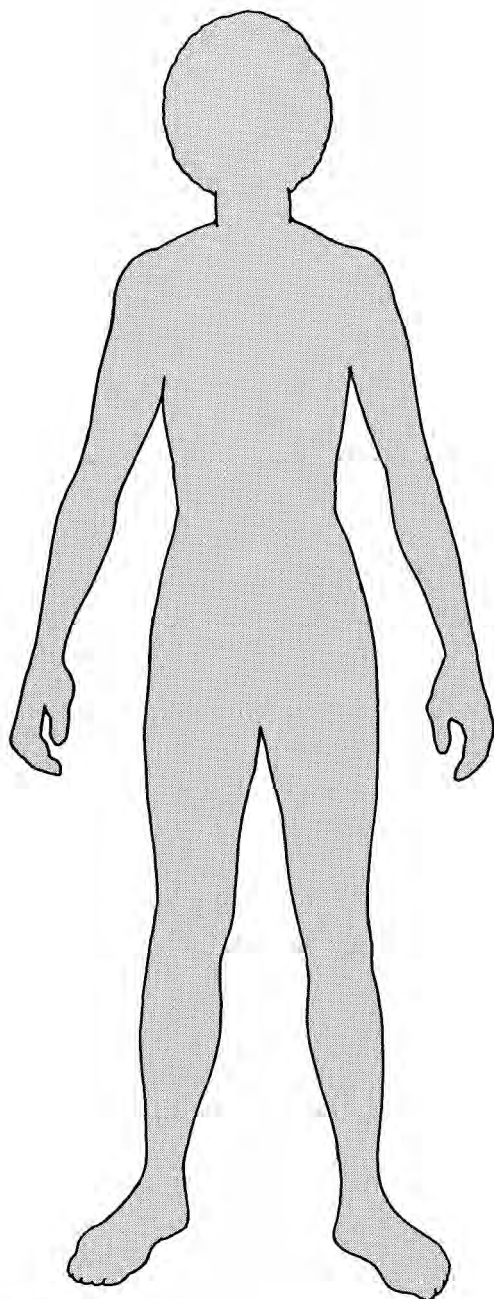


The Skin



Objectives

Students will:

- identify the layers of skin
- discover how our sense of touch works
- learn about other jobs skin performs.

Building Understanding

1. Ask students which sense organ does the work of touching and then have them touch one finger to their cheek. Point out that they are sensing their finger touching and their cheek being touched.

2. Start a list on the board entitled “What Skin Does” and ask students to brainstorm everything they can think of. (The list may include: senses touch, senses heat, senses cold, feels pain, sweats, itches, grows hair, has freckles, has pimples, gets oily, gets sunburned, etc.)

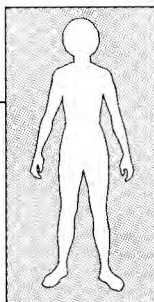
3. Ask students how they depend upon their sense of touch each day—at home, in school, during sports, etc. Take empty cardboard boxes and place an object, such as an apple, a pencil, a marshmallow, etc., in each box. Then call on students to reach into each box and describe the object in as much detail as they can, based on touching it. Ask students what they think the object is. If you have a pair of gloves or mittens, have students try to identify the objects with their fingers covered. Ask students if it is easier or more difficult. Why do they think so?

Making The Model

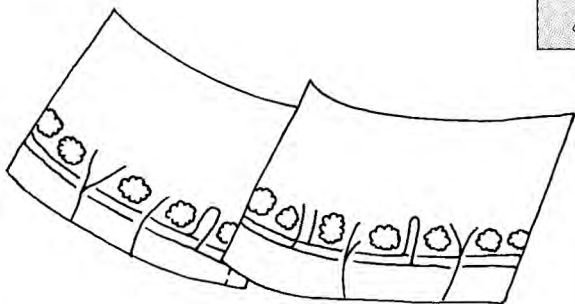
1. Reproduce a set of pages 5–10 for each student.

2. Have each student locate pages 5 and 6. labeled the SUBCUTANEOUS part of the skin. Have students place the left edge of page 6 over the edge of

The Skin



page 5 as indicated and tape them together to form one long piece.



stick out above the surface of the model, just as it does in the human body.

Using The Model

3. Have students find pages 7 and 8, the DERMIS of the skin. Cut out the top part of each page along the cut line and *save* the lower parts. Place the left edge of page 8 over the edge of page 7 as indicated and tape them together. Place taped pages 7 and 8 over taped pages 5 and 6 and fasten everywhere it says TAPE by folding tape to form a hinge.

4. Have students find pages 9 and 10, labeled the EPIDERMIS of the skin. Cut out the top parts as in Step 3 above, *saving* the lower part of page 9. Tape the edge of page 10 over the edge of page 9. Then place the taped piece on top of pages 7 and 8 and tape with a hinge everywhere it says TAPE.

5. Call attention to the places on the model that say PASTE HEAT HERE, PASTE HAIR HERE, etc. Have students cut out each piece on the lower parts of pages 7, 8, and 9 *one at a time* and tape each in the appropriate place on the model. You may wish to have students label each piece as it is taped so they will remember which is which.

•Note that only the bottom part of each hair is taped. Each taped-in hair will

1. Ask students to follow along on their models as you explain how our sense of touch works. Explain that skin has three main layers: the outer layer, or EPIDERMIS; the middle layer, or DERMIS; and the lower layer, or SUBCUTANEOUS (another word for “subcutaneous” is “hypodermic”). Ask students to find and label each layer on their model as you mention that the word *dermis* means true skin, the prefix *epi-* means above, and the prefix *hypo-* means below.

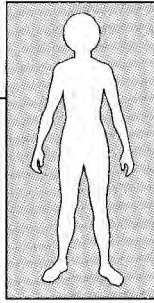
Focus on the epidermis and the dermis and explain that they contain different kinds of nerve endings. LIGHT TOUCH nerve endings can sense a breeze blowing across the skin or a feather being brushed across it. PRESSURE endings sense objects that press against the skin. HEAT and COLD nerve endings sense the temperature of things we touch or that touch us, while PAIN endings warn us to stay away from things that can harm us, such as objects that are too hot, cold, or sharp. Pain endings also sense that the skin has been injured.

When stimulated, each different touch nerve ending sends electrical signals to the brain where there are centers for touch, pain, etc. The brain decides what we are touching or what touched us and what, if anything, we should do, such as pull our hand away, pet the cat rubbing against us, etc.

2. You may wish to mention the following to older students:

a. Skin protects body parts, helps keep dirt and germs out, helps keep

The Skin



body fluids in, and even makes vitamin D.

b. The EPIDERMIS is only as thick as a sheet of paper. Dead cells that keep flaking off the body make up the top part of the epidermis, while live cells that keep dividing into new cells that push older cells toward the surface make up the lower part of the epidermis. Pushed-up cells die before they reach the skin surface.

c. The DERMIS is about 15 to 40 times thicker than the epidermis and is made up of live cells and elastic tissue.

d. Focus on the hair and explain that hair grows from the dermis to the skin surface in sacs called *hair follicles*. Live hair cells at the bottom of each follicle make up the hair root. As root cells grow and divide, they push older hair cells up. These pushed-up cells die, get filled with tough keratin, which is a protein, and eventually reach the skin surface as the hair we see. Hair grows less than an inch a month. When it grows to a certain length, it falls out and new hair grows in its place.

e. Point out on the model that connected to each follicle is an oil gland and explain that it produces oily serum which flows onto the skin surface. Sebum helps keep hair and skin smooth, waterproof, and supple.

f. There is a small muscle attached to each follicle that can contract and pull the follicle so its hair stands on end, causing the skin around it to form a "goose bump." Ask students when they get goose bumps (e.g., when they are cold or frightened).

g. In the DERMIS there are also sweat glands that resemble coiled snakes at one end. Explain to students that when their body temperature

rises, sweat glands give off salty, liquid sweat, or perspiration, through an opening in the epidermis called a *pore*. When sweat evaporates from the skin surface, it removes heat, thereby cooling the body.

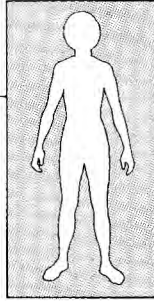
h. The SUBCUTANEOUS contains cells that store fat and small BLOOD VESSELS that branch into the dermis. Fat helps us keep warm on cold days. Blood vessels transport blood rich in nutrients and oxygen that skin cells need to work properly. Blood also carries away wastes. On hot days the vessels that are small arteries widen to allow more blood to flow to the skin so body heat can escape. On cold days they narrow to keep body heat in.

More To Do And Learn

1. Color the Model

Call attention to the stars in the epidermis on the model and explain that each star stands for a cell that produces the brown pigment called *melanin* that shields live skin cells from harmful ultraviolet rays in sunlight. Melanin colors our skin, hair, and eyes. Most people have the same number of melanin-producing cells. The amount of melanin produced determines a person's skin color. You may also wish to note that hemoglobin, the substance in red blood cells that carries oxygen, gives skin a pinkish tint, and that the chemical carotene in fatty skin parts adds a yellowish tint to skin. Invite students to draw stars through the lower epidermis on the right side of the model, then color the epidermis. Students can then color the hairs growing out of the skin, the nerve endings in the dermis, etc.

The Skin



2. About Tanning and Burning

Explain that sunlight can cause skin cells to produce more melanin, which darkens the skin as a tan. Too much sun, though, causes the redness, swelling, and pain of sunburn. Over time, it can also lead to skin cancer, as a result of excessive exposure to ultraviolet rays in sunlight.

3. What's a Pimple?

Point out the oil droplets drawn in the oil gland on the left side of the model. Explain that if too much oil is produced, it can plug a hair follicle. A plug below the skin surface forms a whitehead. A plug that reaches the skin surface and turns dark is a blackhead. If a plug becomes infected and swells, a pimple forms. Students can draw oil droplets in the gland on the right side of the model, then color in a plug in the follicle that forms a whitehead, blackhead, or pimple.

4. Sweating it Out

After physical education class ask which students are sweating. Then invite students to draw drops of sweat coming out of the pore on the skin surface of their model.

5. Where's the Fat?

Ask students to find the round fat globules drawn in one of the groups of fat cells in the subcutaneous. Invite them to fill all of the other groups of cells with fat globules. When students have learned about the circulatory system, they can return to this model and color the small arteries red and the small veins blue. The cross line between these vessels stands for tiny capillaries, half red, half blue.

Making Connections

Divide students into groups and ask them to prepare the following to present to the class:

- a. A skit in which each member of the group is a part of the skin doing its job and one member portrays different things touching the skin.
- b. A report on Braille.
- c. A report on what happens to skin when we have a cut.
- d. A report on what grows out of skin in fishes, reptiles, and birds.
- e. A report on what the ozone layer of the atmosphere has to do with skin.

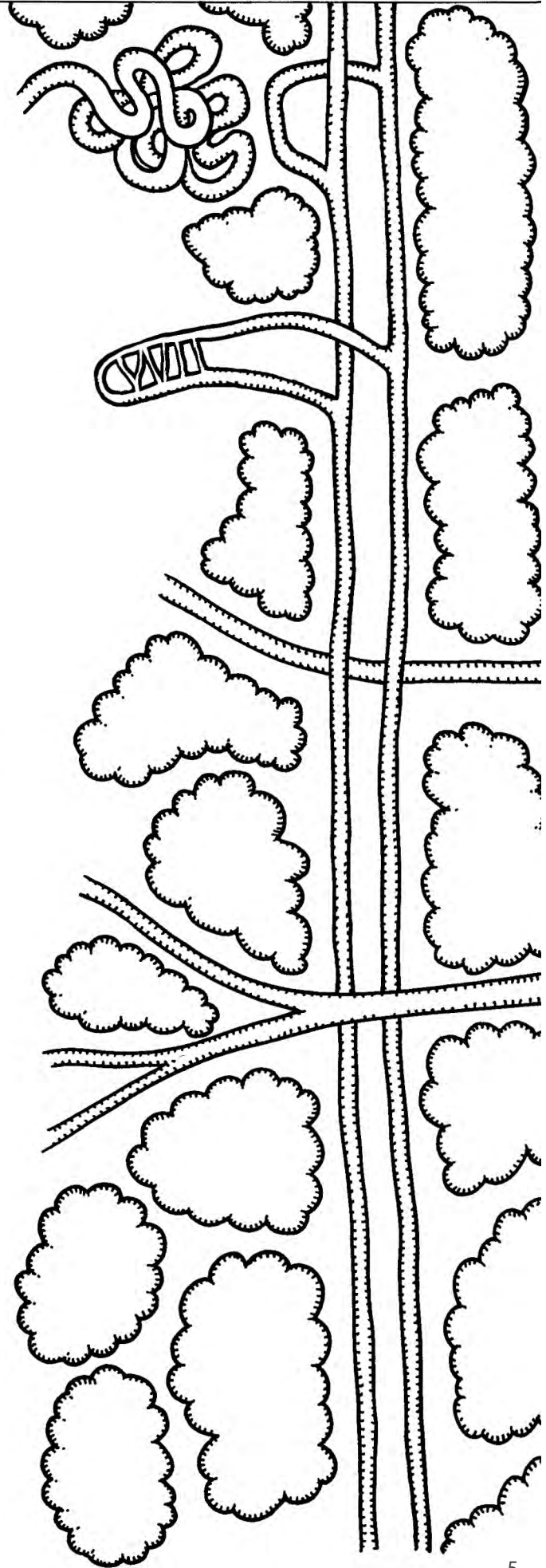
Healthy Choices

1. Teach students that abuse of drugs can cause uncontrollable sweating, a dulled sense of touch, and an inability to feel pain. Ask students why it could be dangerous *not* to be able to sense pain.
2. Explain that some student athletes who want to increase muscle strength and size so they can perform better sometimes abuse drugs called *anabolic steroids*. Some non-athletes also take these drugs to increase their muscle mass. Stress that anabolic steroids are very dangerous because they increase the risk of cancer and heart disease, as well as often producing violent personality changes. With respect to skin, they can cause skin to discolor, cause an increase in facial and body hair growth, and cause severe acne.

TAPE

SUBCUTANEOUS

THE SKIN AND TOUCH



TAPE

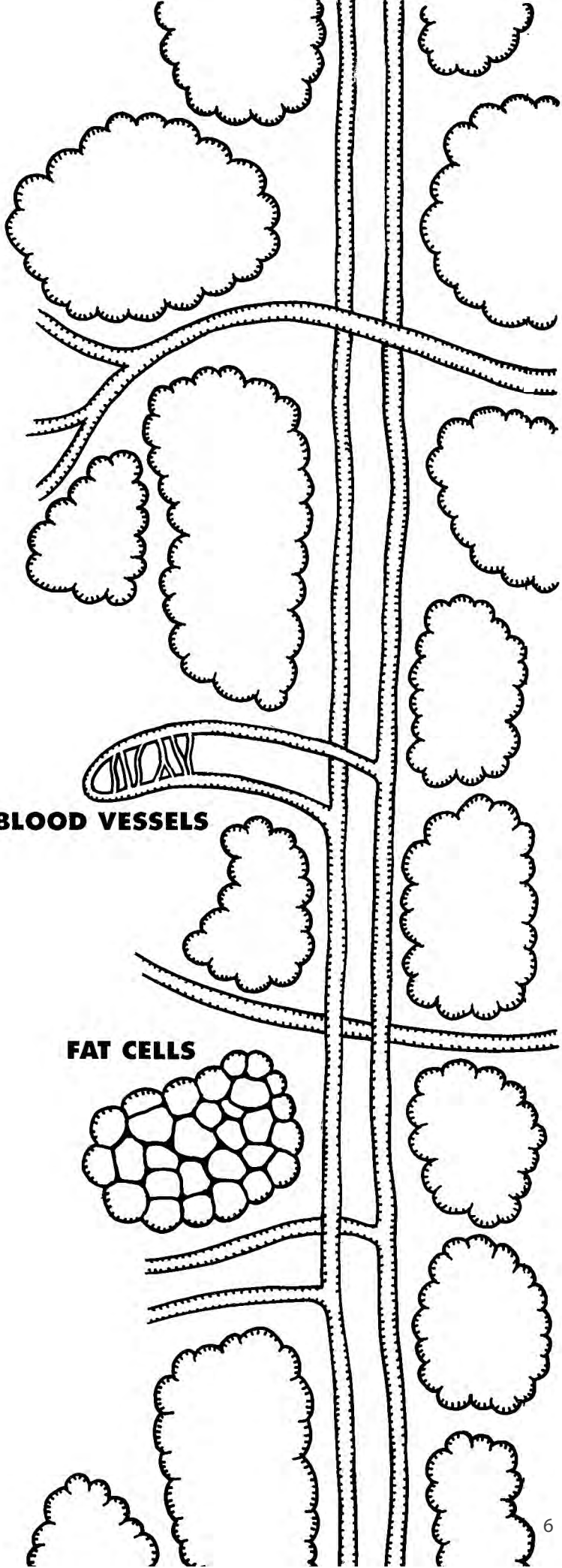
TAPE

TAPE

SUBCUTANEOUS

BLOOD VESSELS

FAT CELLS



TAPE

OIL GLAND

TAPE
HAIR HERE

DERMIS

MUSCLE

TAPE
PRESSURE
HERE

TAPE
TOUCH
HERE

PAIN

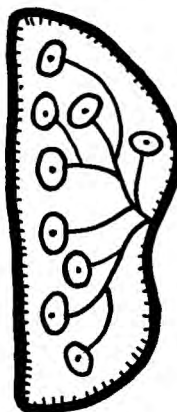
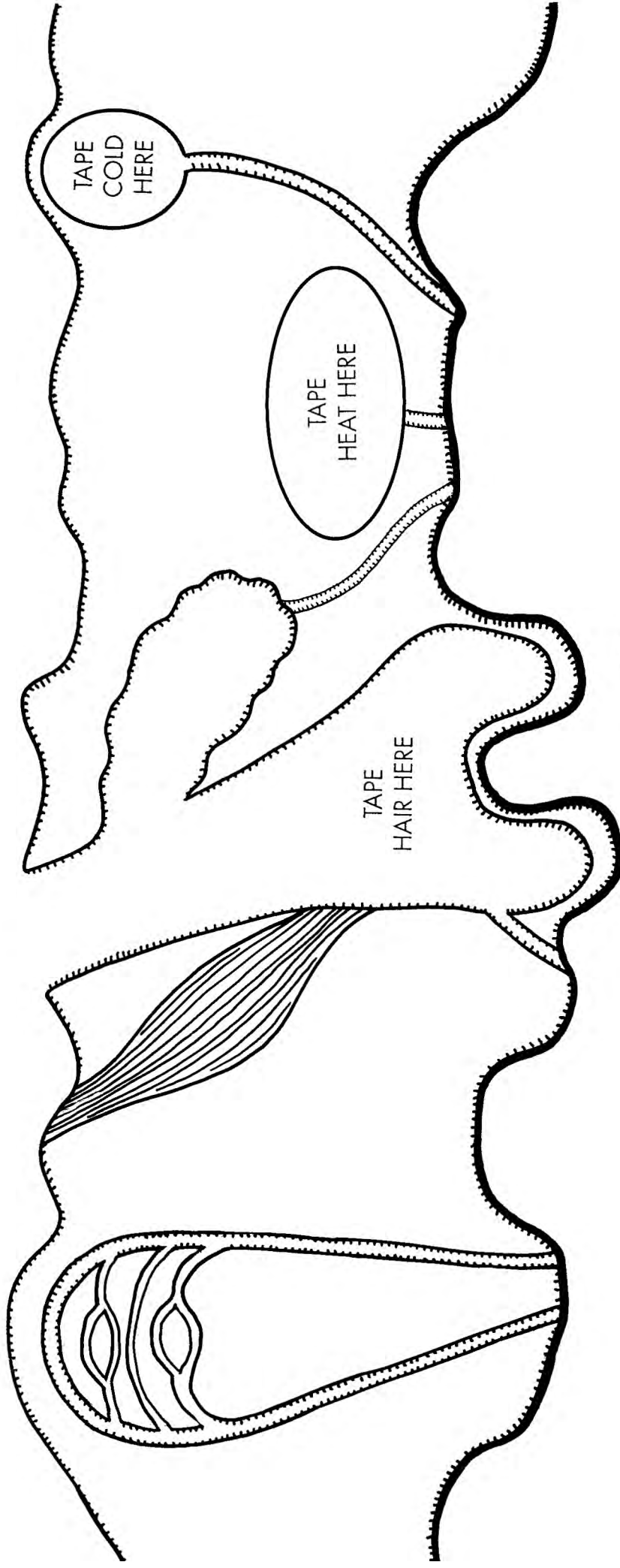
HEAT

TAPE

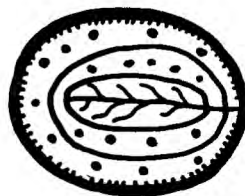
TAPE

TAPE

DERMIS



LIGHT TOUCH



PRESSURE



COLD



TOUCH

TAPE EDGE OF
PAGE 48 HERE

TAPE

EPIDERMIS

TAPE LIGHT
TOUCH HERE

TAPE
PAIN HERE

HAIR

HAIR

TAPE

EPIDERMIS

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