THE CONDITIONS OF LIFE IN TROPICAL AUSTRALIA.

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"White Australia," the pleasant dream of a peculiar political party, is a subject on which a few years ago it would have been inadvisable if not unsafe to venture too unrestrained opinions. There was a time when in certain quarters the euphonious phrase was almost tantamount to a war cry. To some political dreamers it may even have been a perennial dream, full of visions of whiteness and purity, just as to us in England the mention of the "Pearly Pacific" conjures up vistas of prattling palms, wimpling waters and silvery strands. The dream is a pretty one, fitting theme for the poet and artist; Samoa and R. L. Stevenson, what a perfect juxtaposition! What delectable tales our romance weavers indulge us with! The gorgeous colouring, the wondrous life, the glorious moon, the ocean's unceasing sigh—all fine, all beautiful, all seeming perfect—but all superficial or tempered with prosaic features which mar the picture.

The Tropics, America, Africa, India and later the Pacific Isles have successively been the "El Dorado" of many a gallant sailor, many a brave soldier and many a specious adventurer. The dreams of untold wealth have been realised full many a time but at what cost it were not wise to think on. The wealth of the Indies connotes something fabulous—but the *health* of the Indies connotes a melancholy fact, known to most, distorted by many.

There was a time, but yesterday it seems, when "the Tropics" was synonymous with ill-health. That truly dreadful term "miasma" was pregnant with significance—mud, vermin, pestilence. A little knowledge, a little haphazardous discovery changed all that and the pendulum of opinion commenced its backward swing. The Tropics again became a possible El Dorado, a happy hunting ground for the ever-adventurous white man. A little white powder became a certain safe-guard, so it seemed, and one could visit the Tropics with considerable assurance that no untoward effects would follow. One could indeed venture to remain for months or even a few years.

In spite, however, of the enormous advances in prophylactic medicine and the apparent immunity which they have conferred, there remains the undeniable fact that white people, as such, have never yet succeeded in colonising any part of the Tropics. Exception may be taken to this statement and such instances as the states of Central and Tropical South America be cited. Such instances however illustrate precisely the reverse, for in place of the original European settlers a people or peoples of considerably different characteristics have been evolved. These races have not only diverged more or less widely from the original European stock but have broken up into various individual races presenting differences amongst themselves almost as radical as those separating French and Spanish or English and German. These states represent up till the present the highest level to which European colonisation of the Tropics has reached, and they are assuredly very far removed from the ideals which the exponents of the "White Australia" policy have set themselves.

These particular persons appear oblivious of the fact that change of environment alone will cause radical alteration not perhaps so much in physical characters as in mental habitude. A superficial study of the contrast between the British people and the people of the United States serves to indicate this; a closer study convinces. A century's separation, politically and geographically, has evolved the modern American who, whether superior or inferior to his European prototype, is undoubtedly different mentally. Exactly the same process is taking place in Australia. There are at present very few Australians of the third generation and perhaps not a preponderance even of the second generation. Fully half the population are either Europeans or the children of Europeans. From these it is impossible to draw any conclusion regarding the future. At the same time there can be little or no question that a distinct Australian type is being evolved. The familiar term "cornstalk" as applied to Australians indicates at least one direction in which the change is proceeding.

It is not my intention to enter into any lengthy discussion of the characters which go to individualise the modern Australian. Some of these characters are more or less obvious, as for instance the height, as mentioned above, the build, the voice and so forth. It may be said that some of these characters are merely local and that greater differences are to be met with between say Yorkshiremen and Cornishmen. Whether that be so or not it only serves to illustrate the fact that the differences are due to separation, not necessarily wide but relatively

total. Even at the present day it is not often a difficult matter to differentiate say an educated Scotchman or Irishman from a Londoner. The difference is not betrayed in his appearance, his manner or his speech but in his trend of thought and his mental attitude. Here again it is not a question of superiority or inferiority; it is merely difference.

Very few people will maintain that the difference is hereditary; it is largely or almost entirely local. That it is marked no one can possibly deny. Such being the case it is not surprising to find that a distinctive "race" is being evolved in Australia, not purely British it is true, but very largely so, very much in fact analogous to the American "race." No one at the present day would be foolish enough to speak of Americans as English or British in spite of the fact that until recently a continuous stream of fresh immigration has been pouring into the States from this country. There is absolutely just as little reason or cause to consider the people of Australia or Canada as English, for that they certainly and assuredly are not, physically, mentally or ethically. The modern Australian is a distinctive type, a strong type and a good one but it is assuredly not English. I have already remarked that the physical characteristics are somewhat different; the mental characteristics are decidedly different.

The trend of Australian thought is essentially democratic and materialistic. This is evidenced by the whole social system, political and otherwise.

In literature, in art, in music Australia has evolved types, perhaps not altogether of the highest, but eminently distinctive. The merest glance through the literary product of Australia, not excessively voluminous as yet, cannot fail to convince one that it has a distinctive character which is not entirely due to the local subjects of which it treats. Modern English literature, needless to say, is widely read, but, and this is to some extent indicative, modern American literature is just as widely read, if not more so. As far as one can judge the literary taste does not extend much beyond the novel and lighter shades of poetry and philosophy, but this is perhaps characteristic more of the epoch than of the people.

In Art Australia has advanced much further than in literature and many fine products have been the result of Australian effort in this direction. It is difficult for one possessing little artistic ability and not too much artistic appreciation to estimate correctly the real value of Australian art but that it has attained a moderately high standard is obvious even to the uninitiated.

It is particularly in music both vocal and instrumental that Australia has excelled. The names of many Australian musicians are familiar even in Europe and not a few have reached almost the highest pinnacle of fame. As a people Australians are fond of music and show a full appreciation of its highest expression. This is evident not only in the cities but even far in the heart of the "bush," and a day's arduous journey is often lightly undertaken with the object of listening to some well known musician.

It is thus evident that on an average Australian culture does not reach the level of the older civilization of England but that in certain directions it tends to, if it does not actually, excel it.

In matters scientific, and more particularly medical, Australia is excessively backward. Almost without exception scientific medicine is the prerogative of a relatively few Scotchmen and Englishmen, and indeed until comparatively recently purely Australian science and medicine were practically non-existent. There has been, it is true, of late a tendency towards preferential treatment of the "native" product, but in how far this is successful is not yet evident. A much more reprehensible and indeed almost fatal policy was formerly in evidence, namely the glorification of the scientific foreigner. Even before the war the disaster-laden menace of this policy was only too apparent. The present circumstances in Europe may perhaps do Australian science an enormous amount of good in the future, but one hesitates to be assured in view of the somewhat ignorant—there is no other word—attitude adopted towards scientific men and things scientific.

To arrive at a true conclusion in regard to the matter of Tropical Australia one must consider a variety of opinions and a conglomeration of facts and possibilities, scientific and otherwise. Within the confines of the present paper one can only hope to do so in very brief. The actual country itself must be the first consideration, its position, its character and its possibilities. Even to the most casual observer it must be apparent that Australia is the least favourably situated of all the continents inasmuch as it is the most widely separated from the present centres of civilisation and human progress. Even by the quickest possible route Sydney is at present separated from London by at least twenty days, such a rapid means of transit being available only to a favoured few. To the less favoured a journey of thirty days is necessary. With the present railway and steamship speeds at our command no part of Australia can be reached from London under eighteen days continuous travel; with the longest available stretch of

railway communication (say Calais to Singapore) and the highest available railway speed of sixty miles an hour the journey could not be made under eight days. Thus, under the most favourable present circumstances, Australia can never hope to be as near London as was New York thirty years ago and the enormous difference which these years have made must be sufficiently obvious to most of us.

Under these circumstances it is in the nature of things that Australia must be backward unless, indeed, as might conceivably happen, the centres of civilisation be transferred from the Old World to the New. Even then, however, Australia would still be the most unfavourably situated of all the continents. It is thus evident that for many a long day to come Australia must inevitably bring up the tail of the civilised parts of the earth and must continue to do so until some enormous upheaval, literal or figurative, completely alters present conditions.

The above are facts which even the more intelligent of educated Australians do not fully grasp or realise. The majority of true Australians are proud, and justly so, of their country, of what it has done and what it is doing, but on reflection they cannot fail to be conscious of the enormous handicap under which it suffers. This applies to Sydney and Melbourne, two of the finest cities in the British Empire. It applies with doubled force to Perth, Adelaide and Brisbane. Outside these big centres its application increases by leaps and bounds. In such a place as Townsville, the "capital of the North," a mere village in size, numbering even at the widest computation not more than 20,000 inhabitants, the applicability of the above remarks must be strikingly obvious even to the most casual observer. Yet Townsville is a port which in point of shipping tonnage, entered and cleared, ranks possibly amongst the first dozen in the British Empire, the reason partly being that it is at present practically the only port for an enormous extent of country stretching five or six hundred miles inland to the rich copper mines at Cloncurry.

In the multitude of smaller towns and villages inland one finds a mental attitude much akin to that of rural England, namely a more or less intense concern in local affairs and a somewhat restricted and detached outlook on things beyond, apart that is from purely business matters. At the same time one is certain to find in such communities one or two, perchance a few, men and women of much more than average intelligence and education who, even in their remote obscurity, have not lost touch with the great world and whose knowledge is surprisingly up-to-date. A considerable amount of music and literature

may, in the ordinary course of events, find its way thither and the present war has undoubtedly stirred even these people to a fuller comprehension of external affairs, but science and medicine are as a rule of remote interest. Not a few of these places may be fifty or more miles from the nearest medical aid and many of them indeed illustrate a fact, known to most of us, that human beings can get along very comfortably with very little medical attention except in cases of serious illness or accident. To such people the problems of "White Australia" do not appeal in the abstract but they are ever present in the concrete. While it may be said in a general way that their health conditions are better than those of the coast dwellers, while the climate they enjoy is a more equable and therefore more monotonous one (apart from the extremes of temperature which may differ by as much as 70° or even 80° F.), still they are not exempt from many discomforts and inconveniences. There rain, instead of being a disagreeable nuisance, is looked upon as a life-giver and life-saver. The whole welfare of the district, the life of man and beast is dependent upon the timely arrival of a few rain clouds. Should they fail nothing but ruin, temporary at least, rewards the most patient toil and industry. Such droughts have been not infrequent even in the memory of the present generation, but such is the recuperative power of the virgin country that a year or it may be two suffices to restore it to its former prosperity.

These disastrous droughts will no doubt be of little moment when in the course of time a system of artificial irrigation is introduced more extensively. Even now artesian borings have rendered not a few areas altogether independent of rainfall. Such measures will undoubtedly render large tracts of country perennially productive, but they will do little to ameliorate the climatic conditions and taken by themselves they will tend without fail to render the country somewhat less healthy, for there is not the slightest doubt that the introduction of surface water will attract and encourage the growth of many agents of disease. It is on that account not altogether easy to predict from the present circumstances what the future prospects of Australia will be.

To deal with the question as it is at present one must understand, roughly at least, the configuration of the Australian continent. There is in the first place the coastal belt varying in width from a few miles up to eighty or a hundred. Inland this is delimited by a more or less continuous range of hills beyond which is a flat tableland with a tendency to slope towards the interior. In the coastal belt the conditions are essentially what are generally understood as "tropical," namely, there

is a rainy season usually from November to April and a dry season during the other months of the year. The terms "rainy" and "dry" are not as a rule merely relative; they are absolute. During the dry season there is no rain or at most only unmeasurable quantities at a time; during the rainy season it may rain for days and weeks, even months, with only occasional remissions. In Townsville during 1913–1914 the rainfall only rarely assumed the proverbial tropical type and was usually of a more or less mildly persistent character. Occasionally however especially in the evening there were downpours which could only be described as torrential, usually accompanied by thunder and lightning. These as a rule did not exceed one inch at a time but in certain localities, e.g., Innisfail, the daily fall was to be measured in inches. Innisfail indeed has the reputation of being one of the wettest places in the world, the annual fall there usually exceeding a hundred inches; sometimes attaining five or six times that amount. In Townsville the average rainfall was 40—50 inches, but in 1915, this being a year of drought, it barely exceeded 12 inches. Taking a low average it may with fair certainty be said that the average coastal rainfall of Tropical Queensland considerably exceeds 50 inches.

Inland from the coastal range of hills however the rainfall figure immediately drops. At Charters Towers, which is less than 70 miles inland, the average annual rainfall does not greatly exceed 25 inches, while every mile inland from that sees a further drop. Considerable areas do not receive more than five inches a year and that probably falls in a couple of showers.

There is a corresponding difference in the temperatures. At Townsville for instance the average maximum temperature is about 80° F. During the hot wet season there are days and nights when the temperature remains continuously at or about that figure dropping only a very few degrees during the night. Before the advent of rain the temperature frequently runs well over 90° F., but only occasionally did it exceed 100° F. The minimum temperature recorded during my residence in Townsville was only a few degrees below 50° F. At Charters Towers however temperatures of under 40° F. were comparatively common while in many places temperatures below freezing point are occasionally recorded. Maximum temperatures of over 100° F. are more frequent the further inland one goes.

In the coastal regions, however, it is the humidity of the atmosphere, even when there is no actual rainfall, which is the most trying circumstance. It was a frequent experience to find the wet bulb thermometer

registering only 1° or even ·5° F. below the dry bulb, indicating a very high humidity of the atmosphere.

With regard to the black bulb thermometer, registering the solar radiation, readings of 140° and 150° F. were not infrequent during the hot season, while on very overcast days, the readings not infrequently barely exceeded those of the dry bulb; in other words the sunshine was practically nil.

The local character of the country alters considerably in the change from the dry to the wet season. In the former the predominating feature is sand and dry cheerless vegetation. To keep any plant life alive in the garden an assiduous and constant use of the water-hose is essential. On the other hand as soon as the rainy season sets in thoroughly the ground becomes absolutely sodden. Where once was sandy desert is now lagoon or small pond. The roads once buried in dust become quagmires of soft mud through which course streams of turbid water. The roads and paths leading from the higher lands become the venue of raging torrents over which wooden bridges are a necessity. Needless to say the water plays havoc with the beds of the roads and carries away quantities of stones and earth except on the few roads which have been thoroughly tarred or asphalted. The roads and footpaths in fact become dangerous to unwary pedestrians who require to pick their way with exceeding care.

These torrents and ponds may persist for weeks on end and are reinforced by every fresh shower. It is no uncommon experience for banks of earth to be undermined and carried away and for gardens and yards to be invaded by the floods. The excess of water immediately causes the recrudescence of vegetation luxuriant but rank. This again provides further work for people of gardening propensities.

Mention must be made of one or two other features which may be regarded as amenities or not according to one's point of view. In the first place domestic animals are a nuisance to all who do not keep them. The animals most favoured for domestication are poultry and goats. Swarms of both are to be frequently encountered even within a short radius of the Town Hall. Cattle and horses also roam at large. While confining their attention to waste lands and the outer side of fences they are possibly picturesque, but unfortunately they have a decided predilection for weak spots in fences. A loose spar, a crack or a slight washaway under the fence is discovered with amazing rapidity. This spells rapid destruction for a garden on which perhaps months of patient toil has been expended.

In addition to such common animals as fowls and goats, however, there are several others of a more native character. Perhaps the most destructive and annoying of all are the fruit-bats or flying-foxes, as they are called (*Pteropus gouldi*). During the height of their season they come in countless swarms. Every evening towards sunset a dark cloud begins to gather on the horizon and sails with amazing rapidity across the sky. Presently one becomes aware that the flying foxes have arrived and the air resounds with their raucous screams. Their object is the fruit, principally pawpaws and mangoes which they attack with great avidity. Their squabbling noises frequently resound into the small hours of the morning.

Amongst the native birds which visit the gardens most noticeable are the mynahs, which to some extent take the place of starlings in England, and the extremely graceful "peaceful doves."

Few houses are without their "possums" which frequent the roofs. Their nocturnal noises are rather disconcerting at times as, in moving about, they give one the impression of someone walking through the house. They are however much more tolerable than the swarms of rats and mice which abound in most houses and display a temerity far in excess of that of their English cousins.

The "national" bird of Australia, the kookaburra or laughing jackass, of which there are two species, *Dacelo gigas* and *D. leachii*, is not common so far north as Townsville. Its remarkable vocal effects, however, are very familiar to residents further south.

To my mind one of the most characteristic notes of Australian tropical life is struck by the frogs. Three species occur in great numbers, namely the tree frogs, *Hyla arborea*, *H. gracilenta* and *H. aurea*. Less common but even more characteristic is the burrowing frog, *Chiroleptes brevipalmatus*. These, in addition to birds, constitute the great foes of insect life and are particularly useful in dealing with household insects. They frequent the bathrooms for water and the verandahs for food in the shape of insects, but occasionally they venture within the sacred precincts of the house where their temerity often leads to mishap in the shape of a heavy foot. It is a peculiarly unpleasant sensation to tread upon a frog unawares. There can be no doubt that the presence of these frogs, within reason, is beneficial from a sanitary point of view.

Less welcome but not necessarily harmful visitors are lizards and snakes. Two species of lizards are met with frequently in the vicinity of houses, namely the blue-tongued lizard (*Tiliqua scincoides*) and the

monitor (*Varanus varius*). As a rule they inhabit the spaces under the houses and are not frequently obvious unless looked for. They are probably useful in coping with the insect pests. Of snakes there are several species which are to be met with in or near houses. By far the most common of these is the carpet snake (*Python variegatus*) which is non-poisonous and generally regarded as harmless. It frequently attains a length of 5—6 feet. Other snakes are less frequently seen near human habitations but are met with commonly elsewhere. The most familiar of these is the black tree snake, which has the reputation of being poisonous.

It is when one comes to speak of insects that words fail, for insect life is undoubtedly the greatest bane of the Tropics and Tropical Australia is by no means exempt. It would be impossible to deal adequately with the multitude and variety of even the common insects and I shall confine my remarks to a comparative few which are particularly obnoxious or have a definite relation to disease.

One has some slight satisfaction in saying that the ordinary English house flies or rather their Australian relations are less common than in England, but their place is taken by a myriad other insects whose attentions are even more annoying and decidedly fraught with danger. The biting stable-fly (*Stomoxys calcitrans*) is very common and a constant source of worry to cattle and horses. The formidable marsh flies (*Tabanus* spp.) are also persistent nuisances particularly in uncleared areas.

Mosquitoes head the list of inveterate pests and few people escape their attentions. Most new residents are not only attacked but show very pronounced signs of such attacks in the form of small raised lumps on hands and face and ankles. Even the covered parts of the body are frequently attacked. The favourite sites of attack are the temples, the angle of the jaws, the back of the neck, the backs of the hands and wrists and the ankles, in fact the parts of the body where the skin is stretched most tightly over the subjacent tissues. In most people these bites are intensely irritating and the effect may persist for a considerable time. Not infrequently a slight septic infection may supervene on the bite. After some months or a year's residence most people acquire a certain degree of immunity either to the bites or to their effects. A few fortunate individuals appear to enjoy a natural immunity. The most common domestic mosquitoes are *Stegomyia fasciata* and *Culex fatigans*. Anophelines are much less common, *Anopheles maculipennis* being that most frequently encountered. That some, or even several of these

mosquitoes are disease carriers is unquestionable, but this will be referred to later.

Next in importance, perhaps, are ants. They are the dismay of the housewife. All foodstuffs of every kind have to be most carefully protected from these insects. Meat safes are an absolute necessity and they require to be guarded by ant traps. Kitchen tables and dining room tables, in fact any furniture on which food of any kind is to be laid must be protected in a similar fashion. This is a constant source of tribulation to the conscientious cook, for no matter how careful she be one or other of these ant traps may go faulty and a procession of ants find its way amongst the viands. It is indeed almost impossible to keep ants away from food, for they discover what appear to be practically impassable routes of access. Although however their presence is undesirable they probably do little harm and they afford compensation by acting as scavengers. Cockroaches, though not so numerous as ants, are quite as great a nuisance. They also chiefly frequent the kitchens and dining rooms. In addition to the culinary department, however, cockroaches are fond of frequenting the library and the bookshelves. The bindings of books generally show numerous marks of their attentions. So far as I have observed, only the smaller cockroach, *Periplaneta orientalis* occurs.

Needless to say clothes moths bulk very largely in the household economy. The most careful precautions require to be taken with all clothes, more particularly silk and woollen garments. Heavy silks are not suited to the climatic conditions but lighter silks and mixtures of silk and cotton are frequently used both for dresses and for underwear. They suffer most disastrously. Heavier woollen underwear which is generally packed away during the greater part of the year is frequently found reduced to fragments when necessity arises for its being unearthed. Linen, cotton and tweed generally escape except when stained by food.

Amongst other domestic pests mention must be made of spiders which are fairly common. The most familiar spider is an enormous green one, measuring three inches, which is quite common. It is popularly known as the tarantula, but for what reason I could never discover. So far as I know it is perfectly harmless and indeed useful in some respects. Its size and appearance make it somewhat repulsive, but as a rule little or no notice is taken of it. This is the only domestic spider I have personally seen in the north though several others are to be met with.

With regard to body parasites fleas and lice both occur, but, to

the best of my knowledge, not in excessive numbers. The great ubiquity of rats probably prevents fleas becoming too great a menace to human comfort. *Xenopsylla cheopis*, the Indian rat-flea, is probably the commonest flea but *Pulex irritans* and *Ceratophyllus fasciatus* also occur on rats.

Phthirus pubis is, needless to say, a common human parasite, while *Pediculus capitis* and *Pediculus corporis* are not infrequent, but I have never observed cases of such heavy infestation as are only too frequently seen in this country.

The human diseases of Tropical Australia may be divided into two categories, namely, those which are common in countries outside the Tropics and those which are purely tropical in distribution or almost entirely so.

It must be remembered in the first place that the death-rate in Australia as a whole is extremely low, considerably lower than that of most European countries. In the tropical regions, however, the rate is much higher than in the non-tropical parts, probably on an average being at least half as high again. There are several fairly obvious reasons why the death-rate in Australia in general should be low. In the first place the type of emigrant is fairly good physically. The immigration authorities exercise a certain amount of supervision over persons admitted into the country and any suffering from obviously chronic ailments are rejected and sent back. Moreover persons over a certain age are not admitted except for special reasons. It must be said that the medical examination is not excessively strict but it undoubtedly prevents the dumping of a crowd of undesirables and unfits.

It is thus evident that the class of people who are admitted to Australia are persons for the most part between 18 and 50: persons who are in the prime of life and amongst whom disease incidence and death-rate are considerably lower than amongst the two classes, namely young children and aged, in which these factors are relatively high. The number of infants admitted under one year is comparatively small. These are considerations which must be taken into account in contrasting the death-rate of Australia with that of England. When this is done it is at once evident that the difference is not so very greatly in favour of Australia if indeed at all.

Taking into consideration, again, the matter of urban and rural distribution of population, there is a fairly prevalent idea in this country that all Australians live in the bush or scrub or at any rate somewhere in the open country, and that they live a free life bounded only by the

distant horizon. Such a view, needless to say, is hopelessly erroneous. Of the total population of Australia, say 6,000,000, more than one quarter live in five towns. An equal number live in thirty other towns, so that over one half of the population are pure town dwellers. Another half million are crowded into the comparatively small coastal corner of Victoria and New South Wales, so that in the remainder of the vast continent there are not more than 1,500,000 people, i.e., a density of population of one person to every two square miles.

Roughly speaking then it may be said that New South Wales and Victoria are moderately well populated, Queensland and South Australia have about one person per square mile, while West Australia and the Northern Territory are almost uninhabited other than in the small district around Perth. It is thus manifestly impossible to consider conditions in Australia as even approximately homogeneous.

It is not my intention to deal here with the conditions determining the occurrence of disease throughout the whole length and breadth of Australia. Many interesting facts and observations are to be found recorded in the official reports of which perhaps those furnished by the Government Bureau of Microbiology in Sydney are the most instructive. Moreover an extremely useful series of reports on several special diseases has been published by the Department of External Affairs. From a survey and examination of these documents much information may be gathered.

With regard to constitutional diseases in general but little need be said beyond remarking that all the well-known old-world diseases are met with. Cardiovascular and renal diseases are probably quite as common in Australia as they are in Europe and are due to the same causes. Respiratory diseases, particularly tuberculosis, pneumonia and pleurisy are less frequent. This is undoubtedly chiefly due to the fact that conditions of life are at present decidedly better in Australia than in Europe, that there is practically no destitution and very little tendency as yet to overcrowding, except in certain areas of the large cities. Nervous and mental diseases, apart from those of specific origin, are also comparatively uncommon.

Of the specific diseases, syphilis and gonorrhoea are apparently quite as common as they are in England. So far as my knowledge goes neither disease is so virulent or followed by such disastrous effects, as in this country. This is probably is some part due to greater facilities for early treatment and to a better informed public opinion in regard to the diseases. The attempt, indeed, has been made to make these diseases compulsorily notifiable.

It is particularly in the matter of exanthematous infectious diseases that comparison becomes of interest. There can be but little doubt that these diseases afford by far the best indication of the health of a community and of the efficiency of the official and private measures which are taken to preserve health conditions.

Typhoid fever, perhaps more than any other disease, may be taken as an indication of the sanitary cleanliness of any community. It is to be regretted that Australia cannot congratulate itself on an immunity from this disease, of which there has been more than one epidemic within the past ten years. In some areas indeed the disease is apparently endemic, or what is more probable many undetected carriers occur. Little attempt has apparently been made to deal effectively with the carrier problem. The use of typhoid vaccine, however, is gradually being adopted. The paratyphoid fevers are very rarely diagnosed, but in this respect Australia is not much worse than England. That bacillary dysentery occurs there can be little question; that it is rarely diagnosed specifically as such is equally certain. With regard to epidemic diarrhoea of children I have little information, but that it occurs is highly probable.

Of all the intestinal disorders sprue is probably the most characteristically tropical. With regard to its origin and causation we possess little knowledge of value. Some attempt has been made to study the disease in Australia but it has been of a most particularly futile character. Although it is not excessively common in Tropical Australia sprue is undoubtedly one of the most certainly fatal diseases. No treatment has yet been found to give invariably satisfactory results in a well-established case. The disease is almost invariably chronic and progressive.

Of the acute infectious fevers dengue fever is that which has been the cause of more sickness and ill-health than any other disease in Tropical Australia. Its occurrence is apparently seasonal but an epidemic may extend over the better half of a year. In a recent epidemic to which I personally fell a victim a very large percentage of the population was attacked. The disease most resembles perhaps influenza of the muscular type. In addition to the fever which is usually fairly abrupt in onset there is usually a distinct prodromal rash of some indefinite type; there are generally pains in the muscles of the back, sometimes in the limbs, and headache and general malaise. In the majority of cases the illness is short and the symptoms mild, but even in such cases the post-febrile effects may be serious. The heart is frequently dangerously affected, a common sequel being myocarditis of an acute or chronic type. The individual muscle fibres are damaged and a process of

degeneration follows the acute stage. The valves are not primarily affected but the whole organ loses tone and becomes flabby. Dyspnoea on excretion is the most prominent feature and may persist for many months after the acute symptoms have passed. In my own case the myocardial affection is still evident even two years after the actual fever. It may be of interest to note that the condition was diagnosed as myocardial degeneration by two leading London heart specialists, irrespective of any knowledge of the previous history.

Such an infection with such a sequel can only be expected to have serious consequences in persons over fifty, and there can be little doubt that this has been the cause of death in most of the fatal cases.

Dengue fever was epidemic during two successive years, the epidemics being very widespread. A large part of the population of Townsville and adjoining districts was infected. Numerous instances of rather severe illness were recorded and several deaths occurred. The fever itself is not necessarily of a very intense character, but the after effects are frequently most disastrous. Chief amongst these must be mentioned the profound depression which may occasionally lead to suicide. Short of this there are the above mentioned cardiac affections, chiefly of the myocardium, leading to enfeebled muscle substance ("brown degeneration").

Malaria, the most notorious though not necessarily the most deadly of tropical diseases, is comparatively uncommon in North Queensland. While however it is uncommon in Queensland as compared with other tropical regions still in certain restricted areas it is sufficiently common to cause much apprehension. The majority of the cases originating in Australia are of the benign tertian type, but many serious cases are imported from adjoining regions, e.g., New Guinea.

Plague has not yet obtained a firm foothold in Australia thanks largely on the one hand to more or less efficient quarantine administration and on the other to the sparsity of population. All the other natural factors involved in the spread of the disease, however, are present. Rats are plentiful though not excessively numerous, and they carry with them a sufficient number of fleas to serve as intermediaries. Outbreaks of plague are not unknown in Australia, but they have invariably been kept within moderate limits.

Cholera, so far as one can gather, has not yet found its way into Australia and with reasonable precautions there is no reason why it ever should. Water supplies are, as a rule, of fairly good quality, and sanitary arrangements, though far from perfect, are sufficiently effective to prevent any extensive spread.

Similar comment may be passed in regard to dysentery in its various forms. That bacillary dysentery of undetermined type has occurred in some parts of Northern Australia is fairly certain, but so far as I am aware no record has yet been made of the amoebic form. It is not improbable that the return of Australian troops from Egypt and Mesopotamia may serve to introduce the disease to some considerable extent. The problem of the chronic carrier will have to be faced by the health authorities in Australia as in other countries.

Leprosy, though not necessarily a tropical disease, is most prevalent in hot countries. It is not at all common in Australia. A certain number of cases are to be met with amongst the natives but it is disquieting to find that occasional cases occur amongst the white population. Though not numerous they are regarded as sufficiently dangerous to necessitate segregation.

A febrile condition which is of considerable pathological interest and clinical importance is that to which has been given the name of Mossmann fever or endemic glandular fever. This disease occurs almost exclusively in a small circumscribed coastal area around Mossmann and has been studied most systematically by Dr P. S. Clarke. A more recent and somewhat flamboyant attempt to investigate the disease by Fielding, Breinl and Priestley has added little to our knowledge and less to our means of treatment of the disease.

Amongst other diseases which occasionally come under notice mention may be made of climatic bubo, keratosis, ulcerative granuloma and "barcoo rot." These conditions however are uncommon and little has been done in Townsville towards the amelioration of any of them.

Of more interest and importance is the investigation of ring-worm made by Priestley. The disease is not particularly common and is apparently unusually amenable to treatment.

Of even greater importance is the occurrence of lead poisoning, particularly amongst children. The affection has been known and studied in Australia for over thirty years and the symptoms have been accurately described by several medical practitioners. A biochemical investigation of the matter by W. J. Young provided some further useful information. Although no definite conclusion could be arrived at as to the actual means of infection, the views of earlier observers were accepted, namely that the poisoning is a result of inhalation of dust containing dried lead and that intestinal poisoning is much rarer.

Last, but very far from the least important, of disease-producing agents in Queensland are parasitic worms. Although, in this country,

these are generally regarded as negligible factors in the production of disease their importance is invariably grossly underestimated. Yet there cannot be the slightest shadow of doubt that hookworm disease (ankylostomiasis) is at present one of the greatest scourges of mankind. It yields precedence only to tuberculosis, plague and the malarial fevers. The disease is known to be endemic in every country in the tropical belt, including India and large part of China, and the whole of Central America with the Southern United States. It extends into the temperate zones, but only under exceptional circumstances. Malaysia is highly infected and Northern Australia has not escaped.

The number of cases of hookworm disease which present themselves for medical treatment is as a rule relatively small, but the number of cases of light infection cannot fail to be considerable. It must be remembered however that, as I pointed out some years ago[1], the symptoms are not invariably proportionate to the number of worms present in any particular case.

Beyond treating such cases as do seek treatment little has been done towards remedying the conditions which encourage the spread of the disease. I devoted a considerable amount of time and energy to a study of the conditions influencing the development of the worms, but the results obtained, explicit enough though they be, can only be of value if they are followed not only by efficient sanitary control but also by well advised parental control. The only remedy appears to be to make promiscuous defaecation a serious offence with heavy penalty. It seems unpardonable that a disease which can be so easily prevented should be allowed to play havoc with so many school children. Westphalia and the Southern United States ought to be at once a warning and an example to Tropical Australia.

While ankylostomiasis is by far the most serious worm infection met with in Queensland it is by no means the only one. Another worm which appears to give rise to serious symptoms is *Strongyloides intestinalis*. It is frequently found associated with, but not so common as, *Ankylostoma*. It generally gives rise to persistent diarrhoea. Another worm which is comparatively common is *Trichuris trichiura* (*Trichocephalus dispar*). Though generally regarded as harmless this worm undoubtedly gives rise to symptoms which indicate intestinal irritation and malnutrition. *Oxyuris vermicularis* does not appear to be so common as one might have expected, or possibly when occurring alone it does not give rise to symptoms sufficiently urgent to call for medical attention. The

[1] *The Blood volume in Ankylostomiasis.*

majority of cases which have come under my notice have been cases associated with hookworms.

One of the most important of worm infections which occur in Queensland is Filariasis. It is very widespread and appears to be almost as frequent in Southern Queensland as in the tropical parts. The most serious manifestations of this infection are lymph scrotum and elephantiasis. Short of surgical treatment nothing is of any benefit in the former affection while in the latter even surgical treatment cannot be expected to effect a radical cure.

It was found that about 17 per cent. of all patients admitted to the Brisbane General Hospital during 1910 were infected with *Filaria.* This percentage is almost certain to be considerably higher in Northern Queensland, though according to Breinl only 3·4 per cent. of the patients admitted to the Townsville General Hospital are carriers of *Filaria.* Even taking this low estimate we must conclude that there are at least 20,000 people in Queensland who are infected. In view of the serious consequences of the disease this is a condition of affairs which must be viewed with the greatest apprehension.

Tapeworms do not appear to be of frequent occurrence. I possess records of only three cases in Townsville and in every instance there was a strong possibility that the infection had been acquired outside Australia.

So far as I am aware liver flukes or Trematode parasites have not yet been met with amongst the white residents of Tropical Queensland, though a few cases have been recorded from Chinamen in the Northern Territory. These were *Clonorchis endemicus*, a common parasite in China: *Schistosomum haematobium* has been reported in West Australia, but no cases have been recorded in Queensland. In one case some specimens were submitted to me as such but they proved to be merely shreds of fibrous tissue.

There remain a few diseases of which some mention may be made, not because they are common in Tropical Queensland but because there is a possibility of them becoming more widespread. Beri-beri is largely a disease of rice-eating peoples. A certain number of cases have been observed in Australia, but as it is a disease which rarely attacks white people its importance is not particularly great.

Gangosa is another disease the etiology of which still remains obscure. It takes the form of an ulcerative state of the nose and mouth which is chronic and progressive. It is fairly frequent in New Guinea, the Philippines and one or two other groups of islands. It bears, in some cases, a superficial resemblance to leprosy.

It is not my intention to enter largely here into the vexed question of the influence of climate, as such, on white people. In making any study of this matter one is confronted at the outset with a conflicting variety of intercurrent circumstances, which baffle individual determination. Briefly the matter resolves itself into the question, "Is a tropical climate of itself inimical to the health of European people?" The answer can be one only, "We do not know." I have already remarked that Australia is evolving a distinctive race with several well marked characteristics. These however are common to the country as a whole and not to any one part. It remains to be seen whether that race will be able to colonise the Tropics any more successfully than purely European races. Personally I am extremely doubtful, for it is a matter for common comment that Australians from the South are as much distressed by tropical conditions as are fresh arrivals from Europe, if indeed not more so. It is at any rate a fairly general practice amongst the larger business firms to transfer their more highly placed employees to more southern billets after a longer or shorter residence in the Tropics. It is in fact a generally understood agreement that an employee will sooner or later be transferred unless he be condemned to remain, as a punishment for his "shortcomings."

It may be maintained that this inability or unwillingness to remain in the tropics is largely a mental disability. Such a contention means nothing, for mental disability is quite as serious a matter as physical disability or ill-health. There is not the slightest doubt that residence in the remote tropics causes much mental stasis which to those trained in mental rather than manual labour, is quite as prejudicial as stasis in any other vital function. This is both a direct and an indirect result of tropical conditions.

There is however the possibly more important question of actual physical change in the anatomy and more particularly the physiology of white persons resident in the Tropics. This question has given rise to considerable speculation and not a little actual research. It is a matter which has engaged attention in several quarters for a number of years, and it cannot be denied that some interesting facts have been brought to light. Changes in the various organs and structures of the body have been noted, but in no instance does it appear that these observations have been sufficiently extensive or free from error to form the basis for any unequivocal judgment.

In Queensland an ambitious scheme was entered upon for the examination of school children. It was far from original and further from

efficient. Blood examinations were made on a few hundred children and on a few dozen Papuan natives. Although taking no immediate part in these investigations I had frequent opportunity of observing the methods of procedure, methods which to one accustomed to accurate haematological work made the blood run cold. Counts and estimations were nevertheless made and calculations and charts in due course evolved from these. As neither collaborator apparently possessed any but the most elementary knowledge of mathematics or statistics it is not to be wondered at that, as an *interpretation* of the facts of the case, the results are absolutely and unequivocally worthless. Results they certainly are such as the merest schoolboy with slate and pencil might laboriously evolve. Results of any statistical value they most assuredly are not. It is possible that in the hands of an expert statistician the figures might be put to some use. As they stand they can only be regarded as an example of assiduity combined with ignorance. The principal result obtained was that in the "Arneth index" of the polymorphonuclear leucocytes there was a decided "shift to the left."

Interpreted in plain language the foregoing means that in European children born in the Tropics there is a relatively higher proportion of polymorphonuclear leucocytes with two or three nuclear lobes than with four or five. What the precise significance of the number of lobes in a polymorphonucleate leucocyte may be is still a highly debateable question and any result based upon this is manifestly equally debateable. On that account we cannot as yet congratulate the Townsville experts on their results, more especially as we unfortunately have seen these results "in the making."

As specimens of what sententious balderdash may be expressed on this subject, some remarks may be quoted from the concluding sentences of Breinl's lecture on the "Influence of climate, etc., on the white race living in the Tropics." He says, "The European with energy and ambitions will, as a rule, be only slightly affected by the changed conditions of life and the alteration of his social condition. Even he will lose a certain amount of his energy; he will feel tempted to succumb to the fascination of the *dolce far niente*. A call on his energy will, however, always be answered and he will be able to do nearly the same amount of work bodily and mentally as anywhere in Europe."

These three innocently pious expressions of opinion are mutually and hopelessly contradictory and are at the same time destructive of the great aim and object of the "White Australia" policy. In the first place the "European with energy and ambitions will, as a rule," *not*

"be only slightly affected, etc." He will not be affected *at all*, for the very simple reason that he will not be foolish enough to bury his energy and ambition in such a forsaken corner of creation as North Queensland. "The European with energy and ambition will as a rule" find ample scope for the display and exercise of his talents somewhere in Europe. We cannot conceive that permanent residence in North Queensland can be a sufficiently attractive goal for any "European with ambition." It might possibly form a stepping stone; never a goal.

As for the aforementioned ideal European losing "a certain amount of his energy," nothing could be more certain. A month's continuous hot weather in England with a comparatively low humidity tries the endurance of even the most phlegmatic and industrious of men. Double the relative humidity or even increase it by half, give them a six months' spell of it, repeat the process every year for five years, and then make tactful enquiries as to their ambitions. Cut off at the same time their refreshing week ends out of town, their various exercises and amusements, and watch the result. It might result in increased attention to business or the reverse, either of which is the initial step in a particularly vicious circle.

I have met many people in all walks of life in Queensland but I have met few who were enamoured of the climate of its coastal parts. Even the author of the above quoted sentences is guilty of a slight misrepresentation if he makes pretence that they represent his own unqualified views on the matter at the time they were written.

In conclusion, then, I may venture, with due reserve, to give it as my opinion that Tropical Australia will never *under present circumstances* support a permanent population of *exclusively* European character. That it will support a population of European descent I have no doubt, but it will be little more European than are the peoples of the Central and South American States.

To my mind the chief hope of permanently establishing a white population in Tropical Australia lies in a system of residence for a definite number of years, not more than twelve or fifteen, with a definite guarantee of an equivalent position in a temperate region at the end of that service. A liberal vacation should also be allowed at least every second year during the hot season. Such a system is in vogue at present with several of the larger business firms and appears to be satisfactory. Amongst the employees of these firms are to be found the keenest and most enterprising men in the Tropics. Were this enterprise and assiduity to be rewarded only by prolonged exile in the Tropics they

would without the slightest doubt rapidly reach a lamentably low ebb.

Such a system would benefit not only the individual but the business firm as well. The enterprising man would find plenty of scope for his activity and he would be constantly buoyed up by the thought that he was working towards an end which would benefit himself by, amongst other things, securing his transfer to a more congenial locality. This system would have the additional advantage of giving a much larger number of men an opportunity of experiencing tropical conditions and possibly some, if not many, might be found who preferred tropical conditions to those of a temperate clime. Such would undoubtedly form a much more promising nucleus for a white tropical population than men who were forced to remain under tropical conditions against their desire and to the detriment of their health and character.

To accomplish this end what are really needed are men of the widest sympathy and experience, men to whom the future and the development of Australia mean something very real, not mere adventurers whose main object is exploitation and personal aggrandisement.