

Blonds and brunettes in the tropics / by Charles E. Woodruff.

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By CHARLES E.

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BLONDS AND BRUNETTES IN THE TROPICS.

BY CHARLES E. WOODRUFF, M. D.,

San Francisco,

Lieutenant Colonel, Medical Corps, United States Army; Sanitary
Inspector, Western Division.

It was not the intention to make any remarks upon the blonds and brunettes article by the president of the United States Army Board for the Study of Tropical Diseases as They Exist in the Philippine Islands (*Philippine Journal of Science*, December, 1911), written in criticism of the book *The Effects of Tropical Light on White Men*, but the editorial references to the matter in several medical journals now necessitate a review of the "evidence," by which it was concluded that while strong light kills every other living thing, it is not injurious to man, and that blonds who get the most of it in the tropics are as well off as the brunettes. The subject is of vital importance to the civil profession in every part of the United States where the light in summer is greater than in the climates which evolved us, and has, here and there, already killed off the blondest. If the article is accepted as correct it will be followed by much avoidable destruction of health and life, among civilians as well as soldiers, both at home and abroad. It has already stirred up considerable controversy, although it confirms the theory as to the value of pigment.

In the first place the statement that the article was a comparative study of blonds and brunettes is not correct. An examination of some of them showed light types among the brunettes and dark among blonds, and "mixed" types in each. That the main use of skin pigmentation is to exclude light is now

so abundantly proved and generally accepted as to need no further comment, but it is to be noted here that the degree of opacity needed for perfect adjustment to the climate of the Philippines is dark brown. Consequently the minor differences between ordinary blonds and ordinary brunettes from darker climates are so slight, compared to the difference of both from the dark brown Malay, that they both react to the climate about equally. To show the effect of the light we must compare the marked blonds with the marked brunettes, and there are very few of either in the army which is largely composed of medium types, such as found in southern England, between white skinned, yellow haired Baltic men and the olive skinned, black haired Mediterranean. Some well pigmented men have light eyes and hair, and many a dark haired specimen has a skin so white as to class him with the blonds. The statement that "a man with dark blue eyes, light brown hair, and a fair skin would fall in the blond class" is not correct, as most of these men are well pigmented. In one group of 1,286 soldiers, in 1902, the inexact physical descriptions, then the only available data, showed 18.7 per cent. "brunettes" and 27 per cent. "blonds," but from later investigations there is no doubt that if they could have been seen, the proportions of blonds and brunettes would have been greatly reduced and the differences in health in favor of the brunettes would have been far more marked. The two classes were made as large as possible to avoid the deception of small numbers, or a charge of cooking the statistics. In 1910 the records of 322 soldiers showed that less than five per cent. were real brunettes and less than five per cent. real blonds.

For several years investigations of the few yellow haired soldiers in the army showed that without a single exception their families had arrived in America from northwestern Europe since 1848, or, if of colonial stock, had survived because they were in a dark environment, like the home land, such as

the cloudy mountains of Tennessee, where they may survive as long as in Switzerland. The healthy, marked blonds of colonial stock from the hot southern lowlands are too few to bother about. Many have survived in Canada, but none in Louisiana, and but few in New England. The Confederate army was brunette to a much greater degree than the Federal. There was a great racial element in our civil war, though it was basically economic. The flora and fauna north and south of Mason's and Dixon's line are so different as to constitute two biological worlds, and the same rule applies to man in the long run. The blond types, such as the southern mountaineers, had northern sympathies, but the brunette types fought for liberty to enslave others—though there were numerous exceptions on both sides.

The board states that it had no exact statistics as to complexions in our cities, yet says "it is doubtful if the figures for complexion types in the cities differ much from those found in the military service." On the other hand, the army, though marked blonds are rare, is decidedly less brunette than our cities, and the reason is that certain numerous brunette elements of our population cannot enlist for physical reasons, even if they desired. Our defences are practically in the hands of "northmen," both in the army and navy. Even by stretching the class of brunettes to include men with dark brown hair, it constitutes but one quarter of the force. By including the light brown haired with the blonds, that class is over a third, and the mixed types, such as are common in England and New England, are over two fifths. For very evident reasons, the commissioned force is far more blond than the enlisted. The same phenomenon is seen in every land to which the Baltic type has migrated and survived; northern Italy, where the Lombards still flourish at 45° north; Spain, where the Goths are still in the northern mountains; France, whose northern third is more Teutonic than the southern third of

Germany; in each of these places the blue eyed are doing far more than their share of national guidance and defense. In New York city the proportion of blue eyed in the schools increases from the first grade to the university, and the better the neighborhood, the more the blonds.

In the ten years ending 1910, New York city alone increased her foreign born population from the northwestern corner of Europe as follows:

Danes	2,385
English	9,398
Scotch	4,271
Dutch	1,473
Norwegians	10,864
Swedes	6,632
Swiss	2,046
Finns	3,667

There were 22,500 fewer Irish and 45,000 fewer Germans on account of the removal of the causes which formerly drove those people here, but the flow will begin again and keep up forever to replace those killed by the climate. So there is no ground for the fear that the blue eyed controlling element will disappear. The influx in the last decade to New York city alone is greater than that which peopled all New England prior to the Revolution, and we may confidently predict a greater influx to support a civilization which is basically Teutonic. German names are becoming exceedingly numerous among our great workers, as the immigrants since 1848 are now on top. Few people see the significance of the fact that while our Revolutionary leaders have no prominent descendants, the leading candidate for President a few years ago was the son of a Scandinavian peasant, and the present Democratic leader is of the second generation from England.

The poor classification is shown by the statement that the brunette class shows a slight advantage in physical development. There is a wealth of evidence that blonds as a class always have the advantage, and a great one in large groups, for they take

most of the Olympic prizes, and the brown eyed take very few (*Medical Record*, April 27, 1912). The history of the United States shows that as a result of climatic stimulation, the first, second, and third generations of native born accomplish wonders, physically and mentally, from Alexander Hamilton to John L. Sullivan; but later generations are so overstimulated as to sink into mediocrity or degeneration, and the numerous exceptions do not bear too close analysis. Our great fortunes were collected by foreigners, like the first Astor and Carnegie, or the early generations of native born, like Drexel, Vanderbilt, Harriman, and New Yorkers too numerous to mention. There is a rumor that George Washington was born in England and that the record has been found. Our leading surgeons, the Mayo brothers, are of the first generation native born. The early generations accomplished wonders in South America, but very little now, though it is possible to survive a long time in the equatorial Andes, where the coolness and cloudiness resemble those of northern Europe.

The board excluded from observation any soldier "who showed evidence of disease," and yet these show the greatest effect of the climate and need the most study. Men of as little as two months of tropical residence were included with those who by reason of extra resistance had been there thirteen years.

"In both groups (of civilians) it will be seen that the average period of tropical service prior to the commencement of the observations was sufficient for the preliminary stimulating effect of the tropics to have passed away." One of the best attested facts in tropical climatology is the stimulation of the light—a phenomenon never noticed where heat is the sole factor. This stimulation causes a great feeling of well being, and all functions are better than normal. The condition generally lasts from six months to a year, sometimes, but rarely, over two years. Moreover, the blonds receive more of

it than brunettes, so that it is possible to get a group of blonds who would be apparently far better off in a year or two than a group of brunettes. Averages are worthless in such a case.

When the arteries harden, the stimulation of sunny places is a very serious matter, as the recent death of the king of Denmark shows. The profession must stop the habit of sending such patients to sunny climates, for even if the blood pressure is not increased, the feeling of well being causes undue exertion and the heart is overwhelmed, or the arteries break.

It is stated that it is difficult to compare the relative ability of blonds and brunettes to stand the tropics twenty or thirty years, but their relative resistance in two years is a task beset with fewer difficulties. The fact is the exact opposite, as shown later. "Woodruff . . . maintains that . . . the ill effects observed among white men dwelling in the Torrid Zone are due mainly to the large proportion of chemical or ultraviolet rays contained in the tropical sunlight." Such an idea was never maintained or expressed. On the contrary, the vital necessity of pigment in heat regulation was emphasized years ago. A study of light cannot be taken as a denial that heat has effects, too. No comparison of the damage done by light and heat has ever been made; indeed, the slow and rapid waves produce chemical results of an entirely different order, as we see in the extreme cases of death by burning at the stake and that in the electric chair.

"The quantity of watery vapor in the atmosphere has a direct influence on the climate, because it checks to some extent the radiation of heat." This is not germane to the subject, but it is the opposite of the facts. Radiation is a matter of the difference of temperature between two bodies, their color, and their distance apart. When moisture is in cool air it brings a body of water nearer to the skin, and radiation is increased, as every one knows, on a cold, wet day when there is little loss by evapora-

tion. In warm, moist air there is also increased radiation, but the inability to lose by perspiration quickly throws up the body temperature, as proved in the famous cotton shed investigation (*Journal of Tropical Medicine*, 14, p. 231, 1911). If the moist air temperature is over 98.6° F., the radiation is in the opposite direction—to our bodies—and if the air is saturated and prevents all loss by evaporation, we die very quickly of thermic fever, but survive in drier air. The board has been deceived by the increase of radiation from the earth to cold outer space on clear nights when warm clouds no longer intercept the rays. More heat goes to outer space whose temperature is very low than will go to the clouds, or to a tree, for instance, under which no dew is deposited. Fruit growers know this. The phenomena in air above or below blood heat are opposites.

Blackness increases both radiation to cooler bodies and absorption from hotter, so that the black negro cannot stand either extreme of heat or cold, and is not found in the hottest or coldest parts of the earth; but he is perfectly adjusted to his natural environment below 98.6° F., and is found in a very limited area. The negroes elsewhere in Africa are lighter in proportion to their distance from this place, as shown by Dr. G. A. Turner, of Johannesburg, South Africa, in his extensive studies. The statement that "this advantage of pigmentation is least manifest when most needed, namely, in direct sunlight," is not correct, as the black negroes in nature do not expose themselves, but hide like elephants and carabao. When they migrate to very hot places they die out very soon, or protect themselves with white clothes to prevent heat absorption, and a working carabao dies unless cooled off every hour or two.

"The recent work by Aron seems to indicate that the deleterious influence of the tropical sunlight on men and animals is due to the long heat rays rather than to the short length ultraviolet waves."

Through ignoring the laws of radiation, Aron has misinterpreted his data, and really proved the need of pigment to protect from light, as well as its use in radiation. Interchange of heat by radiation or convection is of minor importance, except in extremes. Evaporation is the main reliance in disposing of our surplus, and a half century ago the standard treatment of all fevers was to "sweat them." After a few decades of interruption by Brand's theory that heat is extracted better by conduction into cold water, the profession shows a tendency to return to the old way of favoring loss by evaporation of perspiration. It is found in typhoid that, through nervous reflexes, the cold bath closes the superficial arterioles, reduces perspiration, and thus causes retention of heat which would otherwise be lost, but after a hot bath the skin circulation is increased, and the evaporation of this perspiration reduces the fever further and keeps it down longer. Chastang, of Paris (*Caducée*), now finds the same phenomenon in the treatment of "thermic fever." Hot baths start the perspiration whose evaporation is increased by placing the patient in a gentle draught of air. He finds that the temperature goes down sooner, consciousness returns sooner, and there are more cures than by the cold bath. This treatment would be dangerous where the air is over 98.6° F. and saturated, for then the perspiration could not evaporate, and it would be particularly dangerous to negroes in such circumstances, as their black skins would absorb more heat from the air.

"Steinmetz (*Collected Papers of American Science*, ciii, p. 391, 1910) considers ultra-violet radiations of moderate intensity, such as occur in sunlight, to be harmless to the eyes." There is no such reference, but it probably refers to a lecture by Dr. C. P. Steinmetz, the great engineer of the General Electric Company, of Schenectady, N. Y., and published in *Scientific American Supplement*, lxx, 390, December 17, 1910. The lecture was designed to call attention to the

blindness and other eye injuries due to ultraviolet rays of moderate intensity in some kinds of artificial light. The harm increases with the frequency, from the harmless slow ones just beyond the violet, to the high frequency ones two octaves higher, which "are destructive to the eyesight," even after "short exposure" to those of "moderate intensity." Steinmetz also shows that the harm done by ordinary artificial light is from eye strain of too long application, or defect or excess of illumination, wrong wave length, and too much infrared rays, there being no ultraviolet rays in most of our house lights. As to the body as a whole, Steinmetz said "light has a decided stimulating effect on man when of moderate intensity, while excessive intensity causes harm." As to the eye, he says: "Daylight is harmless because we have tried it for untold ages during the development of the human race," but "those races which have been developed in tropical climates have acquired . . . a protection . . . by pigmentation." He might have added that beside pigmentation there are about fifteen other mechanisms whereby the intensity of light entering the eye is reduced to safe limits.

Now comes Pernet (*British Medical Journal*, July 6, 1912) with a suggestion that freckling on the skin which is covered by clothing may be a reflex from ultraviolet rays acting on the retina, as this phenomenon does not appear in fishes which are blinded. He even thinks that perhaps spectacles to exclude these rays may lessen the freckling on the exposed skin, where we know it is a direct effect of the rays.

It is not true that "when acting on the skin, ultraviolet rays have little power of penetration," as very numerous experiments in Paris, in London by Sambon, and in the Finsen Institute in Copenhagen all show that ultraviolet rays are the sole cause of sunburn, and that they penetrate in proportion to their intensity, wave frequency, and the blondness of the skin. Doctor Kime "demonstrated the great depths

to which the chemical rays of light could be made to penetrate" (*Journal of the American Medical Association*, March 30, 1912). The literature is full of references to such experiments, as well as proofs that x rays of similar frequency are stopped by the skin in proportion to its pigmentation and their own wave length.

The denial that tanning is a protection from light does not take account of hundreds of experiments showing the opposite, nor does it consider the naive reports from sun treatment of tuberculous children in the Alps, that the blonds who do not tan well to keep out the light, do not receive the benefit of the outdoor life in cold air. Instead of having little penetration, they have so much that it has been proved by the late Doctor Hyde, of Chicago, and Dr. Watkins-Pitchford, the Government pathologist in South Africa, that like x rays, they are factors in causing cancer, only in lesser degree. From 1907 to 1910 only one negro soldier had malignant disease in our army.

Including conditions having only remote relation to complexion or none at all—accidents, venereal disease, surgical cases, miscellaneous diseases, malaria, constipation, etc.—and bad as the classification is, the "blonds in these soldiers, after a year, have ten per cent. more cases of illness and days lost than the brunettes. Though they are very few, it is significant that heat exhaustion, neurasthenia, pemphigus, eczema, dermatitis, and ulcers were twice as frequent in blonds, tuberculosis almost twice, and alcoholism three times, and the blonds had more diseases of the eye and ear, lymphadenitis, ringworm, and diseases of the digestive tract. In studying 568 civilians who had been in the tropics from two to thirteen years, there is no distinction between the new arrivals whose weaklings had not yet been eliminated, and the older class from whom the climate had eliminated them. As 11.1 per cent. of these "brunettes" had been attacked by sickness to 90.2 per cent. of the "blonds," it may mean that

among the older class the blondest had dropped out, but among the newer arrivals were still vigorous, as elsewhere explained. In fact the "blonds" did have less service. The better physique and endurance of the Baltic type often makes some of these men able to endure the strains remarkably well a few years, but they pay the penalty in time. Only one of the twenty-one medical officers on this work could see any difference at all in one year in their alleged classes, and there probably was none. On the other hand, brunette Spanish war veterans are now flocking to the soldiers' homes with tuberculosis after resisting the tropical damage for a decade.

With regard to the feelings of well being and enjoyment of the tropics, many of the soldiers considered it a joke, and though the general trend of remarks is significant of light damage, the replies cannot be given scientific weight. In addition, under the stimulation, blonds are sometimes so mentally exalted as to enjoy the service more than a year.

In considering average weight of such groups, the few who gained or lost make practically no difference, and counterbalance so that the average loss or gain of one tenth of a pound is explained. On the other hand, the fluctuations in the averages of such a vital matter as temperature, 98.6° to 99.1° F., show that very sick men were overlooked, perhaps the tuberculous. Men with an average temperature over 99° F. year after year are in dreadful danger. In the tiny differences in pulse rates and muscular strength the board makes the typically prejudged remark: "Brunettes show no advantage." A comparison of dynamometer tests of two groups where no selection has been made as to musculature cannot be taken seriously.

The board made examinations of the stools of 308 blonds and 293 brunettes, to see which class had swallowed intestinal parasites the more frequently, but the relation to complexion is not evident. They found that after exercise all of these

soldiers were lighter in weight (and probably thirstier), they were breathing faster, and the pulse rate and pressure were higher. Nothing is said as to which class had exercised the most, but somehow in one year they have come to the conclusion "that the brunettes are no better able to endure exercise in the Philippines than are their fair skinned comrades." The brunettes are less able, as we see in the extreme cases of pygmies and gigantic Swedes, but the pygmies survive and the Swedes perish.

The "blonds" had fewer invalided for venereal disease than "brunettes," probably from lessened sexual desire, and this in spite of the fact that they had three times the invaliding rate for alcoholism. But three blond drunkards to one brunette in one year among 12,000 men are hardly enough to reason on, particularly as we do not know how long they had been damaged by the climate. If we are biased the opposite way we would say it indicated that blonds were injured the most by alcohol.

There is of course no climatic significance in the fact that the brunettes had more epilepsy than blonds and twice as much dementia præcox, and that five brunettes were sent home for defective mentality, but no blonds. These facts are significant of something else. The tropics make epilepsy worse, but return home reduces the nervous explosions. More brunettes were disabled by valvular disease and wounds, and these, too, are included in the figures to show blond superiority where Nature says the opposite.

The board advises the use of ultraviolet rays to kill ameba in water, but sees no danger from the same rays which enter the watery media of the eye. Hence it makes no remark as to the significant fact that of the three patients with retinitis invalided, two were blond and one mixed type. Yet it is known some ultraviolet rays are soon stopped by water but others penetrate further than light in the ocean. Not a word is said of the significance of the fact that of the eight patients with acquired insanity, five

were "blonds" and three "brunettes," and in explaining the five "blond" neurasthenics to ten "brunette" nothing is said as to the brunette race in the army which is notoriously neurasthenic at home.

The only ones disabled by gout or rheumatism were brunettes, as though the sunshine had stimulated the chemistry of the blonds into a cure. We have long used infrared rays to do this, and also cold light and ultraviolet,—all do it. Now we learn that greater success is resulting from radium rays at the Bohemian Institute at Joachimsthal. It is suspected that all the spas of Europe, some of which have been medicinal resorts for a long time, perhaps milleniums, and whose results we have been inclined to impute to change of scene and climate or to "suggestion," are really efficacious from the radioactivity of the waters. Since Bacon and others in Manila have shown vastly increased radioactivity of tropical air from ultraviolet light, we have a partial explanation of another mechanism by which sunlight can produce the things noted, but whose significance was not recognized. This increased radioactivity is the same as the "x ray atmosphere" which produces such appalling results. The possibility of aspermia in old residents who expose themselves to tropical light deserves investigation.

This increase of rheumatic diseases with pigmentation in migrants is also shown by the proneness of negroes to rheumatism in the United States. In the Philippines the negro rate in these affections is double that of whites, but the adjusted brown race has only four fifths that of the white. When primitive open living man took to cave life, he suffered dreadfully from rheumatic diseases caused by dampness and darkness, as his bones show, and he was brunette.

There were three patients with disabling malaria (two "blonds" and one "brunette"), six with pulmonary diseases except tuberculosis (two "blonds" and four "brunettes"), and five with deafness or

otitis (four "blonds" to one "brunette"), whose significance is not apparent.

The statement that the brunettes have more tuberculosis than blonds in seventy total cases is not correct. The fact is the reverse, as I know from reports I have received and observations I have made. The error follows from incorrect classification and inclusion of mixed types with brunettes. The *habitus phthisicus* in ancient Greece was described by Hippocrates as follows: "The form of body peculiar to subjects of phthisical complaints was the smooth, the whitish, that resembling the lentil; the reddish, the blue eyed, the leucophlegmatic, and that with the scapulæ having the appearance of wings." Hippocrates was only noticing the greater tuberculosis morbidity of the degenerating, disappearing, intruded northmen, whose origin was unknown. It is one of the ways of eliminating the unfit. The French have noted the same phenomenon in central and southern France, and it is going on in America all the time. When the negro is the intruder, as in Scandinavia, his is "the form of body peculiar to subjects of phthisical complaints," but the adjusted blue eyed and reddish are resistant. The rule is universal; other factors being equal, the tuberculosis rate among immigrants at any one place increases with their unfitness to the climate. Savage races are dreadful sufferers in contact with civilization, because the susceptible have never been weeded out. (*Journal of Tropical Medicine*, 1912.)

The fact that brunette civilians had far less "sunstroke" (heat exhaustion?) in the tropics than the other classes is explained away as chance, yet it is said that, "the exact causation of sunstroke and heat exhaustion remains in doubt." It was settled long ago. True sunstroke is due to infrared rays exclusively, and its rate curve in the Indian army is parallel to the air temperature curve. It is uncommon in the Philippines or any other place where the air temperature is rarely above blood heat, but

in the hot parts of the world it prevails in a mixed population in proportion to the pigment. Negroes die in an external heat that the white skin reflects, as in fire rooms of ships. Civil physicians in the United States, where the air temperature rises much higher than in the Islands, report that in 146 cases of sunstroke only thirteen victims are blonds, twenty mixed types, and 113 brunettes, and as we now guard soldiers from heat, no negro was sunstruck in the four years 1907-1910, though formerly they were oftener than whites. It is evident why a southern Italian, properly pigmented for his light and never exposed to extreme moist heat at home, can suffer from sunstroke in the sweltering heat of New York city. City dwellers are brunette the world over, for the same reason that negroes are still more brunette—to exclude light—but it makes them unfit to stand great heat. The same laws apply to horses, for Professor Robbins, of the Chicago Veterinary College, tells me that, in hot weather, white horses, which reflect heat, rarely get thermic fever, the deaths being among the animals of the dark colors which absorb heat.

An investigation by Leifmann and Lurdemann (*Deutsche Vierteljahresschrift für öffentliche Gesundheitspflege*, 43, 2 and 3) has shown that the summer infant mortality curve in Berlin and some other cities is parallel to the maximum daily temperature curve taken at 2 p. m., and that it has no relation to infected foods, as children in cool, dark, underground rooms do not have any increase of mortality in the hot season in spite of bad food and "lack of sunshine." Only temperatures over 23° C. (73.4° F.) are connected with a distinct increase of deaths. In the Philippines I found this critical temperature to be about 80° or 82° F. for adult invalids, but now we must recognize danger between 73° and 80° F. In other words, hospital wards must be maintained below 73° or 70° F. by artificial cooling and kept well shaded, for the promptest response to rise of temperature is in the

lightest part of the summer, around June 22d. True "heat exhaustion," on the other hand, which is the disease in the Philippines, is very largely if not entirely a matter of paresis from light, and should be more common in blonds. It never appears except when there has been exposure to intense light, as in the famous parade in Philadelphia, in 1907. Its symptoms and pathology have nothing in common with thermic fever. Since we rarely have much light unaccompanied by heat, many of the cases are complicated by "thermic fever" in every degree of mixture between the two types. When the board classified the cases, it found among 229 "sunstrokes" in America, seventy-two blonds, eighty-seven mixed, and seventy brunettes, which is proof, if any were needed, of what was said in the beginning—the classification is unscientific. Heat exhaustion is not only more common in blonds, but is prevented by shade and opaque clothes of any color. It may occur in the cold in winter.

Cold Lapland is afflicted with so much sunshine and snow glare that blonds cannot live there, but within 150 miles in a much warmer country the mountains cause so much darkness from the precipitation, mists, and clouds of the prevailing wet winds from the Atlantic, that blonds are the adjusted type. "It does seem proved that on the living subject the brown or black skin, when exposed to the sun, is always slightly cooler than the skin of a white man," is simply not a fact, but a misinterpretation of a few observations in air of medium heat. If it were true, the Laplanders would die of frozen faces when in the sunshine, and the negroes rarely die of sunstroke. The board's own experiments showed that dark surfaces are always hotter than white when exposed to high heat. To prevent undue cooling of the eyes in the arctic by the radiation from these dark surfaces when not in the sunshine, the eyelids are heavily padded with fat and open to a mere slit—the latter also being one of the fifteen

ways of excluding excessive light. Dark surfaces radiate so greatly in low temperatures that arctic animals must be white, and the coolness of black in all temperatures below 98° F. is well known. It is therefore amazing that no experiments were made to prove that black clothes are cooler than white of equal texture indoors and at night in temperatures between 70° and 98° F.; but light colors coolest above and below that range, as in the case of white horses in Arabia and Mongolia.

If a "light bath" is too severe or prolonged, it produces the symptoms of "heat exhaustion" in the absence of heat, but as the room is frequently too hot, the effects of heat are occasionally present also. Heat exhaustion is rarely fatal in big animals, but quickly so in insects exposed to cold lights strong in ultraviolet.

The bibliography mentions an editorial article in the *Lancet*, clxxxi, p. 166, 1911), but I cannot find it mentioned in the text. In this editorial article (p. 167, not 166) the *Lancet* takes a strong but erroneous position that all sunstrokes are due to actinism.

The existence of tropical neurasthenia is denied by the board, but it is evident to nearly every one else who looks for it. It has been found so prevalent in the United States from our summer tropical climate that Dr. J. Madison Taylor, of Philadelphia, has made it the subject of a special article (NEW YORK MEDICAL JOURNAL, July 6, 1912) and avers that it is due to excessive light for which most of us are not adjusted. What relation, if any, the increase of neurasthenia bears to the alarming increase of suicides in the United States, most of which occur in the lighter months, and on brighter days, remains for further investigation. The ethnic types of our suicides should be studied.

Nothing is said as to the recent reports of the deplorable nervous condition of European children raised in the tropics—and the blonder they are the worse they are. The late Professor Grawitz, of Berlin, found the same conditions, even in that

northern climate, to result from the sun baths given by a certain class of ethical quacks (*Deutsche medizinische Wochenschrift*, August 18, 1909), Svante Arrhenius has now proved the matter experimentally in Sweden (*Cosmos*, October 14, 1911). He wired one school room like a huge solenoid, so that the children were stimulated by waves from the high frequency currents. In six months they showed more growth and quicker mental and nervous operations than the controls. It was a dreadful experiment, as the after effects of similar sun stimulation of Swedish children in America are known to be serious. There is now a movement among architects to lessen the glare of schoolrooms, where similar nervous states are caused by light. The quickness and brightness of American school children so greatly admired by visiting European educators, is now known to be pathological, not racial. Embryonic or multiplying cells are known to be more affected by all short rays, so that adults may not be much hurt by what kills their children. It is amazing that "tropical neurasthenia" should be denied when it is known to be caused not only from the heat and light, but also from cold light from certain forms of electric light. Electricians and x ray operators are notorious sufferers unless they protect themselves. There is evidence of it in wireless operators and we are hearing of similar affections in those who work with radium of great strength.

In another article published in *The Military Surgeon* (August, 1910), the board says that of 313 soldiers invalided from the Philippines (July, 1910, to December, 1911), in ninety-one the cause was a mental or nervous disease! Of the 119 deaths between January, 1910, and October 31, 1911, twelve, or ten per cent., were suicides! If ten per cent. of New York city's deaths among young men were suicides, there would be consternation and a search for causes, and yet no climatic significance is recognized in those in the tropics and the cause

is denied. Nevertheless we know that the suicides in New York city are unduly numerous in the light months and on light days, and the flow of insane home from the tropics is proportionately greater than a few years ago, because we are preventing infections, but are unable to avoid the climate.

While on the subject of the nervous effects of the tropics, attention must be called to the curious delusions it causes. Many observers have told me that these abnormities are more marked in blonds of long residence. The preliminary mental exaltation has been responsible for a flood of hysterical praises of the climate and is probably the cause of the notorious statement of Doctor Washburn, of the Civil Service Commission, that the climate was not harmful if one was sober and moral. He broke down himself and had to leave for many months to get well.

Arctic irritability is the same condition. Dr. H. G. Blessing, who accompanied the *Fram*, in 1893, has published parts of his journal in which he describes it. He blames the darkness to a great extent, but the Norwegians have almost as little winter light in their fiords, and the cold does not have the same effect elsewhere. The intense light of the summer snow glare is the only causative factor in common with tropic neurasthenia, and it takes only three arctic summer seasons to produce serious results. The same thing is seen in the light glare of interior Alaska but not on the cloudy coast.

The late mental effects are all in the class of exhaustions and so well marked are the irritable states, that constabulary officials can tell from the character of reports an officer makes, that he is neurasthenic. It is so well understood that the commissioner told me personally that he would not allow anyone to stay there more than three years without a vacation in a northern climate. In the last stages there is an actual delusion that the climate is all right, and it is seen in its worst form in "squaw men" married to full blood Malays, for they are

almost universally neurasthenic and mentally abnormal. This delusion as to the climate is the basis of many requests for soldiers to stay long periods, but many officers force them to go home to save their lives—and the board says nothing about it.

There was a fashionable fad in Manila to deny that the climate was harmful. One person who was always harping on this tune was known to be insane, but the delusion has another basis, which I have found many times. Those who elect to stay in the climate, resent the imputation that they are stupid to kill themselves this way. Being on the defensive, they minimize the danger until they come to deny it. One prominent blond used his own case to prove that the law of adaptation to environment is not universal. It was this curious mental atmosphere which was largely to blame for the article on blonds, for I have been repeatedly informed that the board, long before any results were reported, had created the impression in Manila that they intended to disprove von Schmaedel's theory as to the use of skin pigmentation. This fully accounts for their failure to consult the only man in the world who had specialized on the subject, and the haste with which the matter was given publicity before they could check up its errors of fact, inference, and conclusion.

Dexter, and dozens of others, have conclusively shown by innumerable cases that abnormal conduct increases with excessive light, but the board thrusts all this aside by a few observations on alleged "blonds" and "brunettes," saying that in one year "it is conceivable that misdemeanors would be more frequent among blonds . . .!" It is inconceivable among those classes. There is a far deeper significance in the relation of complexion to conduct and ability than can be brought out in a year's work in the tropics. Why is it that no brown eyed man has ever been President of the United States? I have been informed by Dr. J. C. Ballard, M. R. C., United States Army, who has investigated it, that

only one had dark eyes—Franklin Pierce—and his were gray. Most all were light blue and the rest light gray. He also says that every bishop of the Southern Methodist Church, in a very brunette population, by the way, has had blue or gray eyes except one, and this one, with brown eyes, while the salt of the earth personally, had the least force of all. And there is deep significance on the other side as to the undue proportion of blonds in the jails, asylums, and poorhouses in the northeastern corner of the United States, in spite of the fact that the blue eyed are in the lead in the Protestant Church, school, business, and defense. Significant, too, perhaps is the fact that most idiots are blond but that may be due to arrest of development.

Probably the worst defect was the failure to investigate the complexions of civilians who died, or went home collapsed, after long residence in the tropics, and to take into account the amount of their exposure. The cause of death, in or out of the tropics, is almost always a poison. Heat and cold kill very few people, and it is doubtful if there is any evidence that light or darkness ever killed a man. It used to be said that influenza, while never killing any one, was responsible for more deaths than any other disease, particularly of the aged; yet no one thinks of denying its dangers.

I cannot find any statement as to how many of the soldiers studied were invalided, nor one word as to any deaths among them, though I personally informed the president of the board of the death of one of his blonds at Iloilo about four or five weeks after the investigation ended. At least I was informed that this man was on the list,—if he wasn't he should have been, as he was one of the blondest men in the garrison, and had been in the Philippines some years—the old story. Dozens of observers have shown that prognosis is now so exact that we can tell fairly well the patients who cannot get well in the tropics and we ship them home. The deaths swell the home statistics, and

the rates in the tropics are diminished. This has been interpreted to mean that Panama is a health resort, though the exodus of breakdowns is never mentioned—nor the toll of tuberculosis. One year cannot show much when the worst effects of the tropics may be delayed until years after return north. This is not only seen in the cases of nephritis arising there and fatal some time later, but now we find tuberculosis looming up as an after effect. Within a few years after the close of the Spanish War its veterans began coming to the soldiers' homes with consumption, and their numbers steadily increased until last year, when over seven hundred new patients were admitted, not counting repeaters who go from one home to another. The assistant inspector general tells me that they mostly served in the Philippines. The brunettes seem to have resisted the longest, but all these late cases seem to be remarkably rapid in course and quickly fatal. These men looked well when they were mustered out.

The failure to note any actinic effect on the skin is remarkable in view of the fact that this irritation was the primary cause of the death above mentioned. The lowered "vitality" of his skin was precisely the same as that found after x ray or radium "burns." It had no resistance to a tiny skin infection which is usually trivial, but which spread over the whole head, face, and neck in one vast suppuration, in a skin which could not tan after some years of an exposure which almost blackens others. A secondary double pneumonia carried him off, and though alcohol could be blamed for much of his plight, there was no doubt that his nervous state was the cause of his habits. Yet we must label this case pneumonia, not actinism.

There was plenty of material for determining remote causes of death, for at the time this investigation was going on, almost every week there was the sudden death or suicide of one or more men of long residence. A few blond officials have long been

ignoring these deaths, and yet every little while one of them suddenly disappears. The "boosters" and the press rarely refer to them. One week after the preceding sentence was written the news arrived of the death by nephritis, in the islands, of Dr. Paul G. Freer, the chemist, who, there is reason to believe, was largely responsible for the board's work. Doctor Freer was nearly the blond type, as he had very light eyes and white skin. "Freer and others have been engaged in the investigation of the chemical side of the problem without producing any results which would show that the actinic rays of the spectrum were distinctly detrimental to man." "The researches of Freer . . . render it very doubtful in our minds whether chemical rays of the sunlight and complexion types of Caucasians are factors of any importance in tropical pathology." I have very carefully read over Freer's work and can find nothing to substantiate these remarks, so I presume Freer made such statements verbally. He did show what has been known some centuries—perhaps even by the Chaldeans—that the light on June 22d at a place 47° north is the same as at the equator on that day for equal cloudiness, but what is not mentioned is the fact that in the northern place there is less light the other 364 days, but on the equator there is more. People from the tropics have been seriously injured by the light while visiting southern Scotland in summer. Southerners were sun-struck at Stockholm in the Olympic contests. Scores of x ray operators have died from believing in the harmlessness of x rays, and Freer joins these martyrs to error.

The board goes to the extreme of mentioning one man who "was a most conspicuous blond and had been twelve years continuously in the Philippines, remaining in perfect health." Was it Doctor Freer? It ignores others who died while trying to stick it out for five years, and ignores the blond of long residence who was dead at Iloilo when the foregoing sentence was written.

"It appears that the men who spend much time actively engaged out of doors in the Philippines are the ones who remain in the best health." And yet it is elsewhere intimated that the "direful" results in the early war days were due to the fact that the soldiers were compelled to exercise actively out of doors. If this new advice is acted on, it will cause more cases like that of a noted athlete who, in December, 1909, suddenly found he had tuberculosis from exhausting himself out of doors. I am informed that in Arizona even the ants won't work out of doors between 10 a. m. and 4 p. m. on very light days.

The error as to the need of much outdoor exercise in the tropics is due to the fact that as a rule only strong athletes indulge. They continue the games which are harmless or beneficial at home, and as they resist the harm awhile, it is assumed that the exercise is the cause of their good condition, whereas they may be actually killing themselves. Polo is particularly dangerous because it cannot be played in the shade, like tennis, nor near sundown, as the light is too poor to see the ball. Baseball is less harmful, as there is the protection of opaque clothes and caps with visors, and the sun exposure is short and intermittent with rests in the shade. Too much exercise is one of the reasons why so many people are "all in" after two or three years and why the tour of duty must be kept short.

In the middle of August, 1912, there arrived in the United States from the Philippine Islands one of the very blonds used by the board to prove that no damage was done to that type. He had a very white skin and red hair and had been very active outdoors for twelve years with apparent benefit, but he is now a nervous invalid with tuberculosis. His well pigmented eyes had protected him from glare, so he did not feel the discomfort like a blue eyed blond, and his long resistance had given the impression that pigment elsewhere was not needed.

It generally takes twenty years to establish a new

way of thinking of things. It is now eighteen years since von Schmaedel published his epoch making paper, and attacks on it should be expected for some time, but they will be lessened by this increased mortality of those who deny and defy the danger. "It is by no means proved that pigmentation *per se* is beneficial in the tropics," but the insufficiently pigmented keep on dying in spite of such denials of what others consider proved. To the scientist this denial of the law of adaptation through survival of the fittest, is sheer nonsense, but to the clergy it must be shocking to be told that God was foolish in creating pigmented types in light places. Science has never yet detected God making a blunder, and any theory which accuses Him of it, is outside the pale of science. The habit of denying the usefulness of what we do not understand was given up by scientists long ago. They now accept the use and try to find it out. Stature and bulk are greatest in the tropics, and yet in all species spread over long distances in latitude, the stature and bulk are smallest in the tropics and increase to the north, probably from greater ease of retaining heat. Hence our overweights, as shown by Symonds, do not live as long as underweights (*Medical Record*, September 5, 1908). Likewise, size of nose and size of lung increase toward the north, but the nostril decreases. Every other racial character, such as hairiness or lack of hair, has a use, and may become detrimental if we migrate. Pigmentation is only one of thousands of things which prevent or secure survival of migrants.

There were two exceedingly valuable determinations, red blood cells and hemoglobin, but the board failed to realize the significance of what it found. Light complexioned men from cold places, blond or brunette, have high blood counts in hot climates as a rule. This is due primarily to the difficulty with which a white surface can radiate heat, so that perspiration floods out in a room temperature of 80° to 98.6° F., where the tropical native has a dry

skin. Unless the migrant drinks water every hour or two, the specific gravity of the blood is intermittently too high for the kidneys to eliminate nitrogen wastes. After perspiring all night in sleep there may be almost suppression, not to mention the irritation produced. This is why a nephritis is so apt to progress with fatal rapidity, and the professional ignorance of this fact has caused more than one notable death of both physician and layman, because they did not depart soon enough to a place where it was not necessary to perspire and the blood specific gravity could stay low all night.

The board made one single urine examination at the beginning of the year and one at the end without determining whether the men had just imbibed large quantities of fluid to restore the night losses. On the strength of those two observations the conclusion was reached that the average urine is about the same as in colder climates. No attempt was made to examine the urine which trickles into the bladder after free perspiration all night in sleep. Even if the average were not changed, such intermittent concentration causes dreadful results. In eight of these 693 perfectly healthy, vigorous, young men, albumin developed or casts, in twelve months; although they had not a sign of disease before. It is perfectly clear now why so many army officers of middle age are contracting nephritis. It has long been known that the concentrated urine of those who cannot drink enough, as on hot marches, does not stop its injury at the kidneys, but will light up old inflammations along the whole tract and even start new ones.

It has been seen in Arizona to result from the invisible perspiration. Hindale in his lectures at the Philadelphia Medico-Chirurgical College, in 1907, mentioned cystitis and pyelitis thus caused, and says that when the skin losses are so great that men urinate but twice a day, as often happens, there is sure to be trouble. And yet we still hear soldiers told not to drink on hot marches. No wonder they drop with uremic symptoms and sunstroke.

At this very time a major of the pay corps died of nephritis on the way home because he stayed in Manila only one month too long. If he had taken the previous transport, as his medical advisers urged, and had got into cool weather, so that the kidney irritation of concentrated urine and blood could have been stopped, there is no question whatever that he would have lived much longer. Many other patients just as bad are now living after many years, because they came home in time. I am particularly severe in condemning this ignorance, because it should have been known that the dreadfully fatal heat cramps in the fire rooms of men of war have been definitely proved to be due to the high specific gravity of the blood caused by perspiring too rapidly to restore the fluid through the stomach, and that there is much evidence that it is complicated by uremic symptoms and actual suppression. To the glory of the naval surgeons, they have learned to cure it miraculously in a few minutes by restoring the fluid in any manner—intravenously in dying patients.

We must revise our ideas as to where to send patients with Bright's disease, for we must consider parenchymatous nephritis an essentially climatic disease in white migrants in hot climates and due to lack of pigmentation. It is more frequent in such types in the tropics than in the United States, more frequent in our south than in the north, more frequent in our hot cities than in the cool country, and more frequent in the United States as a whole than in the northwestern corner of Europe whence we came. But in those places where the nights are so cool that one does not perspire, the hot days are less harmful, as thirst makes us replace fluids when the specific gravity of the blood rises unduly. It is one of our national perils, yet the tropical board did not see the evidence of what might be called *tropical dehydration* from lack of pigment.

Though many physicians advise a wee bit of alcohol in the tropics and deprecate too much, we have an explanation of the paradox that drunkards, in spite of the damage done by alcohol, often stand the climate better than abstainers who take too little water. The drunkard takes enormous quantities of water and his kidneys are less irritated by alcohol than by the high blood specific gravity of abstainers.

The manner in which dehydration produces uremic symptoms in heat cramps and cholera, and cloudy swelling of the kidney cells, is not known, but it is probably through an alteration of the blood's osmotic power, though Dr. Martin H. Fisher, of Columbia University, has proved (*Cartwright Prize Essay*, 1911), that both acids and alkalies produce swelling of kidney cells, and that salts administered simultaneously prevent it, by diminishing the capacity of colloids to take up and hold water. He mentions cases of nephritis, some with complete anuria and coma, in which rapid recovery followed rectal injections of solutions of NaCO_3 and NaCl , as in the miraculous cures of heat cramps in the navy. Fisher says: "All the changes that characterize nephritis are due to a common cause — the abnormal production or accumulation of acid in the cells of the kidney." It is to be noted that interstitial nephritis, though a frequent complication of parenchymatous nephritis, has entirely different causes and really belongs with the scleroses, yet all cases are often grouped together in morbidity reports, making it difficult to detect effects of climate. Some years negro soldiers had more nephritis than whites, some years less or none at all.

Hematin, chlorophyll, and visual purple are all intensely sensitive to changes by light rays, and are similar chemically. When there is not sufficient pigment to keep the light out, the hemoglobin is always reduced, even in the face of a high blood count. I do not remember having seen any com-

parative studies in any tropical place of a group of say twenty or thirty yellow haired, light blue eyed men of the Baltic race and an equal number of black haired, dark brown eyed, swarthy skinned men of the Mediterranean race, but it is safe to predict that the former will show a higher grade of this kind of anemia after sufficient time. What I do know from thousands of observations without microscopic confirmation, is that this form of anemia is progressively worse with the blondness and length of stay. Moreover, there is a disease which should be called *tropical anemia* and it is due to light and probably to the light alone. The existence of this condition has been denied many times, but denials do not destroy the fact that the only cases of disabling blood diseases were in "blonds," one each of pernicious anemia, secondary anemia, and polycythemia. In spite of this evidence, speaking of light rays which penetrate the skin and are absorbed by the blood, the board says: "Whether they can produce such changes in that fluid as to lead to constitutional disturbances still remains an unsettled problem." On the contrary, the NEW YORK MEDICAL JOURNAL, years ago, called attention to the fact that Haldane, in 1896, proved that light remarkably diminished the oxygen carrying power of the hemoglobin, and Hasselbach, ten years later (*Upsala Läkareförenings Förhandlingar*, ii), showed that light had "a marked effect upon the tension of the oxygen in the blood" and modified the respiratory efficiency of the cells. In addition, Warthin (*American Journal of the Medical Society*, May, 1907) has shown that x rays, whose penetration is the same as the shortest ultraviolet, did cause, in cases of leuchemia thus treated, extensive degeneration of the kidney epithelium, with calcareous deposits, a toxemia due to excessive destruction of leucocytes, and more or less damage to the nervous system, and now we hear (*Münchener medizinische Wochenschrift*, May 21, 1912) that even thorium emanations have proved fatal in a

case of rheumatism in which they were administered to stimulate metabolism. A hemorrhagic diathesis is produced, with bleeding from intestinal tract or kidneys, and the condition has been caused experimentally in lower animals. Moreover, albuminuria may occur as in the case of the twelve soldiers injured by dehydration.

The board failed to find a change in blood pressure by long residence, but other observers have found it. There was no investigation of changes in viscosity. Watkins-Pitchford has found in South Africa that with the increase of red blood cells which always goes with elevation, there is greater viscosity, more arterial friction, compensatory hypertrophy of the heart, and, later, dilatation (*Transvaal Medical Journal*, December, 1910). Only thirty-four per cent. of white school children in Johannesburg have normal hearts, yet these Boers, because they have not died at once, are often cited as proof that they will never die out in such an unsuitable place.

We must remember that there is a general agreement that living substance originated in darkness, when the earth was warm and surrounded with dense clouds by which sun rays were wholly excluded, and that the molecule of protoplasm, while adjusted to a certain intensity of infrared, is broken up by all other rays, if intense enough. The reason we cannot see ultraviolet and infrared is very evident. The retinal elements (rods, cones, and visual purple), which transform a wave into a sensation, could not possibly exist if they utilized rays which could destroy them. Hence the most vision is in the relatively slow and harmless yellow, and the visibility decreases as we approach the harmful ends of the spectrum, as these are absorbed or destroyed in proportion to their harmfulness, and the most harmful are so completely destroyed as to be wholly invisible.

Some lower animals are intensely sensitive to infrared and ultraviolet, and the rays near the red

and violet may give them a sensation of light, but it is much more likely that the sensations are merely those of comfort and pain. Certain ants, for instance, flee in great excitement from the ultraviolet, while infrared of moderate intensity attracts other insects. But in the case of man's retina, everything shows that both infrared and ultraviolet, as well as the visual rays at both ends of the spectrum, are very harmful. Amber glasses exclude both ends and are protective for that reason, and yet the visual rays are not diminished. In this respect it must be noted that plants which utilize sun's rays for nutritional purposes absorb a band or two in the visible spectrum or some dark rays just beyond either end. They cannot use very long or very short rays, nor much of the yellow as a rule, nor any of great intensity, no matter what the length. There is probably a close relation between wave length and the size of the molecule of protoplasm, and this may be the basis of all these remarkable phenomena. The protective pigments of animals are derived from hematin which has been changed by the light, and chlorophyll is very similar chemically. It might be well then to look into the gradation of our hemoglobinometers, which were largely developed in the cloudy northwestern corner of Europe. A reading of 100 is so rare in sunny America that many physicians have been inclined to believe the grading too high, but now we must consider whether the results do not mean climatic anemia.

The board says that monkeys exposed to heat die of thermic fever, as man does in similar conditions, therefore these and similar facts make it doubtful whether light is a factor of any importance. It surely is not, as heat alone causes thermic fever. Besides, monkeys are well protected from light and live in the cool shade. If they had been dipped in boiling water in the dark, they would have died sooner still and we should be sure that light was not responsible. "It is well known that heat and humidity in an experimental chamber and in the absence of light, can produce symptoms simi-

lar to those occurring in milder degree among residents of the tropics." This is the opposite of the facts; if we avoid a danger, it never hurts us, but our escape does not disprove the danger. A ship has never yet been sunk by icebergs if it steers around them, but that does not disprove their danger. Tropical light has not hurt white ants in millions of years, because they hide from it. Similarly, I know of blonds who have been in the tropics over forty years, with occasional trips home for recuperation, but they stay indoors as a rule, like white ants. The purpose of the original publication was to point out only one of the many dangerous factors which caused so much death and invalidism in the war conditions from 1898 to 1902 when exposure was inevitable. Since 1902 there have been very laudable, persistent, and successful efforts to avoid these dangers, and as a result the sick and death rates have been and are progressively lessening. If we could avoid all climatic damage the blonds and brunettes would fare alike. If we could accept the board's figures they would be a splendid proof of the success of the army sanitarians, but there is still a marked difference, even with all the care we now take to keep men out of the sun and heat in peace times.

In an article on The Harmful Effects of Small Amounts of Light and Heat (*American Medicine*, New York, July, 1912), the following is stated as the result of the study in 1910 of 323 men of troops which had been in the tropics two years:

There were but two deaths from disease, both men with blue eyes, fair skin but dark brown hair. Six were sent home with illnesses not curable in the tropics, five of these had blue eyes, fair or ruddy complexion and the usual brown hair of our lighter types, one being light brown, and one was a light brunette with brown eyes, dark skin but brown (not black) hair. The one man who committed a serious crime (murder) had a fair skin, blue eyes, and light brown hair. Of the six who had been overcome by the heat exhaustion, five had blue eyes, and one brown but as he had brown hair and ruddy skin he was not a brunette. One troop reported thirty-two as having been overcome with the heat—evidently misunderstanding the

question, as no organization ever has that many prostrations—and they had the usual proportions of blonds and brunettes. Three troops said that no one had improved in health, one reported two who were of medium complexion, and one reported twelve with the usual proportions of types. That is, a blond underfed recruit can improve in health even under adverse conditions if fed up, but from the large number in this one company where others had none, the figures cannot be accepted. Sixty reported that their health had deteriorated, and 169 that there had been no change in their health, but on the way home seventy-nine of the regiment broke down and went into hospital, sixty with malaria, one of them dying. As they were a rather anemic thin looking lot, they were not as well as they thought.

In interpreting the foregoing, it must be remembered that thirty per cent. of the troops were recorded as brown eyed, but only thirteen per cent. of the sick and dead.

The board tries to prove that the few insane or nervous wrecks still going home on every transport do not indicate this climatic damage in spite of all our care, and then it compares tropical with home statistics, but fails to state that many of the home cases arose in the tropics. As in all the rest of the world most of the neurasthenics are women, and it states that women "rarely go out in the sun," whereas they are notorious for their carelessness.

To show by actual figures the results of three years' exposure in war conditions, the following is quoted from *The Effects of Tropical Light on White Men*:

In two regiments which gave me the data of 1,294 men who had served over two years in the tropics the results are as follows:

	Numbers			Percentages		
	Blond.	Mixed.	Brunette.	Blond.	Mixed.	Brunette.
Died	22	32	16	5.25	6.20	4.50
Invalided	47	72	31	11.20	14.00	8.70
Deteriorated	106	130	76	25.25	25.00	21.40
Retained health..	227	261	211	54.00	50.40	59.20
Improved	18	23	22	4.30	4.40	6.20
	420	518	356	100.00	100.00	100.00

In less than three years, forty per cent. of the soldiers in the field die, are invalided home, or are deteriorated in health. The surgeon general's report for 1904 shows that in the previous year the losses by death and invaliding

Woodruff: Blonds and Brunettes in Tropics.

were 70.67 per 1,000, which is a vast improvement over the foregoing statistics, and shows how much harm resulted from exposure to the climate in war time, and how much illness we can avoid by careful protection.

"It does not seem that any effort is now made to spare officers or men from exposure to the sunlight," is a reflection on the line and medical officers who have exerted themselves so successfully. The error arises from the fact that the board did not serve with troops and was evidently unaware of what it denied.

The foregoing facts when properly analyzed to eliminate conditions like venereal diseases and accidents having no climatic bearing, thus show that in spite of care the blonds as classified still have decidedly greater morbidity than brunettes. If marked blonds are compared with marked brunettes the difference is greater, as also shown, and if we compare white men with the black and brown the difference is enormous, as shown in the following table, copied from the *Report* of the surgeon general (1910) as to admission rates for diseases in the three types in the Philippines in 1909 (p 114), remembering that the browns are the best adjusted, black less so, and whites the least.

1909 ADMISSION RATES IN THE PHILIPPINES.

	White.	Black.	Brown.
Venereal	290.29	418.46	48.61
Dengue	138.13	50.04	12.29
Diarrhea and enteritis	63.24	25.02	38.74
Dysentery	44.50	28.47	9.50
Furuncle	37.15	23.30	18.07
Alcoholism	23.53	8.63	.19
Muscular rheumatism and myalgia.....	18.66	32.79	16.95
Tonsillitis	18.83	15.53	1.86
Articular rheumatism, acute and chronic	6.85	15.53	3.54
Appendicitis	7.70	2.59	.93
Typhoid fever	6.59	1.73	1.30
Measles .....	.17	....	....
Malaria	115.10	84.56	203.95
Beriberi .....	.17	....	103.93
Bronchitis, acute and chronic.....	24.47	34.51	43.40
Intestinal parasites	3.08	....	29.43
Dhobie itch	12.32	25.89	19.00
Tuberculosis	4.96	6.04	5.96
Influenza	1.03	....	4.28
Pneumonia	1.20	.86	3.54
Cholera .....	....	....	1.68
Smallpox .....	....	....	.56

In 1910 there were no black troops reported, but the relative morbidity of white and brown in the Philippines was essentially as in 1909.

The greater the maladjustment, the more the sickness, as shown by the following statistics (Surgeon General's *Report*, 1909 and 1910). Western Alaska closely resembles our ancestral environment in northwestern Europe, and deterioration in the Hawaiian Islands is slower than in the real tropics.

ADMISSION RATE PER 1,000.

	Disease only.	Total.
Whites in Philippines, 1909.....	1,159	1,351
Negroes in Philippines, 1909.....	1,127	1,314
Whites in Philippines, 1910.....	1,048	1,242
Whites in United States, 1910.....	866	969
Whites in Hawaii, 1909.....	839	1,180
Filipinos in Philippines, 1900.....	747	876
Whites in Hawaii, 1910.....	729	1,009
Negroes in United States, 1910.....	623	827
Whites in Alaska, 1910.....	320	452
Whites in Alaska, 1909.....	281	390
Army as a whole, 1910.....	901	1,007

That is, in the Philippines brown men are the best adjusted, have only two thirds the sickness of whites, and have the smallest rates in everything except the diseases to which they are susceptible by race or habits.—malaria, beriberi, bronchitis, intestinal parasites, cholera, etc. The blacks are not so well off, as they too are unadjusted, but they have far less sickness than whites, excepting rheumatism, which is elsewhere explained, bronchitis, and venereal diseases. In the other conditions the cases are too few for generalizations and vary from year to year. In spite of these tremendous facts, reported year after year, the board says: "We do consider that they (the blonds) are fully as resistant to the Philippine climate as are their darker skinned companions!"

The error follows upon the well known deception of averages and totals. When we include all diseases, each dark race is found to have something (venereal diseases, malaria, or beriberi) to increase its total sickness. Injuries increase the totals still further and tend to equalize them, as the figures show.

The gradual deterioration in the tropics is shown by the death rates in the Philippines by years of service in the army, much of which is in the tropics (Surgeon General's *Report*, p. 112, 1911):

Woodruff: Blonds and Brunettes in Tropics.

Years of service.	Per 1,000	
	Deaths.	Admissions.
Under one	1.86	1,171.70
One to two	1.26	1,388.01
Two to three	2.83	1,199.07
Three to four .....	....	723.68
Four to five	3.35	924.81
Five to ten	3.19	985.17
Over ten	5.81	735.31

The increasing mortality is in marked contrast to the reduction in morbidity through elimination of the weaklings and increasing knowledge of how to avoid illness. Old timers are the most resistant survivors, but when they do get sick in spite of acquired knowledge, their death rate is nearly ten times that of men after the first year of stimulation is passed. The two classes cannot be compared. In addition to all this, we are now learning that the damage resulting from the climate may not show itself for many years. The Spanish War volunteers did not begin to enter the National Soldiers' Homes with tuberculosis until some years after the war closed. Those who think the islands an Elysium for children and old men, or even for those past the physical prime, but wise enough to avoid illness, should ponder well the following facts as to whites in the Philippines (Surgeon General's *Report*, p. 112, 1911):

Age.	Per 1,000	
	Died.	Sick.
Nineteen and under.....	5.15	932.40
Twenty to twenty-four.....	1.62	1,349.30
Twenty-five to twenty-nine	3.32	1,042.30
Thirty to thirty-four.....	2.87	811.33
Thirty-five to thirty-nine.....	5.44	744.08
Forty to forty-four	1.58	618.07
Forty-five to forty-nine.....	10.60	663.12
Fifty and over	20.62	597.94
None are over sixty-four.		

That is, in spite of carelessness, the boys get sick less than men under thirty years of age, but suffer dreadful mortality, and men over fifty years old have less than half the illness of men of twenty to twenty-four, but when they do fall ill, their death rate per 1,000 of sick is nearly thirty times more. How erroneous, then, for the board to have grouped the older men of long residence with the young men

still undamaged! How wrong for men over fifty years old to go out there!

If in the Philippines we give the same light protection to white men that Nature gives to the brown, guard them particularly from temperatures over 82° F., protect them a little more from mosquitoes, and forbid long residence, the sickness would be reduced by at least one third, not counting possible reductions of venereal diseases. This shows how serious it is to deny the influence of factors against which pigment is a protection.

The *Journal of Tropical Medicine* for February 1, 1911, says: "Doctors Duncan and Sambon have separately proved that the best sunprotecting color is an orange red wherewith to line the helmet, hat, or headgear, whatever its form," and that a certain cloth is impervious to the light which is so injurious to skins not as heavily pigmented as the natives of light countries. E. C. C. Baly (University College Chemical Laboratory, London) showed that ultra-violet rays were stopped by certain opaque cloths, and certain cases of "prickly heat" were thus cured. Any color opaque enough will do the same, but the quotation is inserted here to show what little scientific weight is so far given in England to our board's failure to find any harm in light in the tropics. Even in darkest England, where blonds are nevertheless intruders, Shrubsall found them specially liable to certain diseases (St. Bartholomew's *Hospital Reports*, 1903), and MacKintosh also finds similar facts (*British Medical Journal*, October 8, 1910). Professor Lionel W. Lyde, of London University (*Contemporary Review*) almost goes to the extreme of predicting the eventual extinction of blonds from their lack of adjustment to modern industrialism, though they will last forever in their appropriate breeding grounds. Now comes Sir William Bennett (*Practitioner*, June, 1910) with a keen observation that the tuberculous need the conditions of their "native" climate, even if it be a dark house in darkest London—and by native he means "adjusted."

Other scientists are discovering unexpected facts, showing that we are limited to a much smaller zone or area than we formerly imagined, but that we can survive migration a long time if the change is not marked, and modification by survival of the fittest takes place and a new type results. For instance, Professor Ellsworth Huntington (*Palestine and its Transformation*) found in the Bashan highlands at 33° N., where the climate is cool and somewhat moist and cloudy, that among the Druzes there still persist the blue eyes and brown hair left by the crusaders. Only 120 miles further south, in a very small, isolated, rough country in the Dead Sea depression, where the climate is wholly different, there is a remarkable negroid survival. This is the same phenomenon as we find at the southern end of our Alleghanies. In the cold, cloudy mountain tops the Baltic type survives pure, but at the foot of the mountain, 100 miles away, negroes live. Neither type can survive where the other does. Similarly in the tropical Andes there are decaying remnants of the Mediterranean race, but the very dark Indians of lower levels cannot survive there. In central Italy too the blonds are mostly in the cloudy uplands—also in northern Spain. But there is absolutely no instance of survival of many generations of blonds in sunny places—that is, real blonds of the Baltic type.

The same phenomena are seen in northwestern Canada, as a physician from Alberta tells me. The Indians and halfbreeds suffer severely from racial susceptibility, the whites less so, but the blonds among them have an undue proportion of cases. During the cold, dark winter they all do so well that they rarely ask medical advice; but, as the light season begins, about March 21st, they deteriorate, and as it ends, September 21st, the cases are improving. The heat lasts only a few weeks, from June 20th to August 20th, and cannot be the sole cause.

Exactly the same phenomena of deterioration in

the light months and improvement in the dark, are seen also in New Mexico, so I am informed by Doctor Ingalls, of Roswell, where there is no cold weather at all. Moreover, he tells me that his cases from the north are blue eyed to a large extent, and that the cases doing the worst are those so accurately described by Hippocrates. Roswell has 300 clear days and the Adirondacks about an equal number of cloudy ones, and the deterioration in Roswell is more than in the Adirondacks. Indeed there is a summer exodus from Roswell. During the rest of the year patients are kept in the shade, as those who exercise much in the sun come to grief.

While this investigation was going on, I learned that the Bureau of Science borrowed books on light effects to study, not having them in their own library! Nevertheless, in spite of knowing nothing about the subject, they were willing to aid and abet an attack on an accepted scientific law so universal as to have no exceptions,—the law of adaptation. It was not so long ago that this bureau, or the agricultural bureau, made an attempt to breed up a horse fit for the islands by selecting as breeders some animals which had utterly failed and had been discarded by their owners as unfit for the environment. The bureau did some most excellent work before the climate began to affect any one, but it is now time to question its publications. It is pertinent to remark that the members of the board were light types except one or two, and one of the dark was found professionally unfit for promotion about the time the investigation was begun, but was given another trial. Rumor says he failed on this subject of tropical sanitation, and the blond president was one of the examiners! This must not be interpreted as meaning brunettes are more injured by the climate nor that the blond examiner was at fault. It may have been due to the system, as well as tropical light. The newspapers inform us that there is bitter opposition to these examinations, which were designed by men long since dead, and which have

been abandoned in civil organizations long ago. The claim is made that they are mere memory tests which favor drones with keen memories who have never done anything but draw pay, and we are liable to deprive the nation of the services of experienced workers who have been too busy to memorize details with which no officer should burden his mind. In the tropics they are said to be very unfair as the light and heat destroy memory for details in both blonds and brunettes. It is said that line officers are now studying ways and means of ending their system and make promotion depend upon prior work—original or executive.

"The direful effects of the Philippine climate which have been so vividly depicted by Woodruff relate to the earlier days of the American occupation, and are not seen at the present time." The remark is too flippant to appear in a serious article, and it indicates inability to see the bad conditions still being produced; particularly in the chief surgeon, who was in a deplorable condition at that very time and who died before the article denying any such effects was received in this city. He was a blond, and, by the way, his death, though due to the tropics, is necessarily classified as due to pneumonia induced by California's climate—an illustration of the way death rates in tropical places are kept low.

It must not be thought for a moment that the board deliberately made false statements. It believed everything said. It is an illustration of "suggestion" and could be used in a course of lectures on psychology. It is significant of "suggestion" that the chief surgeon believed the climate beneficial, but he paid the penalty which will be meted out to many another misled by such articles. This one was "published with permission of the Chief Surgeon, Philippines Division," and it now looks as though he ordered it, but he is dead and cannot tell us.

Increased normal suggestibility, by the way, is an-

other of the effects of light on blonds, as I have often noticed it in others and have been victimized by it myself. It is the cause of much of the bickering among tropical residents and arctic explorers. Twice have I seen an evil minded man, lacking in a sense of honor, put a large command into a state of inefficiency, through constantly suggesting to the suggestible commander, that officers were always doing wrong. One officer was so influenced by the "suggestion" that the climate was perfect that he actually proposed to accustom his soldiers to it by marching them in the sun at the hottest part of every day. He too was a blond stimulated by light, but he was in hospital within a year of leaving. Some years ago a certain nation would have been brought to the verge of war by the misinformation of a tropical agent, affected by the climate and under the influence of suggestion, had his mental condition not been recognized by the cooler heads at home.

"The subject needs much more study before a definite conclusion can be reached." Yet these blonds come to a very definite conclusion from one year's study that pigmentation *per se* is useless, and reject the twelve years' study of one who has specialized on it, and reject the work of hundreds of others too. A little pigment was seriously needed.

In tropical medical articles we must now do as the constabulary officials do, and scrutinize more closely before acceptance, to see if the facts really are as stated, whether facts adverse to the conclusion have been omitted and all available assistance has been obtained from experts. The complexion of the writers must be taken into account and how long they have been in the tropics and whether they have yet been affected by tropical light. I have been informed many times that in the civil profession here and in Europe, there is the same conservative opposition to new ideas, as led our professional forefathers to vilify Jenner, Pasteur, and Lister for their bizarre theories. Anything which appears to negative a new truth is seized upon with

delight, and now von Schmaedel's theory must suffer the same martyrdom through misrepresentation. I have been repeatedly informed that many physicians are industriously circulating the rumor that I, and not Duncan, of England, had advised orange red underclothing, and they have expressed the greatest pleasure at the failure of these tests to show the vast benefit of wearing thick red underclothes in hot weather. The unscientific experiments were not made with my knowledge and I have always disapproved of them. The result, nevertheless, confirms my theory.

Most of the medical journals were at first incredulous as to von Schmaedel's theory and published harsh things about it, particularly the *British Medical Journal* and the *Journal of Tropical Medicine*. They have all been more or less convinced of the truth except our own *Journal of the American Medical Association*, which in this respect is the most backward in the world. An editorial writer on its staff has been persistent in false statements, misinterpretation of facts, and in the naive faith with which he accepts all adverse opinions and rejects the favorable. Luckily, to use his words, any careful reader must have observed the lack of poise which characterizes many of his pronouncements. Some of the debatable features are presented by him in a form so convincing and a style so entertaining, that the lack of poise in places is readily overlooked. The members of the association should resent this misuse of their journal, and, thank God, there are independent journals to give the truth.

The *National Geographic Magazine* has been another offender, though it should have been eager for new climatological facts. C. J. Con, of the Weather Bureau, wrote me that he would not even read such "hallucinations." This accounts for much. One physician who opposed the theory confessed to me he had not read the evidence. Even Osler misstated the facts in his textbook. Never-

theless, Professor Giuftrida Ruggieri, of the University of Naples, told the Eugenics Congress in London, July 25, 1912, that researches in the United States (not the Philippines) make it certain that the races of man acted in exactly the same way as the races of animals.

Professional opposition is gradually fading, and, what is much more important, the alleged benefit of sunshine in tuberculosis is rarely mentioned, though a few years ago, Dr. S. A. Knopf, of New York, who applied these dangerous rays to the naked bodies of his patients, was able to publish many opinions in their favor, but no facts. In the very issue of the *Journal of the American Medical Association*, June 1, 1912, which accepts without scrutiny the alleged proofs that blonds in the tropics are as well off as brunettes, Dr. Lawrason Brown describes the treatment of tuberculosis and does not mention sunlight at all. On the other hand, he shows that in the Adirondacks during the light season beginning about Easter time, the patients lose weight quite rapidly, and this continues until late in August, or early in September, when the glary season is over. Then, when the light is reduced to safe limits for northmen, the patients increase in weight until Christmas, the darkest period of the year. They hold their own or decline but slightly until the light comes on again, and this slight decline of some may be due to the excessive cold, for which they are not adapted. The rapid decline at the beginning of the light season has no relation to heat, which does not begin to be oppressive until the summer solstice. It must, then, be the light of the tropics as well as the heat which makes tuberculosis so appallingly rapid in those lacking pigmentation. Even in the native, who normally hides away at midday, the disease is rapidly fatal if he works outdoors at that time, but if properly treated, he is quite as curable as Norwegians in Norway. We should take a lesson from Hippocrates and find out which ethnic types do best in each season in the Adiron-

dacks and which worst. We do not know what types are best there, as the country had never been inhabited the year round, until a century ago. The Indians lived in the lowlands in winter and went up in the mountains only when the snow did not drive the game down. Soon we will hear the phthisiographers advising against sunshine, for it is safe to predict that the blonds, as as in the Alps, will be found to do worst in summer and perhaps the little brunette the worst in winter.

Light is very effective in curing local foci it can reach, but it does this through its irritation, not as a bactericide, as the bacteria have been proved to be unaffected until the increased serum flow damages them. Air outdoors, cool enough for the type of man, seems to be the main reliance, neither hot nor very, very cold, and it is as good for a tuberculous vertebra as for a tuberculous lung. Its effect is lessened by excessive light to the body as a whole.

These comments are based upon the article published privately by the president of the tropical board, as I have not seen the official report, but I reserve for future publication more dark facts explanatory of this curious opposition to the acceptance of the proofs of the effects of light on men. If we ignore the use of pigment, the government will continue to lose many thousands of dollars yearly through sending unfit types to the tropics—not to mention avoidable pensions to unfit men.



