9 Using clothes to keep warm

To keep ourselves warm we need to stop too much heat from leaving our bodies.

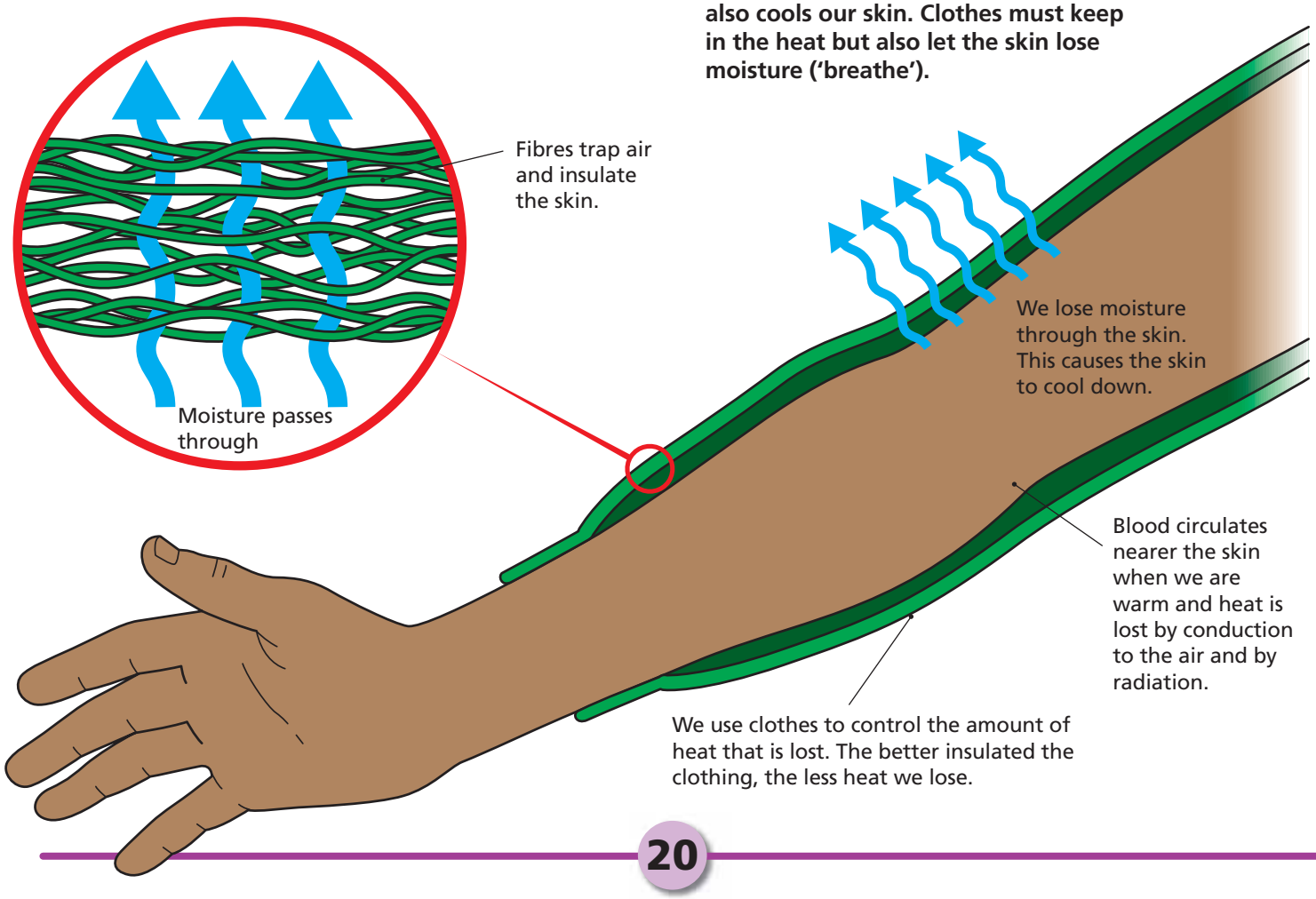
Keeping our bodies warm is vital, but we have to think about comfort and movement as well as warmth.

Warm clothing

The easiest way to keep warm is to keep cold air or water from moving past our bodies and carrying heat away by conduction.

One of the best insulators is **PLASTIC**. We could wrap ourselves in plastic sheet or plastic foam. This would keep us warm, but within a few seconds we would be very uncomfortable. This is because we are always losing moisture, as well as heat, through our skin in the form of sweat. Plastic will not allow moisture to go through it, and so the moisture trapped near our skin would soon make the plastic clammy and wet. Within a short time, we would be so uncomfortable that we would be pulling the plastic off.

▼ (Picture 1) Our skin loses heat by conduction and radiation. Sweating also cools our skin. Clothes must keep in the heat but also let the skin lose moisture ('breathe').



▲ **(Picture 2) This cross-section of a ski-glove shows how many layers of fibre are used to trap air and insulate the fingers.**

Letting clothing breathe

The secret to keeping warm and comfortable was discovered thousands of years ago. It was to wear clothes made of **FIBRES**. Materials made from fibres are not solid, but are thin strands that are **WOVEN** together into a fine net (Picture 1).

Curiously, when we use fibres, we are not really using the insulating property of the fibre. Instead, we are relying on trapping air between the fibres. Air is a very good insulator, and also weighs very little.

If we trap air, we keep it from circulating and stop convection. At the same time, moisture can escape into the air, so we feel more comfortable (Picture 2).

Using the weave

We can trap different amounts of air, depending on the fibre we use and the way it is woven. Think about wool, for example. This is a naturally curly and bulky fibre, so it weaves together to make a cloth that traps lots of air and is naturally warm. It is good for when we need to be in places which are cold.

Now think about cotton. This is a naturally fine fibre that packs down well. As a result it does not hold as much heat as wool and is more suitable for use when we want to protect ourselves from the heat of the Sun as well as slight, cool, breezes. This is why it is used in many hot countries.

Summary

- **Clothes prevent air moving over the skin and carrying heat away by conduction.**
- **Clothes trap insulating air between fibres.**
- **Fibres need to be woven in order to let moisture escape, as well as keep heat in.**

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