

Hewetson

**ENVIRONMENTAL INFLUENCES
AFFECTING BLONDES IN
RHODESIA AND THEIR
BEARING ON THE FUTURE.**

A SURVEY OF THE SITUATION FROM THE
MEDICAL AND SCIENTIFIC STANDPOINTS.



By Dr. W. M. HEWETSON,

*Being a Paper delivered before the Rhodesia
Scientific Association, at Salisbury,
May 15th, 1922.*



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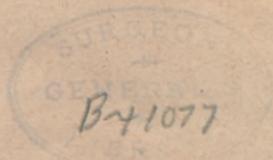
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TO THE MEMORY OF TWO RHODESIANS.

CLEMENT NEVILLE HIGGS,
of Lion's Den,

Accidentally Shot, January 21st, 1922, age 42.

CHARLES SMITH PRATT,
of Gambuli,

Died, March 25th, 1922, age 42.

PREFACE.

"A third cause of common Errors, is the Credulity of men, that is, an easie assent to what is obtruded; or a believing at first ear, what is delivered by others. This is a weakness in the understanding, without examination assenting unto things, which from their Names and Causes do carry persuasion; whereby men often swallow falsities for truths, dubiosities for certainties, sensibilities for possibilities, and things impossible, as possibilities themselves. Which, though a weakness of the Intellect, and most discoverable in vulgar heads; yet hath it sometimes fallen upon wiser brains, and great advancers of Truth."

And this cause of error, the philosopher tells us, is supinity or neglect of inquiry, "rather believing than going to see; or doubting with ease and gratis, than believing with difficulty and purchase."—SIR THOMAS BROWNE, died 1632 ("Pseudodoxia Epidemica," Chapter V.).

* * * *

"So numerous indeed and so powerful are the causes which serve to give a false bias to the judgement, that we upon many occasions, see wise and great men on the wrong as well as on the right side of questions of the first magnitude. This circumstance, if duly attended to, would furnish a lesson of moderation to those who are ever so much persuaded of their being in the right in any controversy. And a further reason for caution is that we are not always sure that those who advocate the truth are influenced by purer principles than their antagonists. Were there not even these inducements to moderation, nothing could be more ill-judged than that intolerant spirit which has at all times characterized political parties. For in politics, as in religion, it is equally absurd to aim at making proselytes by fire and sword. Heresies in either can rarely be cured by persecution."—ALEXANDER HAMILTON, "The Federalist," Chapter I., 1787.

* * * *

During the second summer following Queen Victoria's Golden Jubilee, when Cecil Rhodes was busy on behalf of us here now, making the acquaintance, securing the interest, and winning the fast friendship of such men as Earl Grey, W. T. Stead and many others, it was "'Ansom, sir?" The dear old jingle and leisurely trot on easy springs have given place to "Taxi?" and rush, while a diabolical clockwork destroys any sense of restfulness. Verily, much water has flowed under London Bridge since the late eighties. The internal combustion engine, unheard of then, has driven the quaint old cab out of existence so long ago as to make these times seem antediluvian to us now, while it has conquered the air and the depths of the sea.

Internationally also the world has turned upside down since then. Apart from, and perhaps more significant than the changes in the map of recent years, the rapid spread of education to the teeming millions of Asia and Africa is

obviously generating further and probably vaster changes.

Yet the British Commonwealth of Free Nations—one might say English-speaking, as the United States may once again be included—remains firm and more significant than ever, in spite of great relative reduction in her "striking power." It has justified, indeed, Rhodes's whole-souled belief in it. To him it was no vague and impotent dogma. His was the type of faith which removed mountains and justified itself in works—towards all men—but first to the Anglo-Saxon. St. Francis of Assisi's devotion was not more heartwhole than that of C. J. Rhodes.

I have wondered if Rhodes, on showing the map of Africa to Sir Hercules Robinson (and at various times to others) and frankly telling him that his objective was the Great Lakes, ever had a qualm about the habitability of these parts to the British and Dutch, ever gave thought to the question of latitude, or the

possible significance of skin colouration of the African native. No evidence is, so far as I am aware, extant to show that he had a doubt. Yet one can hardly believe that to a man of his extraordinary insight and capacity, things obvious never suggested anything of this nature. But if they did, he kept them to himself, believing, doubtless, in that genius for colonisation which he so often dwelt on, to conquer all difficulties, apparent or still to be revealed.

At that time this region lay under the sway of despotic barbarism and the national expression was in blood. It can be said that Anglo-Saxon civilisation, after passing through the pains of hell in its early days, has accomplished its mission; that the ideal has not miscarried.

To-day we have a blonde community, small in numbers be it at once admitted, but highly selected and approximating already to a fixed type, with characteristics of its own showing distinctly; a high standard of initiative (counting of heads in a census takes no note of the proportion of a population engaged in creative work) and an average productivity much above the rest of South Africa.

And we have a native population rapidly increasing in numbers under Peace and which has got its feet firmly planted on the ladder of progress in Knowledge and in Arts and Crafts. Sixty thousand are under regular instruction in schools, while through association with the white man some are approaching the standard of skilled workmen.

One of my chief objects is to emphasise the significance of our great change in environment and the need for full realisation of it by every man and woman in the country. The more highly specialised Nature's forms become, and Man, of course, is, taken all round, the most highly specialised, the less plastic and adaptable for changes in environment do they become. But Man has not ceased to evolve yet, though the process is too slow to be appreciable to our eyes. And means, I believe, are within our grasp which we have not yet adopted, but

which should be, for producing very considerable improvement in one of the fundamental bases of success, viz., robust health.

Though I come to the obvious conclusion that we are not physiologically adapted to the country as yet, and need special precautions, the very thing we have to beware of personally, the immense Sun Power, is a potential source of wealth economically. And, when this power is suitably combined with the floods of water in normal seasons, or harnessed by Science in other ways, may result ultimately in the Tropics becoming the centre of gravity of civilisation.

Professor J. Arthur Thomson, in his latest publication, "The Outline of Science," Part 13, says:—"In matters biological we are only just emerging from the age of mythology, through a period of observation into one of experiment; and this in its turn is opening up vistas of future control hitherto undreamt of over the processes of life itself."

These are strong words for a scientist in such a position to use. So great, however, are the recent advances in knowledge in Biology, in Physics and Chemistry that to those who know only a little of what is going on in the laboratories of the world there is ample evidence to support it.

It may or may not be, that other Kimberleys and Witwatersrands remain to be discovered; hardly likely, one thinks. But that other mines and wealth-producing sources are to be discovered there can be no shadow of doubt, and these belong in the realm of Science. In this sphere lie the future Goldfields and De Beers. To Rhodes indeed, reaching out into the future, they were but stepping stones on the way.

When exactly, the catchword and political cry in England, "the three R's" (reading, writing and arithmetic) held sway I cannot say, but can remember hearing it as a schoolboy; also in the eighties. It was assumed, no doubt correctly then, that the world was open with this equipment to the poorest and a fair chance given to all. To-day the three

Primary Sciences—Chemistry, Physics and Biology—have assumed the position of fundamental requisites. They are the gateway to the hundred branches of Applied Science. The Tropical farmer who works largely on his own must have a grounding in all of them if he is to successfully use Nature's forces. To him they count much more than they can in an old country where experience has established the general lines of working and where other advantages obtain. Money spent on these to-day is bound to return a rich harvest in years to come.

To my mind the Directors and Administrators of the Company formed by Rhodes have followed, so far as they were able, his ideas. I cannot forbear to mention the Department of Agriculture they have established. They have by attracting such a staff of scientific workers, and not only scientists but enthusiasts, given us a tradition and example which will redound to their credit as long as we remain.

The subject which I have taken up has created so much interest since the lecture was delivered in Salisbury and published serially that, though I had no intention of issuing it in this form, owing to my conviction of the urgent importance of these matters to us, I am taking this step in order to make it available in handy form and to reach as wide a field as possible.

The diagram in this booklet gives the facts which form the backbone of my statements and deductions. It may appear on first glance to be too difficult to understand, but with a second and third examination will become easy. With this mastered the study and observation of plant and animal life, their reaction to this, their principal circumstance, will form a new and ever-widening field of interest.

Personal discussions of such matters leading to the assimilation of new portions of scientific knowledge must result in good being done. I consider the application of such knowledge of more lasting benefit than the ability to com-

mand Capital. The latter speedily follows wherever its use is justified.

Into the economic applications of the study of Sun Radiation, however, I have not entered, though it is a most certainly fruitful field. I should be glad if readers who care to would let me know of any facts observed which may prove of importance in regard to health matters.

Though this little booklet may be read, and I hope prove of use elsewhere, it applies to and deals with the country I know. Hence for those who know the features of our climate so well I have avoided quoting elaborate tables of figures and rather directed attention to the physical principles involved.

My practical conclusions and advice are the outcome of personal experience and cogitation. Some of them I find so resemble those of Woodruffe in Manila, and others quoted in the praiseworthy booklet "put together by J. G. Macdonald" some years ago, that it might be thought they were cribbed from it. That is not so. I have hammered the matters out for my own satisfaction and given the scientific grounds for my conclusions. It being the case that the enquiry has been quite independent, any corroboration of views must lend weight to them in common.

In addition to the undermentioned sources from which I have drawn for authoritative statements, I have to acknowledge with cordial thanks the stimulus and help of discussion with many personal friends and the Rhodesia Scientific Association for permission to publish this lecture:—

"The Outline of Science," edited by Professor J. Arthur Thomson.

"Manual of Tropical Medicine," Castellani and Chalmers.

Stewart's "Physiology."

"Electro-Physics," I.C.S.

"Outline of Zoology," Professor Thomson.

"The British Medical Journal," etc.

W. M. HEWETSON, M.B., D.P.H.
Sinoia, July, 1922.

OUTSIDE FARMING CONDITIONS.

The following remarks were made as an introduction to the lecture at Salisbury, and I add them here because I feel that the country people—the settlers—though they have some advantages, need all the sympathy and encouragement possible.

W.M.H.

* * * *

I might have used, in the title I have chosen instead of the words "environmental influences," the words "climatic factors." As I will deal with everyday things with which you are quite familiar, such as Heat, Light, etc. I want you to think not only of your immediate environment in Salisbury, but of the country as a whole, especially those parts which surround you, e.g., Lomagundi, Shamva, Gatooma, etc. You, in Salisbury, are fortunate in having what I will call for the moment a more bracing climate than those mentioned, which are, as you know, lower by about 1,000 feet and considerably hotter. Residents here to-day owe a debt to the memory of Selous, who led the expedition to this place.

You have many other advantages, also socially, which outside places, especially the farmers, do not enjoy. You have the advantage of numbers, well organised sport of every kind, music, dances, entertainments, electric light and so forth. These are things, which in moderation, have a beneficial influence on health.

Compare that with the lot of either the bachelor farmer in his two-roomed house or married one with a wife and young children. They are many of them isolated; the nearest neighbour is often three or more miles away. No telephone beyond Sinoia. In many cases neither horse nor motor. Think of the difficulties of procuring daily supplies. Ten, 20, 30 or more miles from the railway, the expense of dentistry, so essential to Europeans, when there is no dentist nearer than Salisbury, doctoring, education for family, the nightmare of possible assault on women when their husband is away, no monthly salary, but uncertainty always, as to market and

price for everything they produce. There is one certainty which is that the monthly native wage bill has to be paid, otherwise they are haled before the law as criminals.

Life under such circumstances is a struggle—unbroken for months, or even years sometimes, by a visit to town. Your Salisbury *joie de vivre* is conspicuous by its absence, and indeed is often replaced by what I term *Melancholia Rhodesiensis*. The farmer, all over the world tends to an individualistic type of mind, but such struggles here tend to make him unreasonably suspicious and pig-headed.

But speaking generally, these conditions are faced before success is attained (and the sprinkling of such people with culture and refinement, is a fairly thick one) with steady courage and stout heart, sometimes with that cheery abandon depicted in such glowing colours by our late famous novelist Gertrude Page.

I am not complaining that you, in Salisbury, lack sympathy, my experience has been that I always receive the greatest consideration and kindness, but the necessity for us all to hang together (or pull together) in the future and to know the experiences of each other will bear emphasis at this moment. I take it for granted that everyone here feels the necessity to strive, in everyday life and in every sphere of activity for a sense of solidarity amongst whites here. We blondes cannot afford these acute sectional antagonisms which exist in some older communities and seem to occupy the major part of political life, or to cultivate grievances either as a hobby or an occupation. Furtive ferocity is worse than open barbarism and if sectional interests here attempt to emulate those others, and clash violently, to the detriment of the whole, then we had better have left the country under the domination of Lobengula and the Lions.

What is essential for our further consolidation here is Peace, not merely from armed strife, but from sectional and other subtle forms of energy-destroying controversy. Cohesion must be no empty phrase.

ENVIRONMENTAL INFLUENCES AFFECTING BLONDES IN RHODESIA AND THEIR BEARING ON THE FUTURE.

A SURVEY OF THE SITUATION FROM THE MEDICAL AND SCIENTIFIC STANDPOINTS.

PART I.

BLONDE INVASION.

The word "blonde" is simply a more proper and technical manner of expressing what we mean when we speak of "Whites"; the latter term indeed being uncouth and inaccurate. The word means "fair skinned."

One of the great divisions of mankind, of which there are four, is the Caucasian. It is sub-divided and we get the Blondes, Teutonic and Slavic. The Teutonic, consisting of English, Dutch, Germans and Norse, are nearly all north of 50 deg. N. lat. The Slavs are the Russians, Serbs, Croats, etc., but with them I am not concerned.

South of the Teutonic in Europe you have the olive-skinned races, getting darker the further South you come—Gauls, Portuguese, Spaniards, Italians, Greeks, etc. Elsewhere in the world you have red, yellow, brown and black skinned peoples.

The Teutonic peoples are characterised by vigour both of body and mind. They are responsible for the invasion, since the great geographical discoveries, of all parts of the world, and most recently of the African Tropics. The convulsion through which the world has just passed was due to one section, highly organised and virile, expanding. No other than another Teutonic section could have withstood the tremendous pressure exerted by this one. Another characteristic is their solidity, or stability of nervous system. They do not go off "pop" like the Latin peoples.

Take the map of the world and let us see what parts of the world the blondes have invaded, particularly keeping an eye on the Tropics. There is Canada, of course, with its long five months winter of frost. The United States, founded originally by the English, under Sir Walter Raleigh followed by the Dutch is now a conglomeration and compound of all European races, but retains its original language. But its southern boundary is still 30 deg. from the Equator, and it is safe to say that the proportion of pure blondes between 30 and 35 deg. is small.

On the other side of the Equator you have Australia and New Zealand. The large city of Sydney is 34 deg. south, and all the five capitals are in the non-tropical portion, and by far the greatest number of the Australian population is in the southern half. A portion of Queensland is within the Tropics at about the same latitude as Southern Rhodesia.

A gentleman of high scientific attainments and well known in Rhodesia, wrote me the other day. "Last year, starting from Tasmania, I went on a long trip up the East Coast of Australia to the extreme North of Queensland, where I stayed some time. The colonising of the latter area started about the same time as the rest of Australia. The obvious results to-day indicate that in the temperate southern zone, the English characteristics remain, while in the Tropics, the

Dago, or Southern European type, is being, or has been developed."

In New Zealand, its chief city, Auckland, is 37 deg. South, and the rest of the country further away from the Equator. These two latter countries, Australia and New Zealand, are the most successful examples of purely Anglo-Saxon colonisation.

We have South Africa, with Cape Town at 34 deg. south, from which point colonisation has, during the last 120 years, spread north. But there has been a considerable element of degeneration intellectually, and in other respects in this northern advance.

India and the Dutch East Indies are, of course, older colonies, but they are in no way comparable to the foregoing. The representatives of the blondes there are merchants, planters and rulers, and are replenished from time to time while they are still directly under the rule of the parent country in Northern Europe. It is interesting to recall that the blondes in South Africa, where they are more permanent, and the great majority of whom are Dutch and British, are indirectly a result of this earlier invasion. Cape Town being only the half-way house to these places for 100 years or more.

In Africa, also, you have the three centuries old Portuguese colonies. These are feebly held and even their seaport towns are no bigger than an English village, or were not until recently.

CENTRAL AFRICA.

You have the Congo, a mining population so far only. Slightly older than Rhodesia, you have Nyasaland, Kenya Colony, late British East, and Tanganyika Territory, late German East. On the Highlands, which go up to 6,000 to 7,000 feet you have the only attempts in them at permanent settlement of blondes. But from what I know of them (they suffered of course during the war) I don't suppose that Rhodesia takes second place to any of them in progress or social institutions of a permanent nature.

In passing, it is worth while noticing that the most successful Spanish colonies within the Tropics have been on the high tablelands of the Andes and Cordilleras of South America, Colombia, Ecuador, Peru and Chile, and in Mexico. They date from the Spanish conquests of the 16th century and have long been republics. But an interesting fact, also to be noted, is that they are practically new races which have arisen by the blending of the emigrants with the original inhabitants. Anglo-Saxons, or Teutonics generally, do not exhibit this trait of fusing with the aborigines.

A quite remarkable coincidence is that three of the largest cities, probably the three most important in the Southern Hemisphere, Sydney, Cape Town and Buenos Ayres, are situated in practically a dead line just about on the 34th deg.

SOUTH AFRICA'S SLOW PROGRESS.

Although America was discovered in 1492, and the Cape rounded before that by five years, the United States of America alone has a population of 110 million Europeans, while South Africa has only a population of $1\frac{1}{2}$ millions. The lesson from these respective developments is simply that there must have been more natural obstacles to the blonde in South Africa. And everyone knows that had South Africa not been so highly favoured with mineral wealth, her development would not have reached its present stage, or so far north.

Central Africa, except the Frozen Poles, is the last discovered portion of the world. It is not yet 70 years since Livingstone saw the Victoria Falls. **Rhodesia falls wholly within the Tropics.**

PIONEERS OF THE TROPICS.

If we establish ourselves here as a permanent self-governing community in the Tropics, we shall be the first blondes in the history of the world to accomplish that feat. The position is obviously one of some importance, and while the

economic and political fields have been thoroughly explored recently at Cape Town, I claim, without apology, that at this juncture the field should also be surveyed from the scientific and medical standpoints. It is no use surveying portions of the field, however thoroughly any given portion may be done. One colour left out of a picture is sure to give a false conception.

And, while politics may be put down as, to some extent, the expression of human passions, such as self-interest, they are also the outcome of the economic situation. And no one will deny that the economic life of a nation is bound up with the physical features of a country, for instance. its fertility, its climate, etc., and especially with the human life and characteristics which result from these physical features. I cannot claim that this paper is more than an opening one, but I have felt impelled to make this effort in the absence, so far as I am aware, of any other.

OUR SOUTH AFRICA.

Poets also have a way of hitting off situations, and if Kipling's description—written during the South African War, I believe—was accurate then, it is still broadly true to-day.

“Half her land was dead with
drought,
Half was red with battle.
She was fenced with fire and sword,
Plague on pestilence outpoured,
Locusts on the greening sward
And murrain on the cattle.”

And that, as he says, is “our South Africa!”

The German colonies have been detached from that country by recent events, so practically the British and Dutch are left alone as governing representatives of the blondes. Now you know which of the British settlements of blondes mentioned have attained the dignity of self-government, and which are

still governed from Downing Street, i.e., Crown Colonies. And, while the fact of self-government might be taken to mean **success in colonisation**, and indicate a suitable dividing line, it is necessary to lay down a postulate on other grounds as to what constitutes it. You will agree, I think, that mere replenishment from north Europe does not constitute it. It must be taken to mean “the capacity to live in a country and propagate a stock through several generations, as good at least, as that from which we sprang.”

Individual lines may deteriorate or die out, but what the issue depends on is a sufficient number of native-borns of equal quality, whose birth-place and actual home is in the land, to form a nucleus for anything in the way of replenishment by immigration to enlarge and build on to. If the country fails in this respect, she must inevitably become a dependency of some other, more permanent State.

How many are a sufficient number exactly, I cannot undertake to say. It will depend on circumstances.

WHAT IS OUR AIM?

Are we likely to succeed in this hitherto untrodden path, or are we in setting up a blonde independent State in the Tropics trying to get up a cul-de-sac, or blind alley? I cannot answer categorically “yes” or “no.” Nothing involving life where the future is concerned can be so answered. The situation must be examined to find out by a study of History, which I have just briefly sketched, of the Laws of Nature and the Current Tendencies of things, whether such a thing is possible or probable. And, of course, our failure or success must have an influence far outside our borders and particularly on the future of Africa herself.

What light does the history of Rhodesia so far give us? It has been said that anyone who once comes here and goes away, returns again sooner or later. Bluntly, that is not in accordance with

facts. Were we not all disappointed with the last Census returns? I do not wish to minimise the difficulties of pioneering—indeed the disasters we have got over in the history of Rhodesia are wonderful, and give considerable grounds for hope. But it cannot be urged, in spite of all complaints, that we have lacked advertisement. Apart from what has been directly done by the Company, our late lamented Gertrude Page has made "Rhodesia" a household word almost wherever English is spoken, certainly in the British Isles. The first great burst of energy associated with conception, birth and mothering, has resulted in 30 years in a population of some 34,000 blondes; no, not all blondes, that number is Europeans. And the cost in life has been heavy.

BIRTH RATE.

What is our Birth Rate? That is one of the best tests. Since this lecture was given in Salisbury the Census figures of last year have become available. Owing to the variation of the population during the war years it will be best to take the exact figures of last year only. Working out the number of births (913) and married women of reproductive age on a strictly comparable base with that of the birth rate in England from figures in Parkes and Kenwood's Public Health, I find the rate is 23.5 per 1,000 for last year.

This is the highest number of births we have ever had, though possibly not the highest rate, which compares with 27 per 1,000 in England to-day.

Though it shows a diminution, which is greatly to be regretted, it cannot be considered radically unsatisfactory by any means.

CHANGE OF ENVIRONMENT.

You are aware that when tropical animals are taken to the Zoological Gardens in Britain, they do not breed freely, often not at all. Stock breeders in England encounter sometimes what

are known as "shy breeders." These are generally amongst the best bred and most highly specialised types. Miscarriage is more common amongst blonde women in tropical climates and is certainly so in Rhodesia.

IMMIGRATION.

A conspicuous deterrent to increase of population is that terrifying disease, Blackwater Fever. Though the number of deaths from it is not large, the fact of its incidence, chiefly on young adults, and solely on the country population, and the effects on the lay mind render it, as I have said, "a conspicuous deterrent," to settlement on the land. And without increased settlement your towns cannot grow much larger. The late Sir John Forrest, a well-known Premier of West Australia, once said that every man who went out into the back blocks and broke up country and prepared it for occupation, was worth ten men in the town. It gives the greatest satisfaction to know that we have here now a research worker who has come from a prominent position at Home and tackled the subject with energy and insight.

The Home Parliament is now voting a sum of three million pounds for the purpose of organising systematic emigration within the Empire. Col. Amery, a brilliant member of the British Government, is undertaking this work. He recently delivered a lecture on this subject before the Royal Colonial Institute. He says: "On the average of the five years before the war, our emigration would have been over two millions since the war began. Owing to the stoppage of that emigration, and notwithstanding the loss of nearly three-quarter of a million lives in the war, we have an excess of over one million people above our normal increase, which is proceeding at the rate of 600,000 per annum."

Naturally, Rhodesia should come in for a share of that surplus, but means should be taken somehow to see that our immi-

grants are not allowed to become careless and contract this preventable disease, or they may perhaps do as much harm as good. The point is a difficult one in practice. Interference with personal liberty, even when the good of the individual is the object desired, is always resented, while as a rule, it is not until after one or more years in the country that the disease appears.

THE NUCLEUS COMES FIRST.

But if my postulate about a nucleus of native-born Rhodesians is correct, then our hopes must be primarily centred on the children. And it is also a source of great satisfaction that we have now a Schools Medical Inspector of high qualifications. The Department of Education has just issued his report—an outspoken and, to all interested in our future, an extremely valuable document, which must be carefully read and studied. Babies are the best immigrants.

I could quote other evidence, but time forbids. It is clear, however, from the broad facts shown, of the tendency of emigration of blondes to cold and temperate regions and their success there, that we are "up against it," that we are **beyond the natural range of our species.**

THE STIMULUS OF DIFFICULTY.

I have deemed it necessary to make this historical and local survey and get down to the actual position to-day, in order to throw into relief the necessity for studying the climate here and its effects. It is indeed well known that climate has profoundly affected the destinies of peoples.

But a road without difficulty provides no stimulus. And difficulty to the Anglo-Saxon has ever been the key to wind us up to the concert pitch necessary for achievement. What means are at our disposal for achievement? Since the beginning of the Ascent of Man, something over a million years ago, from that stage in which he was merely an

upright biped, till he has reached his present position and appears to be a result of a totally separate creation, the lever has been his Superior Brain-power, backed by Physical Energy. Money, nowadays, is important, but not paramount, only secondary. The same laws hold now that did a million years ago, and will a million years hence if the Sun and Earth remain.

Though the individual who loses sight of the protection and sustenance he receives from communal life is a fool, we are subject, individually and as a community, which latter is more important, to the overhead principle of the Survival of the Fittest and the extinction of the unfit. And Nature is the sole judge in this case. No appeal from her is ever allowed, though she gives warnings before the final verdict. The mills of God grind slowly, but they grind exceedingly small. The Laws of Nature are the mills of God and they grind all the time. Intelligence and Activity then, constitute the backbone of our resources.

Wherein then lies the difficulty exactly of Europeans colonising the Tropics? Is it due to germ diseases alone or is the cause climatic, or are both implicated?

PART II.

RAYS FROM THE SUN.

Here is a model of the Earth. A given area (a square inch or 100 square miles) of a portion of the tropics will receive the same number of rays from the sun as any other place on a line drawn round the globe in the same latitude. But go in the other direction, at right angles to the lines of latitude, to the north, and the number of rays striking the same area will gradually diminish, owing to the slope of the ball away from the sun, till, when you reach the Poles, they are reduced to nil. The latitude of the home of blondes, as shown already, is situated between 50

deg. and 60 deg. N. lat., i.e., more than half way from the Equator.

Further, the earth is surrounded by a gas envelope or atmosphere. The density or weight of this envelope is equal to a pressure at sea level of 15 lbs. to the square inch, becoming less and less dense the further we get from that level. Now this atmosphere absorbs a large proportion of the sun's rays which strike its outer limit, hence the sun's rays travelling **obliquely** to the Temperate zone will traverse a thicker layer than those which travel vertically to the tropics. And, of course, more are absorbed by this thicker layer than are when the rays strike right through. This is confirmed daily by the waning of the sun's power as he sinks towards the horizon, or rises in the morning. Twenty to twenty five per cent. of the sun's rays are absorbed even when the sun is straight overhead. You will perceive the fundamental nature of these two differences at once.

But the atmospheric heat is not derived **directly** from the sun's rays. "They do not really warm the air to any appreciable extent."* The real warmth of the air is obtained from the **dark** heat radiated from land and sea. The rays from the sun heat the earth first. The technical name for this heating of the earth is Insolation. I will explain this **dark** heat in a moment, but I wish to make the point here, that whereas the sun's rays travel 90 million of miles in the form of light, the dark heat has little power to travel and its effect is sensibly diminished even 20 feet above the surface of the earth.

The official meteorological records of the atmosphere are taken at a level of exactly four feet from the ground. We get so used to these records that we are apt to assume that it is the same at 14 and 24 feet. A house closed up in the morning with blinds drawn, is much cooler, at midday, than one with everything open

to the air near the earth. This is another fundamental point, and if you do not carry anything else away from the lecture than these three points, you will have done some good.

FACTORS OF CLIMATE.

"Climate" is composed of many factors all subject to great variation: (1) Atmospheric heat; (2) Direct radiation of heat, light and chemically active rays; (3) Humidity, or amount of moisture in the air; (4) Altitude, or density of atmosphere; (5) Air movements; and (6) Electrical conditions.

A single variation in any one of these alters the whole, so we get infinitely varying climatic conditions.

Until one goes into the subject one has little idea how complicated it is. And yet it is no more difficult than any other branch of science. Yet that Climatology has been neglected in favour of the exact study of germs and their effects, there is ample evidence in the lack of works on the subject or references to it in medical books. Hence, though germs are the great causal factors of disease, we won't advance much unless we study both sides of the question of disease and its prevention.

Rainfall is generally considered one of the most important features of a climate, but I have omitted it here. It is important from agricultural and other points of view, but is not exactly one of these ever-present factors I have termed "environmental influences."

GENERAL REMARKS.

In northern Europe you have four distinct seasons, here we have only a very modified form of them, and the year is generally divided into a "wet" season and a "dry" season. Hence it is more monotonous than the very changeable north European climate. And monotony is not good for mankind.

* "Manual of Tropical Medicine."
(Castellani & Chalmers)

There is a high degree of cloudiness in northern Europe, which means that the air is nearer most of the time, to the point at which rain falls. This again affects the sun's direct radiation, shutting it out. Sometimes in the more northern and western parts of the British Isles, one scarcely sees the sun for months together.

Those who have lived in the country in England or Scotland know the vast resurgence of life in spring. In this change, after the long winter nights and short dark days, the human system also takes part. Tennyson, I think it was, who crystallised the physiological rejuvenation in the lines:—

“In the spring the young man's fancy
Lightly turns to thoughts of Love,”

And characteristically wars break out in the summer when stimulation is at its height. It has been said that South Africa is never long without a war.

Was not the most scientific method of dealing with a threatening situation in South Africa a few years ago that of giving the leaders an enforced holiday in a different climate?

And how much would life be lengthened and how many illnesses prevented if we only had the pluck to take a lesson from the northern winter and take, say, a fortnight's rest in a cool, darkened room once a year?

Though the monotony of sunshine is not felt so much because of its constant stimulus, like a tippler we think it is the only thing for us, and, like the tippler, we ignore the ulterior and more permanent effects.

EFFECT OF ELECTRICAL CONDITIONS?

The subject of the effect of the Electrical conditions of the atmosphere, i.e., the amount of free electrons, on the human body is an untrodden path yet, therefore I cannot say anything about it. But as the electrical condition of the atmosphere is brought about by the interaction of the other factors, and as

the factors of heat, light and chemically-active rays are known to be all electromagnetic in nature, their Resultant must be of importance and calls for investigation.

About Altitude, not much need be said, although to it various ills are commonly attributed. Practically here I find it is the other factors that are more important and which are more amenable to avoidance or modification. The effect of altitude on Radiation will be referred to later. There is, it is true, owing to altitude, a little less oxygen in the air,* but not sufficient diminution to do much beside increasing our respiration. This is probably beneficial, but the reduction of oxygen content of the air shows the need for special attention to ventilation. Rooms to get proper ventilation need to be not less than a certain size. Here, I think, we should reckon on about a half larger than the usual size.

Physiologically, “Man shall not live by bread alone, but by every breath that proceedeth through the nostrils.”

Our Relative Humidity is low, and our most favourable factor. Because of this we have comparative freedom from lung diseases compared to England, and also from that damaging complaint Rheumatic Fever. Many other diseases known to moister tropical climates are absent. I have here a chart which I resurrected a few days ago only, made during my work on Scurvy, in 1910. It shows graphically some of the features of the Rhodesian climate. The Relative Humidity has a yearly mean of 57 per cent. at Bulawayo. It falls from February till November, when it reaches 40 per cent., and then rises steeply. But I would like to get for the present purposes the figures of the Absolute Humidity, which would differ considerably.

The effect of such low Humidity on Radiation will also be referred to later.

* The loss in density of the atmosphere at 4,500 feet is about 15%

AIR MOVEMENTS.

Before taking up Heat and Light, I will deal with Air Movements, which affect Ventilation. Questions of ventilation and heat are, however, closely interwoven. Owing to the same physical features connected with the shape of the earth and its relation to the sun, the force of air movements differs in the three principal zones very greatly. In the Temperate zones in England we get gales and winds such as we never get in Rhodesia. In Berwickshire, a year ago, I saw a whole plantation uprooted by a gale. The winds and blizzards at the Poles are terrific often. And it was from the South Polar regions that Sir Douglas Mawson predicted most accurately, day after day, the nature of the weather in Australia, while investigations of this nature were one of the principal objects of Shackleton's last expedition. The cooler air of the Arctic regions blows strongly towards the warmer portions of the earth.

We experience nothing like these gales because we live near what are known on land as "The Equatorial Calms," on the sea called "The Doldrums," not so famous now as in the old days of sailing ships, but very noticeable indeed to every passenger as he passes through the tropics on the way to and from England.

Air does not "conduct" heat in the same way as solids, such as copper or iron. Heat is removed because the air being a gas, expands when heated and thus becomes lighter. Hot air, as you know, tends to rise and literally gets "blown off," because it is lighter and its place is taken by cooler air which is heavier, hence air movements. "Convection" is the word.

AIR AND THE BODY.

The body temperature is 98 deg. and a gentle breeze by conveying away the heat brings comfort, compared to stagnant air. In some parts of the Tropics

coast towns get a breeze off the sea about 4 p.m. "Here comes the doctor," is the well known phrase. When you go with your wife into a restaurant, which provides alternatives of up or downstairs, and ask her where she will go, her answer is "Upstairs." You go up and find it crowded. It is cooler because farther from the dark heat rays from the street. And it is more airy because the friction of the earth and obstructions in the lowest layers of the atmosphere diminish free play of air. A man who would put a windmill up with its wheel just on the ground level would be a fool.

Our houses are built only one storey high, partly because ground is cheap, but we thereby limit their ventilation and also suffer the heat of the earth during day time. As one of our cardinal differences in this climate compared to north Europe, is the heat, this gives us at once a clue how to lessen it very considerably and kill two birds with an extra stone (or literally storey), i.e., you reduce heat and improve ventilation.

PRODUCTION OF HEAT INSIDE THE BODY.

We now come to the piece de resistance, and in order to grasp thoroughly what effects heat causes, a lesson in Physiology is necessary.

The body temperature is 98. The atmosphere in England is given as a mean of 55 degrees* over the whole country. Thus there is a fall of over 40 degrees between us and the air around us in England. If the skin were a non-porous, non-conducting membrane we would not lose heat, but as a fact that is what is continually going on. This **heat-loss** is one of the great factors in the working of our body. It is as essential as the carbonic acid we throw off

* I am quoting from memory and have been unable to verify this figure. If there is an error the figure quoted is too high.

from the lungs, the urine by the kidneys and feces by the bowel. If any one of these four factors stop entirely, we stop. If any one is interfered with the machine works badly and we are ill.

Our mean temperature in the occupied portions of Rhodesia varies, but for the sake of taking a fixed point we will call it 70 degrees; that is pretty near it. Hence there is, other things being equal, a reduction of 15 degrees in the step between us and the air around us compared to England—a full third less heat-loss. We compensate partly for that by using less clothing and our lungs give off more heat in the form of moisture and we perspire more. The loss of moisture from the skin is not so noticeable when Relative Humidity is low. It becomes obvious when it forms as sweat drops in such places as humid tropical coast towns. Hence the same temperature is much worse to bear in the latter case, because both principal avenues of heat-loss, radiation and evaporation, are narrowed.

I might point out from this how beneficial is exercise and increased breathing and perspiration in helping to keep us healthy by making up the heat-loss. Obviously one of the chief duties of Government is to encourage sport. And also this shows that manual labour in itself is not detrimental.

But two-thirds of the heat-loss of the body is through radiation from the skin and one-third by the other routes.

VIGOUR, THE RESULT OF RAPID METABOLISM.

It is this rapid heat-loss in cold and windy climates that is the principal cause of the vigour of constitution of those of North Europe. The following illustration will show how the principle is applied in the treatment of the wasting disease, Consumption. In my earlier student days, before I knew anything about doctoring, I visited a sanatorium. It was the Blencathra Sanatorium in Cumberland. It is situated high up on

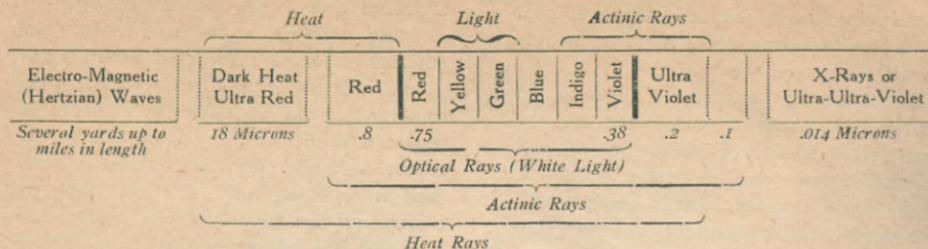
the bleak side of a mountain, and was much colder than my home, about 20 miles away. On seeing the open-air sleeping shelters I enquired how the patients avoided the rain and snow. "Oh," the Superintendent replied, "they sometimes wake up with three inches of snow on their beds." It seemed to me rather a harsh cure, but there it was. And it is based on the fact that by increasing the heat-loss you make the chemical fire inside the body work faster (just as a fire draws better the colder the outside air is), and so provide purer and more nourishing blood as it goes round to every part of the body.

A new method requiring very elaborate apparatus and highly skilled observers has just come into use for estimating the exact amount of chemical changes (metabolism) that take place in the body. It is called the estimation of Basal Metabolism. Professor Leonard Hill, working with others, found that "the metabolism of children crippled with surgical tuberculosis, but lying more or less nude in the open air, was increased 40 per cent. above the standard of healthy children." "It was due," they say, "to the increase of bodily tone by exposure to the open air." He follows this by another article in March last containing observations on patients in Switzerland. He concludes: "Here again we consider that the main cause for the rise in metabolism was the exposure to the atmospheric cooling power." So that for promoting bodily tone and vigour of constitution the fact that heat-loss is essential does not admit of a shadow of doubt. So ladies, if you do not want to get fat, sleep in the open air. It is much better for you than Thyroid and other drugs.

EXPLANATION OF THE NATURE OF RAYS OF LIGHT, ETC.

In order to understand light rays and chemically-active or actinic rays (synonymous) as well as those giving heat, I exhibit this diagram. (See page 16.) It

PRINCIPAL.



Full range of each variety shown below diagram. Practically each variety important as shown above.

Uniform Velocity = 186,000 miles per sec.

shows all the known radiations; the Alpha and Beta rays from Radium, which are of a different nature, excepted.

The diagram indicates the position and relation of the optical, chemically active, heat, and electromagnetic ether waves. On the extreme right we find the X or Roentgen rays. The lengths of the waves are given in microns. One micron is one-millionth meter or .001 millimeter. The ultra-violet and the Roentgen rays have these physical properties in common (1) that they produce fluorescent and chemical effects in various substances, and (2) that they are able to discharge electrically charged bodies.

These radiations travel straight from their source, whatever that may be, in a series of waves. A stone thrown into a pool shows exactly what happens. A series of waves of a beautiful concentric nature is started, which travel to the edge at a given speed. The "wavelength" is the distance between the crests of two adjacent waves. The series shown here diminish in wavelength from left to right. The longest are the electro-magnetic or Hertzian, the rays used in wireless; the next in length the dark-heat rays, followed by those of light, then actinic rays, then the X-rays. The longest waves are several yards to miles in length, while the X-rays go down to one ten-millionth of a millimetre

(a millimetre is 1,25 part of an inch). There is no difference in their nature except their length, but on length their various properties depend.

LIGHT CONVERTED TO HEAT.

The heating of the earth, Insolation, and subsequently the atmosphere, which I mentioned before, is due to the conversion of the shorter optical waves into the longer invisible heat ones. These latter are suited to warming the air, but not penetrating it very far like white light. The grasping of this point about the conversion is essential to understand what exactly happens and how to mitigate the effects. Almost everything that is exposed to the sun does this, but the capacity of different substances varies. Our bodies have the same effect. The "Black Bulb" at the Bulawayo Observatory for the month of January, 1922, shows an average maximum of 154.5 deg. F., while the atmospheric average maximum was 86 deg. F. Water absorbs heat in this way less readily than the earth, and also gives it out less readily. Hence arises the sea breeze at 4 p.m. already referred to, when the air on the land has become heated and risen.

Waves from a "luminous source" like the sun contain the three varieties shown in the brackets. From a non-luminous

source, such as a hot poker (not red hot) or the earth after the sun has shone on it you get these, the ultra-red rays, about 18 microns length. When you perceive the poker to be "red" hot this gives red rays also, about $\frac{3}{4}$ micron, and as it gets hotter still you get yellow and ultimately chemical rays as well; that is, it has become a luminous source also. Note which type the heated earth gives off.

You would not be able to hold your hand more than a second at a distance of a foot from a white hot bar of iron; you could remain comfortably at ten feet away, but at 100 you would not perceive the heat at all, but could see the bar at a much greater distance. This illustrates what I said about the "carrying power" of the two kinds of wave lengths.

PART III.

EFFECTS OF ACTINIC RAYS.

The ladies know what effect sunlight has on the colour of fabrics, and how rapidly their texture rots out here. This is due to the actinic rays. It is these rays which are the primary cause of the "weathering" of the earth's surface from rock to earth and sand, and when rain comes the particles of rock separate and it becomes broken into sand, etc. And in a recent lecture here it was stated how granite had been heard to split with a loud report. Of course, the rays converted into heat by the rocks take part in this action also.

When the sun "gets hot" in the spring in England the young shoots come out and they are at once coloured green by the development in them of a wonderful substance, Chlorophyll. This is due to the actinic rays. At the same time very fair-skinned children get sunburnt. This is an inflammation of the skin and is followed by pigmentation or tanning, which protects from the sun. It has been shown experimentally that it is the actinic rays which cause sunburn and

that the pigmented skin stops actinic rays.

Now there is another important factor, that if heat diminishes with altitude the value of actinic rays increases steadily until at 5,000 feet, as we are nearly, we find them just twice as strong (other conditions in both cases being alike). Dr. Hudson, physician to the Montana Sanatorium, Switzerland, said recently: "In high altitudes the sun is astonishingly powerful, even in midwinter."

This month, a party of intrepid Britishers are attempting to scale the summit of Mount Everest, over 29,000 feet. About 24,000 feet is the highest reached hitherto. One of the difficulties they have to contend with is that while they are liable to get their feet frost bitten, they are also exposed to the danger of sunstroke at the same time. It is a completely paradoxical situation, but as regards the power of the sun's rays, shows that altitude increases their power.

Total the number of hours of bright sunshine and average cloud in England and in Rhodesia in a year, multiply the difference by the difference in the photographic value of sun and cloud, and then multiply by two for altitude, and you get the total difference in actinic rays in a year. That total, you will agree, must be strikingly great. And you will understand then the intense blackness of the local natives' skin. This is only a rough method of estimation, however. The matter is one that demands accurate figures, and these should not be difficult to discover by meteorologists.

You know that the X-rays are used for curative purposes in certain diseases, but the dose must be as carefully studied as that of a poison like strychnine when prescribed as a tonic. The first X-ray operators were so enthusiastic and knew so little about them that they were careless about themselves. They got inflammation of the hands similar to sunburn, but ignored it till it was found in some cases to be incurable and in

others cancerous; while other troubles, including sterility, were found as a consequence. X-rays is a new variety of light. On account of its minute wavelength, it penetrates the flesh or a foot of iron. Naturally such waves create a disturbance in whatever they are directed on, for instance the flesh, just as the ripples on a pond lash its edges (and gradually wear it away if continuous).

Prof. Swift Joly, of London, writing only a month ago, says: "Some years ago I was led to the view that there was much in common between the reaction of the cell to radiative (X-ray) treatment and the behaviour of those photo-sensitive substances which form the basis of photographic action." It is, of course, the actinic rays which act on these substances in photography when the "exposure" is made.

Post-mortem examinations in cases of sunstroke and experimentally on animals show to the naked eye changes in the brain, and the damage to the minute cells invisible to the eye, but on whose vitality life depends, can be shown by the microscope.

You know that red is the only light allowable in a photographic dark room, because red glass absorbs all the other rays except the red, especially the actinic. (See diagram.) Rabbits stand direct sun badly. Castellani's experiments in Ceylon show that when exposed to the direct sun at midday they died in 67 minutes, and that others protected by red glass never seemed any worse.

Now, although compared to the minute X-rays, the chemical rays from the sun are longer, but are themselves only about one hundred thousand of an inch; they have (see as stated) very many effects in common both physical and physiological, and there is, I submit, from the evidence just quoted, a *prima facie* case at least that they do penetrate the skin of blondes, and acting in **great quantity** as shown, over years of time, must cause changes in our tissues. These changes may not be sufficient to lead to imme-

diately death of the cells, like sunstroke, but their vitality may be affected so as to render them less able to resist disease. The lowered resistance may be of greater importance than exposure to germs, say, of Malta fever or malaria.

And we know that direct sunlight is one of the best destroyers of germs. In temperate climates we find practically all the infective diseases due to unicellular **vegetative** germs.* In tropical zones we find a different type of disease germs, **protozoal**, which do not depend on accidental methods of entering the body as the others do, but pass through stages of their complicated existence in other animals or insects and enter the body directly by the bite of blood-sucking insects, etc. By this means they avoid exposure to sunlight.

You have seen then the disintegrating effects of actinic rays on such substances as granite; their effects in causing sunburn and the analogous effects of X rays on the skin; the experimental evidence of Castellani on rabbits, and the great difference in grand total between places like England and Rhodesia. If time permitted, much more evidence could be given, but these selected facts show the reality of their power.

RELATION OF ACTINIC RAYS TO THE BLOOD.

But the most suggestive thing, to my mind, is the production of the green matter chlorophyll, which gives the colour to all plant life, considered together with the *a priori* specific purpose of the colour of skin in different latitudes. This latter in whatever degree, whether an ordinary tanning, or jet black, is due to grains of melanin, and its function is, as seen above, protective.

The Chlorophyll enables plant leaves to breathe in carbonic oxide and out oxygen,

* England being free from Protozoal diseases benefits much from spells of sunny weather as has happened during the last two years.

while the colouring matter of animal's blood, Haemoglobin, enables them to breathe in oxygen and out carbonic oxide. Each process is the exact converse and complement of the other. (But plants also take in a small quantity of oxygen, though their chief action is the former.)

Is it far-fetched to suppose that the actinic rays have some intimate relation, indirect and hitherto undiscovered, to the health of red blood corpuscles? There is considerable and accumulating medical evidence to show that this is so.

One of the points that is well known to zoologists is that the protoplasm of the minute unicellular organism, the lowest in the animal series of life, the ameba, is affected and altered by direct sunlight in half an hour. We have in our blood "white" corpuscles, many thousands, which are to all intents and purposes amebae. They form one of our chief defensive forces against any infection by disease germs. There is evidence, the "Arneth index," though its value is not fully established yet, that in tropical climates these corpuscles are altered to some extent.

The following figures, for which I am indebted to Mr. C. L. Robertson, Hydrographic Engineer, show the differences at Salisbury in the present most exceptionally dry season, as compared with the previous year, for the month of January, which is usually a very wet month.

Mean maximum daily temperature	+ 8.1° F
Relative Humidity	- 22%
Black Bulb, i.e., direct sun... ..	+ 1.1
Mean number of hours sunshine daily	+ 3.8
Sun directly perpendicular January 24th.	

Blackwater fever broke out about the middle of February, approximately six weeks earlier than usual, and was markedly severer in type. I make no deductions, but these are very striking differences and may have some connection. Of course blackwater, it is agreed, only occurs in persons affected with malaria, and I am entirely in accord with the emphatic advice of Dr. Thomson in advocating proper and prolonged treatment of the latter with quinine.*

AND TO THE NERVES.

It is not necessary to suppose, however, that the rays penetrate beyond the skin before showing an effect. The differences between plants and animals are that the latter have a muscular system, which permits of free movement, and also a nervous system which controls everything, including movement, and the nutrition of the body and its cells. In the skin there are special nerve endings, the purpose of which is to make the skin sensitive to outside things, so that we can select good from bad. These are connected by telegraph-like wires, the nerves, with the brain. According to text books, it is the nerve-endings in the skin which are shielded by the pigment from the actinic rays.

It is well known by everyone that the brain controls your arms, legs and eyes, but not so well known—and it should be—that by a somewhat different arrangement, and all dependent on full nerve connection with the brain, that the partly automatic process of breathing, and the more fully automatic process of digestion, are accomplished. If the nerve of an arm is cut or diseased, the limb

* The mention of this disease is apt to give rise to the impression that it is very prevalent, which impression of course would be wrong. It is essentially preventable, though we do not know everything about it yet. However it is interesting from many points of view, and it is an extraordinary phenomenon. I regard it as one of Nature's warnings to blondes in the tropics. Hence the necessity for a final triumph over it and its abolition or reduction to entirely negligible proportions.

Its full discussion would be out of place here, and while it is essential to be cautious in making deductions, I may say I am confident that when the factors mentioned above, are charted, in graphic form and compared with the curve of the incidence and severity of the disease, that more than a superficial connection with the physical factors will be discovered. Similar information could be gained from other countries where the disease occurs, and would go towards establishing or disproving this view.

withers, apart from inability to exercise it. The nutritive tube, the alimentary canal, is very richly supplied with nerves. And there are connections via the brain between the skin and the bowel by which one reacts on the other. A rash on the skin (some people are very subject to this) is often caused by eating something that disagrees. In severe burns of the skin ulcers may form in the intestine and cause death. Excessive light may thus reflexly affect the intestine and its digestive power, etc.

High authorities on tropical medicine agree that the first effect of a tropical climate on blondes is one of stimulation and great energy, and that it is followed by one of depression and lessened energy. Some say that this is actually due to the chemical rays, therefore it is probably, an effect on the nerve tissues. Finsen, after experimenting on tadpoles, beetles, etc., came to the conclusion that the action of these rays "could best be considered as an excitation of the nervous system."

All plant and animal life is due to the sun, man being the most highly organised and delicately balanced and deriving his characteristics and food supply most **indirectly** of any, from that source. Hence it would appear that he does not need, and cannot make use of more than a limited amount of **direct** sun power, i.e., the reverse of plant life. In other words that he needs protection from this terrific bombardment, which agrees with what is perfectly obvious in regard to skin colouration from the Poles to the Equator.

Nature has provided the eye to perceive certain wave-lengths—those which we know as light—special nerve-ends in the skin to perceive heat wave-lengths, and has adopted pigment to filter sufficient chemical rays only into the body.

"EYE GATE."

Though it takes all the colours of the spectrum, or rainbow, combined, to make

white light, the principal ones are yellow and green. You have just seen what an excess there is of sunlight, and I must content myself, if my *prima facie* case as regards the skin is admitted, by pointing out to you the directness of the route right into the brain by the eye. When you perceive light eight hundred billion waves, or ripples, or vibrations enter the eye per second. Take the wave length of visible light, quoted above, and the speed of light, 186,000 miles per second, and work it out. Again, the iris of the native's eye is not blue like ours, but very dark brown, and it is difficult to distinguish between iris and pupil sometimes. Excess of light and chemical rays entering there (as they do in blue eyes) are, in my opinion, **more** potent than on the skin, and deprive the system of much energy which might be used for other purposes, i.e., cause a lowering or delibity, and inability to cope with any extra strain. They must have a **direct** effect on the nervous centres. These centres, as already mentioned, control the rest of the body, its functions, and its nutrition.

Anyone who spends much of the day in the open without sun-glasses has little energy for reading or study at night. In fact, so much is loss of energy felt that it is customary to take a little tonic before facing the evening meal. I might add that this is an explanation, not an excuse, and might not apply to everyone. I find, personally, that in order to do any hard mental work I must have a very modified light.

INSTINCT.

You are well aware what a large portion of the activity of wild animals, natural to these parts, is nocturnal. Look at a flash-light photograph in big game books, or drive along the roads at night with a powerful light and you see a perfect menagerie. You have to guard

your mealies from the depredations of pigs, porcupines, etc. at night. Your dog, if you observe him, generally seeks the shade wherever he may be. Our brain power has, apparently, been developed at the expense of our instinct. There is one immediate practical point as the outcome of all this, which illuminates our loss of instinct

PART IV.

RESULTS OF ATROPHIED INSTINCTS.

I have showed you the differences we have to contend with here in the way of heat loss as compared with our natural habitat in England, and, leaving the other factors out for the moment, one would expect an intelligent race emigrating to a hot climate to avoid as far as possible, heat, and keep out the sun's rays and their heating effects from the house at any rate. We spend one-third of the 24 hours in bed and the greater portion of our lives indoors. But mothers and young children and invalids are often confined for days together in the house during the heat of the day.

What actually do we do? We use, instead of an insulating material, the Satanically-convenient, but pernicious and damnable galvanised iron, about the best conceivable for transmitting heat. We pride ourselves on our British birth and intellect and come to this country and live in ovens! Well, what is an oven made of?

The temperature of some upright iron, very oblique to the sun's rays and coated on both sides with paint, on the inner side, on the 26th March, at 2 p.m., was 105; that of the western verandah of the Sinoia Hospital, vertical to the sun's rays, was 117. The atmospheric temperature under the Stevenson screen was 86, a difference of 31 degrees. Do we justify the description *Homo Sapiens*?

An Independent Rhodesian paper, the other day, remarked cynically, that the

coat of arms of the new Rhodesia should be "a sheet of corrugated iron rampant." After visiting the editorial offices,* I can appreciate the writer's feelings. It must have been "George Washington" in an exceptional burst of candour. If a mighty whirlwind unroofed every iron house in the country and deposited these roofs in the Indian Ocean, it would be the greatest blessing in disguise that could happen—for the merchants would not be able to meet the demand and something else would have to be used. I believe public opinion is ripe for mobilisation in order to start on this urgent reform without a moment's delay.

We follow one another sheepishly. I saw, not far from a stately hostelry in Salisbury, a row of new houses the other day. I said to myself "What are they?" Compared to the other building they looked like rabbit hutches. They appeared to resemble railwaymen's cottages at home, only they had iron roofs and verandahs instead of slates, and this in a tropical climate. They were shabbily low and had some tinkering little devices to salve the conscience about ventilation. My gorge rises so at the damage these low-roofed iron-heated houses are doing to us that I can scarcely trust myself to speak before a public audience on the subject. Who is it that suffer? The women and young children on whom we depend and whom we look to for the future, who have to stay indoors during the heat of the day. A man can go out and move about in the air protected by a pith helmet, but I would like to make him wear a corrugated iron one for leaving his wife and children to stew in an inverted iron pan.

I have gone into many houses since I came to Rhodesia, twelve years ago; some that I considered hell upon earth, and wondered how women and children could live in them. I have traced some of these people, and the results are not favourable to the country. The ganger's cottages on

* Now happily rebuilt.

the railways are an offence to human nature, the rooms are little bigger than railway compartments, the sides and roofs are made of iron that keeps the rain out about 40 days of the 365, and lets the heat in the other 325. I am glad to hear, however, that the General Manager is taking some tentative steps in Portuguese Territory to alter things. I show you here a sample of some Rhodesian farm houses, about which it is difficult to weave romance. The Government in their offices and other public buildings are also sinners. You can feel the heat from the long Government office verandah at Sinoia three yards before you get under it, any day when the sun is shining after 10 a.m. I am not playing to the gallery when I pillory the Railways and Government, they are scientific sinners—we all are—and the victims of circumstances. But the pioneer stage has now gone and we have got to improve things without loss of time. Nature forgives mistakes sometimes, but procrastination is a bar to all her favours. I do not ignore practical difficulties, but I do ask for a start to be made and new buildings to be constructed on a better system. Create a demand by asking for something better and the merchants will put in on the market.

MEDICAL OBSERVATIONS.

Evidence from the Medical Side of the effects of galvanised iron must be given. I have already mentioned the report of the Schools Medical Officer. Not long ago I was called in great haste, some miles away from Sinoia, to attend a lady, a young wife of good constitution, living in an iron place, sides and roof, two rooms about ten feet square with a five feet verandah. Her condition had given her husband reason to believe for some hours previously that she was dying. She was in acute distress, suffering from heart failure, due to heat exhaustion following malaria and the confinement to bed in

that place. Her immediate removal to a thatched hut appeared to save her life. That is not the only case I could quote. A patient in an iron-roofed iron verandahed house has a terrible time at some seasons of the year between 4 and 6 p.m., and in a recent case of Blackwater Fever I had, this nearly turned the scale against her, even during the stage of recovery.

If these conspicuous results are directly observable, what must the effect be over a long period of time. "Constant dropping of water weareth away a stone." I find medically that people have not so much to come and go on in this country when they get sick, and I fancy my medical confreres will agree with me in this view.

The difference in bloom and appearance of children from a thatched house and those from an iron-roofed house is remarkable, other things being equal. From corrugated iron you have streaming down all day, and for long after the sun's rays have weakened, or gone, dark heat rays which heat the atmosphere (a heat of 31 degrees above the ordinary temperature) with probably some harmful effects on the air besides that of heat. At any rate, the sense of stuffiness and oppression is very noticeable after 4 p.m., and right on far into the night. There is never the same feeling of freshness that there is under a decently built thatch place.

INSECT LIFE PROMOTED BY IRON.

It puzzled me for a long time when I found far more mosquitoes in unceiled iron-roofed houses than anywhere else, but when I tell you that in one case in which a ceiling was put in, careful observation before and after, showed a difference of eight degrees in the room below during the day, you may understand why that is so. The heat invigorates insects—that does not need to be said—and the malaria germ needs a constant high temperature in order to go through his necessary

FACING THE SITUATION SQUARELY.

development in the mosquito before he can infect human beings. But even though you ceil a house, with verandah included, you are on a wrong principle, for you imprison hot air there, which prevents natural ventilation in the room below.

THE HEART.

For some years my attention has been particularly drawn to the frequency of heart irregularities in this Country and further observation has confirmed the fact that such exist together with weakness of the heart's action. This is not what is known as heart disease. The heart, of course, is a muscle, a hollow and self-acting one. It is the internal pump which keeps us alive by circulating the blood. Its strength and regularity at any given moment is the indicator of the general condition of a patient. If it loses tone and strength, the whole machine at once becomes less efficient. It was this in my medical experience which has led me to observe closely the factors I have discussed, some of which might cause it, and eventually to the fixing on the baneful effects of galvanised iron as one great cause in producing debility, and this general weakness, so paving the way for actual disease. We have carried the iron age a little too far. Here is what one of my patients, who lives in a low-roofed iron house says, "Dear Doctor, please send me a tonic, my heart has been going like a race-horse. I think it is just weakness."

Every untimely death, and there are many, only deepens my sense of gravity of this matter. An iron roof may be splendid for a laundry drying room, but not for your human dwelling, unless it is your purpose to dessicate everything in it, including your brains.

These are a few of the physical effects. I have not time to mention the psychological, and there are many other points still untouched.

This, however, is not the place for saying smooth things or preaching vague doctrines. One of the glories of Science is that it is Truth and her disciples must follow her wherever she may lead. The biggest fool is he who fools himself. It is no use minimising obstacles and I hope I have done something, at any rate, towards a fuller appreciation of what we are up against.

But, am I really pessimistic? Not in the very least, though I would not like to say that this is ever going to be an easy country for blondes. But, as ever, Success will depend on attention to details. And we here have got to make this country go, and each must pull his full weight. I have pointed out some of what I believe to be our enemies, sun radiation in excess and iron roofs being the chief, but compared to many tropical countries, we have a remarkable freedom from many diseases. And if the native, with his ignorance and lack of initiative, could exist here, surely, with modern science at our command, we can overcome these special disabilities. Success, however, will mean, I will again say Discipline and Devotion as well as Common Sense. It is Bright Brains versus Black Skin. If such are actively applied I feel sure we may look forward to the evolution of perhaps one of the finest types of mankind. There is evidence that South Africa can do this. It is either that or degeneration in Rhodesia. No MIDDLE course appears on the horizon, to my eye, for blondes in the Tropics.

ABOUT BABIES.

Babies do phenomenally well in Rhodesia. No one who has watched them closely up to the age of 18 months will deny that they do better than in England and are less trouble. Here are the weights and ages at the Baby Show held

at Sinoia in September, 1917. They represent not a selected few for show purposes, but practically all the babies in the district at that time. The weights are, taken as a whole, well above the normal standard for their ages, and there was nothing to indicate that in vitality they did not correspond with their weights.

Name.	Age in months.	Weight.	Boy or girl.
J.W.	10½	23.8	b
C.A.	15	24.4	g
O.P.	21	24.5	g
J.B.	22	24.8	b
M.	17	24.8	b
G.P.	18	23.2	b
C.S.	14	26.8	b
L.S.	23½	30.0	b
Z.H.	18	23.10	g
H.	6½	17.12	b
S.F.	8	21.0	b
S.	3	11.0	b
P.	5	11.15	b

Here then we have a pointer of the utmost importance, viz., that at the time when Nature is in its most plastic stage the response to climatic conditions, but without the sun, is of a satisfactory nature.

But what happens afterwards? The child toddles about, and from the time he is two onwards is much about in the sun round the house, or on the verandah, sometimes it is on the road. Of course, we keep the grass away from the house, but that glare reflected is unsuited to his tender age, and that and the sun make him pale, thin, often listless and fretful, compared to his happy indoor days, and growth appears almost to stop for a long period. This again renders him more susceptible to the malaria germ if it gets a chance. I'm no advocate of molly-coddling or bringing him up in the dark, and baby must get accustomed to the conditions of life; but a knowledge of the effects of too much sun will show how carefully the necessary acclimatisation and exposure should be studied at this stage.

We have in Rhodesia some very fine young people in their teens. They have often been remarked on by visitors and local people. One need not be unduly optimistic to look forward to the time shortly when we shall hold our own in the world's athletic competitions. But not all Rhodesian children are of this stamp unfortunately.

RHODESIA AND SWITZERLAND COMPARED.

Now you would not expect to hear that our climate has any resemblance to that of Switzerland? However, I will read you Professor Hill's description:—

"In October the sunshine at Montana averaged over eight hours a day, and during the last three weeks of November the sun shone every day, while the air was calm and frosty; the thermometer, while showing from 5 to 20 F. of frost at night, rose at mid-day in front of the sanatorium to some 50 F. Wet bulb 35. Montana is at an altitude of 5,000 feet, and the mid-day winter sun piercing the clear atmosphere was so warm that it raised the surface temperature of a dark fur or wool coat to 100 or 120 F., and a shade became necessary for the head."

(1) The altitude is similar to ours and (2) the amount of sunshine; the (3) heating power of the sun was great; (4) the relative humidity was low, and it shows another fact (5) that the sun's rays penetrate a clear atmosphere as ours is (due to altitude plus low humidity) and that of Switzerland, much more readily than one with a higher degree of moisture. Twenty degrees or so lower temperature would put us in a climate almost identical with the description given, but we probably have a considerable excess of chemical rays over Switzerland.

The climate of Switzerland is looked upon as a reservoir from which the jaded British business man may, in a month, lay in a stock of health for the year. And we know what a wonderful change

for the better comes over us when we take a trip on the veld and have plenty of exercise and sleep in the open air. It is more effective than all the drugs; but, alas, we do not put that experience into practice, but shut ourselves in houses most of the year, which deprive our lungs and blood of that magnificent cooling power of the air which is necessary for bodily tone. Approximately 1,000 gallons of blood pass through the lungs in the average person in 24 hours.

REMEDIES SUGGESTED.

A word or two about the Remedies. I wish particularly to avoid prescribing in a dogmatic manner and my object has been, to-night, to introduce to you principles which I trust you will consider and arguments which you may digest and decide yourselves on what is most suitable in any given case.

1. Houses should be constructed so as to allow of, when the weather is fine, practically sleeping in the open air. This may appear difficult at first, but a little brain power will overcome that. Probably it will mean that conventional designs must be scrapped, but the architecture to me seems, so far, of a scrappy nature. "Sleeping porches" are, I believe, a regular feature in new houses in the United States.

2. That we should get some distance from the earth, by a second storey or some other means, I am convinced, is essential in order to avoid the mid-day heat from the earth, and for better ventilation. Somehow a thoroughly cool place must be arranged. Excess of light should at the same time be particularly avoided.

3. The use of a roofing material which is **ABSOLUTELY NON-HEAT CONDUCTING**. As the substance which is best for this is being actively produced at our doors to-day, it seems very unworthy of us that we cannot find some means of using it for our protection instead of importing hundreds of tons of my pet

aversion every year. Are we getting the best out of asbestos? But for the immediate future, till something of this nature is procurable, I recommend thatching over the roof, especially the verandahs. The manager of the Co-op., Mr. Newett, tells me of an asbestos paint he has tried, and says is very effective; but I have been disappointed with the several other paints tried, and I do not recommend tinkering with the question. They make a difference, certainly, but they do not stop the heat coming through by a long way. If you could wake up to-morrow morning and find all the galvanised iron in Salisbury replaced by the fairies during the night by asbestos, you would not know the place, it would be so much cooler.

4. The cultivation of the natural covering of the earth, grass, instead of suicidally denuding it and allowing the highest degree of insolation of the earth round the house, but it must, of course, be kept short; and the shading of all streets by trees. In more rainy countries trees may be detrimental to streets, but I think with suitably rooted trees it may be found that they will actually last longer here. The Council, I am delighted to see, is tree-planting extensively, and I can only say, "Go on, and go further with the good work." Doesn't it seem a pity that Dust and Heat appear as necessary concomitants of civilisation? Is it really inevitable?

5. The use of suitable spectacles (sun glasses) to keep out excess of light and chemical rays from the eyes, and the wearing, by those who work in or are much in the open air, of non-actinic clothing. Every blue-eyed person in the country, and especially those who have once had Blackwater Fever, should wear these spectacles as methodically as they wear headgear between 9 a.m. and 4 p.m., and more especially in winter, or "the dry season." They have the peculiar effect that though you have the

sun on your skin, you feel infinitely fresher and stronger when evening arrives.

The gorgeous winter flowering shrubs and climbers, Bougainvillea, Poinsettia, and Golden Shower, indicate what are the best colours for protection in clothing, namely, reds and yellows.

Increased health gives increased hope. When things get a swing in the right direction, they tend to acquire momentum, and vice versa. No single thing, in my opinion, will so promote increase in the white population by birth and by immigration, and the prosperity of Rhodesia, as improved health and the better reputation which will result.

In a specialised attention to the construction on scientific principles of houses, and care in the other matters mentioned, I see one of the decisive factors for our future in this Country.

PART V.

SPECIFIC BEARING ON PRACTICAL ISSUES.

What then are the bearings, special if any, of these things, Medical and Scientific, on the future? Questions of racial adaptation are part of the Science of Anthropology. And I think it only right that the practical bearings on affairs should be briefly discussed. Administration and the making of laws such as forward the interests of a community must be based on a sound conception of the situation in every aspect and on first-hand knowledge of details.

Our position is in the Tropics. We are a European population of 33,600, of which the Blondes (Slavs included) constitute 32,400. Indigines and natives from other parts are 862,000, Asiatics which may be regarded as effective units like ourselves, few are employees, number 1,250. There is no fusion of the three types or prospects of such.

The basic principle of British polity

—equal rights for all—is bounded only by reason. It is founded on human instinct and Christian ethics.

We have brought to the native peoples here a Constitution which gives stability in place of insecurity and semi-Nomadism, and advantages under which and from which they can rise rapidly, amongst other things to the standard and dignity of equal political rights.

The large body of Christian missionaries here, our own countrymen and others, is effective to secure just treatment to those still in the raw state if it were not obtainable otherwise. And it is to our economic interests not to have friction.

It appears tolerably clear from the figures that our population must be considerably increased at an early date to form a sufficient make-weight to, in the interests of all, retain control. Without this the time may not be remote when the economic results of past and future effort may be jeopardised.

Our fertility as a race so far shows no important diminution from that of England. But native fertility with their polygamous system and early marriage, unmarried females are unknown and sterility is rare, must exceed ours considerably. While in numbers they have a huge start. They are immune to the effects of sun and to serious malaria.

The chief available and most obvious source of increment by immigration is that of the large emigrating type of population in Britain and North Europe. But owing to the peculiarity of our situation in relation to the natives (admittedly difficult to grasp) we cannot absorb anything like the numbers that North America or the Antipodean Colonies can.

While increase of population is most clearly indicated as the most insistent need, and the numbers absorbable are not indefinite, there is also the factor that such increase must not be a dilution or lowering of standard. Success does not lie in that direction. So much will be admitted by South Africans. Further, it is here that the usefulness of a knowledge

of biology in general and ourselves in particular is visible. To dilute and lower the standard would be adding a fatally weak link to our armour. Prestige and personality form a key to native psychology and respect—it is inbred. The native has learned to respect and believe in our system of law replacing that of his own old one—diagnosis by witchcraft. And in spite of criminal indignities offered by them there has been no ebullition on our part of such race feeling as "Lynch law."

From the standpoint of disease also those who, either from lack of intelligence or sufficient means, or both, cannot take the necessary precautions to guard their health, will be a weakness, increasing disease and becoming a financial burden. I speak from knowledge of the facts. It is an open question now whether power should not be taken in some cases to secure a better state of health in regard to malaria, but that is repugnant, and not the most desirable method.

We are a very young country as years go. Like Pitt, we may have laid ourselves open, in some eyes, to the charge of youthful over-reachingness. Still, as Pitt pointed out, in accepting the charge, there may be worse crimes than youth. At any rate, we are looking ahead.

Put succinctly, our position suggests the analogy of a research worker. We are, but not in the sense of the miner or hunter, pioneers—as a community, not as individuals—in a Darwinian sense—proving our fitness, or otherwise, for survival and permanence. Success in

such circumstances demands similar conditions to those of the research worker.

These are, firstly, his objective is clearly laid down; secondly, his hands are freed to adopt any method he may choose, new or time-honoured, so long as these are in consonance with scientific principles and likely to attain the end in view.

Our problem or objective has, to the best of my ability, been stated. I cannot therefore regard with equanimity any proposal by which the second condition is annulled, i.e., that this Territory should relinquish into other hands the question of Immigration, its fostering and control, the selection of suitable types and the power to say nay to unsuitable ones from whatever source. No other means or material which may be offered in substitution will compensate for this loss. And if that goes, the objective also goes.

In such a case it requires no great mental effort to perceive what the end will be, what the condition of those placed between the upper and nether millstones; between the direction from interests and policies outside, and the rapid increase and rise of a native race.

Preconceived ideas of territorial unification may be excellent in theory, great in conception, noble in principle probably and beneficial often, but must yield to sound judgment and appreciation of facts. Despotism has passed into the region of history, and to-day hegemony is also a waning force. Recent history from the standpoint of Social Anthropology shows this clearly.

