best, as being better non-conductors. A white hive will be cooler in very hot weather and warmer in very cool weather than one of any dark color"

Heat *for our purposes*, may be divided into luminous and obscure. The source of lumnous heat is the sun, and comes to us in the form of light. Obscure heat is a product of the tissue change going on constantly in the bee. Many think that color modifies radiation and absorption. This applies to luminous heat; not to obscure heat.

There are four factors for our consideration.

1 ABSORPTION.

White is not the coolest because it is a "better non-conductor" but because it absorbs less heat than darker colors. *Experiment 1.* Take three thermometers, surround the bulb of one with white, another with red, another with black. Place equally favorably situated in the sun and watch results. The white will register the lowest and the black the highest. Other colors may be used, hence, we conclude, that *color modifies luminous heat.* Black absorbing most; white the least, and white hives will be the coolest for summer, black the warmest.

2 CONDUCTION.

Concerning conduction and convection we will have little to say.

The woods employed for hive building are not dense in structure and therefore contain considerable air. Conductivity of heat is inversely proportional to potosity; hence plaster of paris is used between the plates in the manufacture of fire-proof safes, on account of its pores or meshes, when set containing much air. Loosely packed chaff hives are warmer in winter than densely packed ones. Woolen garments are warmer than cotton on account of the air confined in the meshes of the former.

3 CONVECTION.

Convection promotes the circulation of air in the hives.

RADIATION.

*Experiment 2.* Take one of Leslie's cubes, which is simply a cube of copper, hollow, with sides of the same thickness. Cover three of its sides, one with white, another with red, and another with black velvet of precisely the same texture. Leave on fourth side polished copper. Fill the cube with boiling water, place four thermometers equally favorably situated, one from the centre of each side the bulbs being ½ inch from the surfaces. Watch results, the three velvet sides will radiate alike; the polished copper side radiating least. Hence, we conclude *color has nothing to do with the radiation of obscure heat.* And a white hive will not, therefore, be warmer in very cold weather than one of any other color. We are frequently told that white stockings and white clothing are warmer in winter than black or any other color.

Experiment fails to confirm this statement, but, let us be careful of error here, for by Leslie's cube being used with other substances and calling lampblack the standard for radiating power, the following results will be obtained:

| | |
|---|---|
| Lampblack | 100 |
| Whiting | 100 |
| Paper | 98 |
| Sealing wax | 95 |
| White glass | 90 |
| Varnished lead | 45 |
| Mercury | 20 |
| Polished lead | 19 |
| " iron | 15 |
| Tin. gold and silver | 12 |

And as black paint often contains carbon, and white paint lead, the relative radiating powers of these *paints* can be approximated by at the above table.

Interesting questions will here present themselves.

WHITE POLAR BEARS.

Those who believe color influences radiation believe polar bears are warmer white than if they were any other color. Does experiment 2 support this view? The question of uniformity of temperature favoring comfort may come up.

While the sun shines on bruin he would certainly be cooler white than any other color (Exp. 1.) and when the sun did not shine he would be no cooler white than black, but probably the correct view is to be found in the fact that he would be safer from his enemies, as being more difficult of detection.

WHITE SNOW.

If the snow were black it would absorb much more heat from the sun, and hence, melt easier.

OUR COLORED FRIENDS

In equatorial regions demand slightly different treatment, although the same reasons will apply to their always desiring white clothing in hot weather.

Nature's method, for the reduction or maintaining the equilibruim of temperature in animals, is by evaporation or perspiration. For example, take the temperature of our friend Doolittle. It will be found 98.5. Run him a mile or so, his temperature will be yet about 98.5, but he has lost considerable sweat probably. Latent heat of steam is 537 *i. e.* the heat employed in changing one pound of water into steam will raise the temperature of 537 lbs. water from 0. C. to 1. C.; and the surplus heat.