ened invasion of migrating springbuck which would otherwise have utterly ruined the crops in the district (vol. iii., p. 92).

Man, however, is not altogether to blame for the scarcity of some of the larger animals of South Africa. Rinderpest undoubtedly played havoc among them, and large numbers of kudu, African buffalo, and others are known to have been decimated by this dread disease.

The smallest of the South African antelopes, about the size and weight of a large hare, is the blue duiker. It is wonderfully alert, and possesses the senses of sight, hearing, and scent in a high degree of perfection; so much so, indeed, that the bushbuck is believed to have made some sort of compact with it for their mutual protection (vol. iii., p. 42).

The fourth volume deals with the insectivores, rodents, whales and their kindred, and the edentates. One of the most interesting features of the South African fauna is the presence of the golden moles. Though very similar in habit to their European relations, the golden moles differ from them in structure and colour, and have been placed in a distinct family. It is worthy of note that an extinct relation of this isolated group (Necrolestes) has been discovered in the Santa Cruz deposits of Patagonia. The several curious burrowing rodents—viz. the blesmol, mole rat, and sand mole—are sometimes mistaken for true moles. They belong to quite a different order, and feed on roots, whereas the golden moles are insectivorous. The author's statement (vol. iv., p. 170) that two species of the octodont tribe of rodents inhabit South Africa requires some modification, for probably neither of these should be included in the family Octodontidæ. Right at the end of the fourth volume, instead of at the beginning of the work, the author explains what is meant by the term "mammals."

We have already commented on the author's charm of style, and throughout his work he makes one feel that he has acquired his extensive knowledge in the open field and has a personal and intimate acquaintance with most of the species he describes.

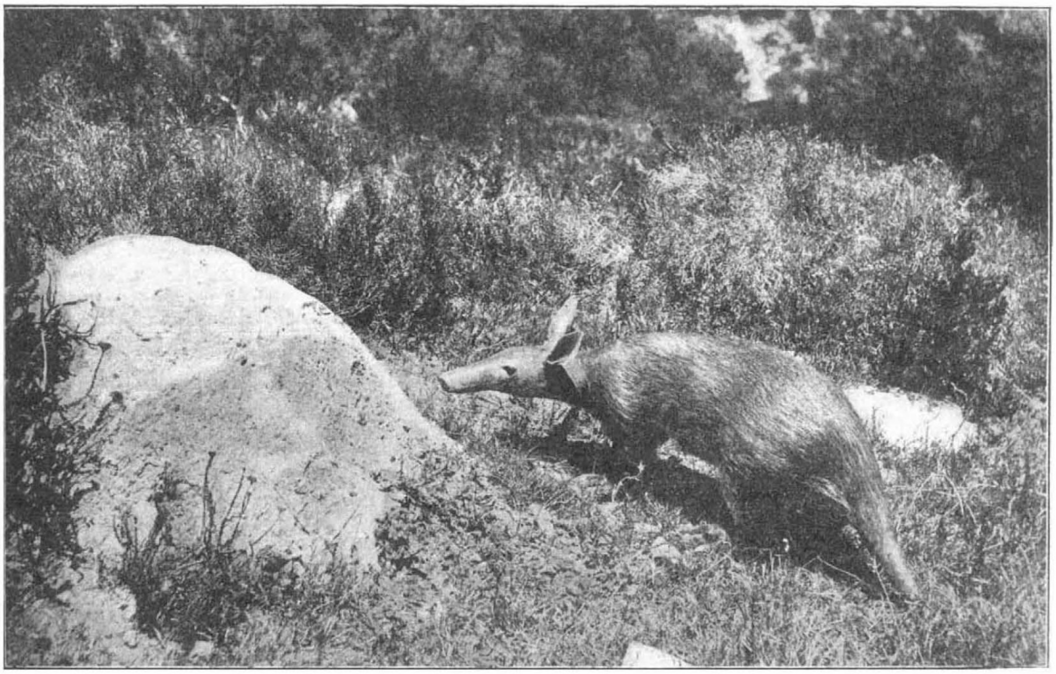

FIG. 2.—Aardvark. From "The Natural History of South Africa."

Science of Ventilation and Open-air Treatment.

DURING the war it was found that the physical condition of many of our young men was far from satisfactory, and there can be but little doubt that one of the contributory causes to this state of affairs was the ill-ventilated dwellings and factories in which such men frequently had to live and work, combined with a lack of opportunity or disinclination to take exercise. For example, in one region of England, of 200 youths of eighteen to twenty years of age examined and rejected, no fewer than eighty-five failed to pass on account of poor physique and other physical defects.

One important cause of defects of physique and of degeneration is the effect of occupation on workers. "One of the most striking features of the report of grading in the industrial districts is the rapid fall of the numbers of the young men who could be placed in Grade I. at the age of eighteen years compared to the numbers who could be placed in the same grade on being examined four or five years later" (Sir J. Galloway, *British Medical Journal,* September 11, 1920).

A second great cause of rejection was tuberculosis, much of which was unsuspected. Careful statistics from one city revealed the striking fact that of 277 cases proved to be tuberculous, 218, or 78 per cent., were previously unknown to the health authorities.

Such being the state of affairs, the publication of the second part of Dr. Leonard Hill's monograph[1] on the science of ventilation and open-air treatment is particularly to be welcomed. Containing much new work, the volume really comprises a series of essays reviewing the subject from various points of view, both theoretical and practical. The opening essay, in which Miss D. Hargood-Ash collaborated, is devoted to the physics of radiation, and presents the recent knowledge in regard to radio-active elements and the electrotonic theory. The final chapter deals with modern methods of ventilation and heating.

For several years past Dr. Hill, in conjunction with various colleagues, has been devoting his attention to this question. According to the popular notion, "stuffiness" and "closeness" of the air are due to an excess of carbon dioxide in the air, or to organic poisons from the breath. All recent work goes to prove the falsity of these old views. In regard to the latter hypothesis, all the positive results so far recorded as to the poisonous effects of the condensed moisture of the breath can be explained on the assumption that either the amount of condensed fluid injected into an animal was in itself sufficient to kill the animal by virtue of its comparatively great volume, or that the impurity arose from the protein of condensed saliva.

In regard to the carbon dioxide content of the air, much money has been spent in keeping the percentage of this gas down to the requirements of the authorities, yet up to 3 per cent. of carbon dioxide in the air breathed produces no unpleasant effects; with each breath it is a natural act to inspire the dead space air into the lungs, air which in itself contains about 3 to 4 per cent. of carbon dioxide. Indeed, the partial pressure of carbon dioxide in the alveolar air is the normal regulator of the respiratory act. Again, the ill-effects of "stuffiness" have nothing to do with smell; frequently those enduring the smell have no idea of its presence or potency.

It is now abundantly proved that the enervating effects of close and confined atmospheres are due to "heat stagnation" within the body. This is particularly liable to occur when the wet-bulb temperature is high, and efficient evaporation from the skin through sweating prevented. The discomfort under such conditions is alleviated by the use of fans which stir up the air. One of the most illustrative experiments in this direction is that in which a number of persons were confined in a hermetically sealed chamber in which a high wet-bulb temperature was induced by means of trays of water placed above electric heaters. At the height of discomfort to those inside, people outside the chamber could breathe the air without ill-effects. Circulation of the air by fans in the roof brought great relief to the occupants of the chamber.

The chemical purity of the air is important in so far as it may give an indication of infective bacterial content, and in certain trades in which the atmosphere becomes laden with dust particles, particularly silica dust. It is also important from the public point of view as regards the pollution of the air by excessive coal consumption. Coal consumption fouls the air with soot and smoke, producing fogs which diminish sunlight, thereby making cities dismal, and bringing loss of health and happiness to the town dweller. Herein the dweller in the country is at an advantage. Vital statistics show that, despite all the sanitary advances of recent years, the town dweller is still at a disadvantage as compared with the countryman, who frequently lives in any but hygienic surroundings. The country dweller owes his relatively robust health to many of the factors which make for success in open-air treatment.

The success of this treatment in tuberculosis depends upon its judicious application. Exposure to moving air induces efficient respiration, exalts the metabolism, and lowers the fever. It must be so employed that the bodily functions are not depressed and the heat-regulating capacity of the individual exceeded. The patient must always be happy and comfortable. As Dr. Hill puts it: "The ideal conditions out of doors are seen to promote the feeling of comfort and happiness, a gentle cooling breeze to promote adequate cooling of the skin and stimulate the metabolism of the body, coolness and low-vapour tension of the air to promote the evaporation of water from, and blood-flow through, the respiratory membrane."

The clothing of the body, in both health and disease, should always be directed to the prevention of heat stagnation. Many people greatly overclothe. Clothes should be as light as possible, permeable to air, allow free evaporation, and not become wet with water vapour in such a way that they cling to the skin and cause undue heat loss and a feeling of "chilliness." Permeability is essentially a matter of the method of weaving. The cellular type of weaving is to be recommended on this account for underclothing; for outer clothing close-meshed fabric is also to be avoided. Wool owes its advantage in underclothing to the fact that the elasticity of the hair keeps the garment off the skin, thereby securing an air layer beneath, which facilitates evaporation and prevents clinging wetness. The less the adherence, the greater the volume of entangled air, and the greater the heat-

[1] Privy Council. Medical Research Council. "The Science of Ventilation and Open-air Treatment." Part ii. Special Report Series, No. 52. Pp. 295. (London: H.M. Stationery Office, 1920). Price 6s. net.

retaining power, even of the wet material. In tropical climates there is particularly a great disadvantage in clothes which lessen evaporation. Heat-stroke is due to excessive heat stagnation.

In regard to indoor conditions, these should approximate as near as possible to the outdoor conditions of an ideal day.

Successful ventilation not only prevents heat stagnation of the body, but also keeps the temperature such that it stimulates the worker without producing uncomfortable cooling of the body.

In the British climate, of mist and cloud, radiant heat is always preferable to convected heat, hence the superiority of the open fire and the modern gas-stove. Radiant heat makes up for the absence of sunlight. Buildings should always, so far as possible, be warmed in such a manner as to keep the feet warm and the head cool. The judicious employment of fans to impart air movement will frequently make all the difference between good and bad ventilation. Dr. Hill's kata-thermometers prove of the greatest service in investigating the ventilation conditions of any building, and it is certain that they must be extensively employed in future to ensure satisfactory conditions, particularly in large buildings.

The question of the bodily heat regulation in the tropics is one of vital importance to the colonising white man. For years past there has been discussion as to whether it is possible for the white man to adapt himself efficiently to tropical climates, or whether this can be done only by pigmented races. Many authorities have inclined to the latter view.

The effect of the tropics is largely due to the action of the sun's visual rays, particularly those of the blue end, which, if sufficiently powerful and prolonged in action, have a lethal effect upon protoplasm. The ultra-violet rays are filtered out by the horny layer of the epidermis. The scales of the skin reflect diffusively many of the visual rays, particularly when the skin is wet with sweat. The function of pigment is to absorb the visual rays, thereby protecting the blood and living tissues from dangerous effects. The pigmented man can, therefore, have a thinner horny layer to his skin, and lose heat well through flushed blood-vessels, without risks of injurious effects from ground glare and sky shine. The view which attributes a higher heat-emissive power to the skin of the negro is erroneous. Despite the above advantages, however, pigment puts an extra tax on the heat-regulating mechanism of the body, since it has to get rid of the heat into which light rays are converted.

The great value of pigment is that it protects man from sunburn, and enables him to go naked and secure the full cooling power of the environment by losing heat by radiation, convection, and evaporation. The white man wears clothes to protect himself from sunburn, and the ill-effects of tropical climates are largely due to the wearing of unsuitable clothing, frequently from custom or from an idea of caste distinction. The white man also usually indulges in an unsuitable diet, which sets his heat production at too high a level. For this reason it is imperative that the white man in the tropics shall be suitably clothed and adjust his diet to the climate, resting during the hot hours, and taking exercise freely during the cool of the day.

The efficiency of the yellow races in hot climates shows that climatic adaptation to the tropics does not depend solely on pigmentation of the skin. As shown above, such adaptation seems to depend upon the correct correlation between the metabolism and the heat-losing mechanism of the body. Given proper sanitary measures against infectious disease, much can be done to promote the efficiency of the white race in hot climates by getting rid of the stagnant moist environment produced by clothes and houses. These in particular tell at present against the health of white women.

M. F.

The Discovery of Fossil Remains of Man in Java, Australia, and South Africa.

By PROF. A. KEITH, F.R.S.

PROF. EUGENE DUBOIS, the discoverer of Pithecanthropus, has recently published[1] an account of fossil remains of man found in a deposit in Java, which he regards as of Pleistocene age. In 1890, the year before he made his first find of the remains of Pithecanthropus at Trinil, Prof. Dubois was led to search for traces of ancient man in the district of Wadjak, which lies some sixty miles to the south-east of the site where his more famous discovery was made. His attention had been directed to the Wadjak district by the discovery there of a fossilised human skull in 1889. Further excavations of the terrace-like deposit in which the first skull had been found placed Prof. Dubois in possession of fragments of the jaws and cranium of a second individual, which were in the same state of mineralisation as the skull which first came to light.

Prof. Dubois has only now published a full account of these discoveries, made thirty years ago. He finds that the remains unearthed at Wadjak indicate that Java was at one time inhabited by a people very like the blacks of Australia, but in some respects even more primitive than they. The publication of an account of a fossil human skull found at Talgai, Queensland, by Dr. Stewart A. Smith[2] in 1918 has apparently induced Prof. Dubois to reinvestigate the fossil remains from Wadjak, and to compare them with the ancient Talgai skull. Thus for the first time it is possible for anthropologists to compare

[1] "De Proto-Australische fossiele Mensch van Wadjak (Java)," *Kon. Akad. van Wetensch. te Amsterdam Afdeeling*, May 29, 1920.

[2] Phil. Trans., 1918, ser. B, vol. ccviii., p. 351