to be true for animals and humans. For all, light is a kind of food. Humans take the light in through the eyes and via the retinal - pituitary -endocrine system, it passes into the cells.

Ott's particular contribution to photobiology is that he began many years ago, to say that the exact mix of spectral ingredients that we ingest affects many aspects of human health and vitality. As you change the light, you change the spectra; as you change the spectra, you change the light-nourishment that finds its way to the cells; as you alter the cells, you alter the human body.

## **5. FROM OUTDOOR TO INDOOR**

To determine what mix of spectral ingredients is likely to produce the most vital humans, a logical place to start is with natural light, since this is the only light that humans ingested for thousand of years.

During all of that time, the only human experience of light was of natural light: sun, moon, stars and fire. Therefore, whatever light-receptive capacities exist in humans and whatever cellular reactions humans have to light, they must have evolved to be attuned to the particular spectra emitted by those light sources.

In the past century, we invented artificial light. It has been only a few generations since artificial light became so widespread that we moved into artificially lighted environments. Now, most of the light we ingest through our skin and eyes is artificial. Meanwhile, we no longer receive the light we formerly received, because we are no longer outdoors. It is a kind of madness to think that this change would not affect us, another sign of our removal from any understanding of our interaction with the environment.

Ott has coined the term "malillumination" to describe the results on the body. We are "starved" for some natural light spectra, he says, and we have "overdosed" on those spectra that come from artificial lights: incandescent, fluorescent, mercury vapor, sodium, television and others.

Imagine that you suddenly gave up eating all fruits, vegetables, grains, nuts and began eating pasta, candy and sugary cereals only. All these groupings are "food," but the nutrients within each are substantially different. Where they are the same, there is some protein, for example in candy, they are of entirely different proportions. Eating pasta, candy and cereal will keep you alive, but eventually it will affect your health. And so it is with alterations in light-diet from the "natural" mix of spectral ingredients to the artificial mix.

Ott suspects that malillumination causes disorders ranging from lack of vitality to lowered resistance to disease, and hyperactivity. He believes it can also lead to aggressive behavior, heart disease and even cancer. He argues that the body cannot handle this intervention in a natural human relationship with the environment any more than it can handle food additives or chemicals in the air. The body breaks down on the cellular level.

As our lifestyle removes us further from full spectrum natural light and into artificial environments, our condition becomes worse. Even when we are outdoors, Ott points out, we filter the light that we receive in our eyes with sunglasses (which eliminate certain spectra, while allowing others to pass through) as well as eyeglasses and window glass. Smog also has a role, he says, quoting a Smithsonian report indicating that during the last one hundred years there has been decrease in sunlight reaching the surface of the planet.

## **7. SEEKING THE LIGHT**

We know that humans seek food. A lot of life is spent in this process. We can say that seeking food is instinctive in all humans. Even babies know how to do it, within their limits. If light is also food, then might we not seek it, as plants do? Is this why we look at the moon? Is this why we gaze at fire? Is there an innate longing for light, like a kind of cellular hunger? If so, then Anne Waldman could be right when she writes: "With natural light gone, we seek a **surrogate light: television.**"

Wurtman, professor of endocrinology and metabolism at MIT, also argues in "Scientific American" magazine, that the body can be seriously affected by changes in light spectra. Wurtman's descriptions are very similar to Ott's.

"Since life evolved under the influence of sunlight, it is not surprising that many animals, including man, have developed a variety of physiological responses to the spectral characteristics of solar radiation. The findings already in hand suggest that light has an important influence on human health, and that our exposure to artificial light may have harmful effects of which we are not aware. The solar spectrum is essentially continuous, lacking only certain wavelengths absorbed by elements in the sun's atmosphere, and at midday it has a peak intensity in the blue-green region from 450 to 500 nanometers. . .

"The most familiar type of artificial light is the incandescent lamp, which is strongly shifted to the red or long-wave length end of the spectrum. Indeed about 90% of the total emission of an incandescent lamp lies in the infra-red.

"Since the [human] photoreceptors are most sensitive to the yellow-green light of 555 manometers, most fluorescent lamps are designed to concentrate much of their output in that wavelength region. . . since fluorescent lamps are the most widely used light sources in offices, factories, and schools, most people in industrial societies spend many of their waking hours bathed in light whose spectral characteristics differ markedly from those of sunlight,"

Wurtman offered a chart that traced the path of light through the eye showing graphically what Ott had called the "dual function." The light passes through the eye and creates chemical interactions in the pineal gland, the pituitary gland, the hypothalamus, the spinal cord, various nerves as well as the ovaries and the gonads, thereby affecting sexuality and fertility.

"When young rats are kept continuously under light, photo-receptive cells in their retina release neurotransmitters that activate brain neurons; these neurons in turn transmit signals over complex neuroendocrine pathways that reach the anterior pituitary gland where they stimulate the secretion of the gonadic hormones that accelerate the maturation of the ovaries."

Wurtman indicated that among rats that had their eyes or their pituitary gland removed, ovarian growth was no longer affected by light. He suggests that no one has yet identified which light spectra are the catalysts for ovarian action.

Louise Lacey, in her book *Lunaception*, makes the argument that women's menstrual cycles in pre-technological times were attuned to moonlight. Wurtman, who perhaps had not read the book, was effectively presenting evidence for how this could happen.

Wurtman indicated there are some diseases that are known to be affected by specific light spectra. A skin disease, erythropoietic protoporphyria, is

caused by an imbalance reaction to wavelengths in the region of 400 manometers, the region of the color violet.

Herpes infections and psoriasis represent imbalances within a similar range: 365 manometers, ultraviolet. (The treatment for these now combines light-therapy with the ingestion of certain herbs and foods. The light apparently interacts with the food, just as Ott said it would.)

With respect to infant jaundice Wurtman reports: "...Premature American infants were successfully treated with light, the sole therapy for neonatal jaundice. . . blue light is the most effective in decomposing pure solutions of bilirubin, an imbalance of which. causes the problem. . . however full spectrum white light in almost any reasonable dosage has proved effective in lowering plasma-bilirubin levels. . . . The observation that ordinary sunlight or artificial light sources can drastically alter the plasma level of even one body compound opens a Pandora's box for the student of human biology. It represents the strong possibility that the plasma or tissue levels of many additional compounds are similarly affected by light. Such responses must be physiologically advantageous, but some may not be."

Wurtman also considers the periodicity of light and the mammalian relationship to the light-dark cycle. He says that as we make our days longer with artificial light, there are major changes in the body. He reports relationships between time of day or night and contents of the blood, temperature of the body, sleep and wakefulness, the production of catecholamines, magnesium, sodium, potassium, phosphates and other minerals.

"We have investigated the daily rhythmicity in the body temperature of rats to see what colors of light are most effective in inducing a change in rhythms to a new light-dark cycle and what intensities are needed. The body temperature of rats normally rises by one or two degrees centigrade at the onset of darkness and falls again at daybreak. We found that green light is the most potent in changing the phase of the temperature cycle and that ultraviolet and red wavelengths are the least potent."

Wurtman concludes: "Both government and industry have been satisfied to allow people who buy electric lamps, first the incandescent ones and now the fluorescent, to serve as the unwitting subjects in a long-term

experiment on the effects of artificial lighting environment on human health."

[Study Continued in File 23...](#)