CONNECT TO CHEMISTRY

While Karen was blow-drying her hair, she noticed that her silver earring had become uncomfortably hot. If her earring was about the same mass as her earlobe, ***infer*** which of the two had the higher specific heat.

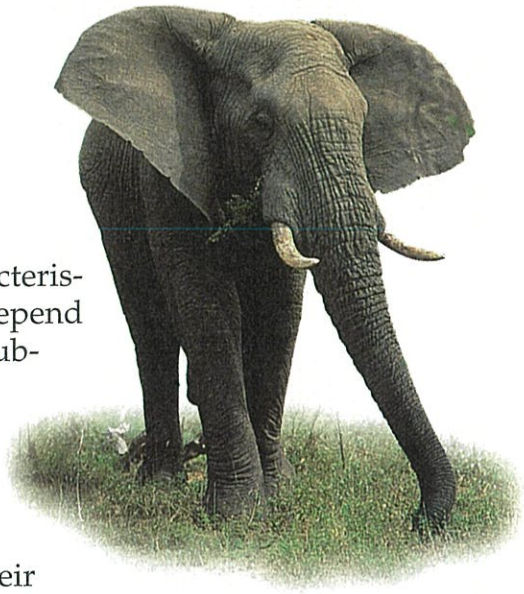

Figure 5-18
Different animals use different methods to cool themselves. *Why are elephants' ears so large?*

The thermal energy characteristics of complex systems depend on the specific heats of the substances involved and the masses and shapes of the systems. For example, as shown in **Figure 5-18,** elephants fan their ears to dissipate heat and lower their body temperature. Without this ability, the large mass, shape, and high specific heat of the materials in an elephant's body would keep its temperature too high.

With your new understanding of specific heat, think about temperature changes you've observed in objects around you. Now you have an idea about why a kettle of water takes so long to boil and why a sandy beach heats up quickly on a sunny day.

Section Wrap-up

Review

1. A bucket of sand and a bucket of water are side by side in direct sunlight. Which warms faster? Why?
2. Use **Table 5-2** on page 141 to calculate the change in thermal energy when a 55-g iron nail cools from 90°C to 25°C.
3. **Think Critically:** Water and a liquid called ethylene glycol are used in automobile radiators to keep the engine from overheating. Explain whether you would rather have a coolant with a high or a low specific heat.

USING MATH

Suppose you are on a diet that recommends intake of 9 000 000 J (more than 2000 Calories) each day. If you add this amount of heat to 50 kg of water, how much would the water's temperature rise?

Skill Builder
Interpreting Data

Equal amounts of iron, water, and sand, all at the same initial temperature, were placed in an oven and heated briefly. Use the data in **Table 5-2** on page 141 to match each final temperature with the appropriate material: 31°C, 5°C, and 46°C. If you need help, refer to Interpreting Data in the **Skill Handbook.**