

Inaugural dissertation on the influence of climate on the health and mortality of the inhabitants of the different regions of the globe : submitted to the Medical Faculty of the University of Edinburgh, in conformity with the rules for graduation, by authority of the Very Reverend Principal Baird, and with the sanction of the Senatus Academicus / by Arthur Saunders Thomson, candidate for the degree of Doctor in Medicine.

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Prize Thesis.

INAUGURAL DISSERTATION
ON THE
INFLUENCE OF CLIMATE
ON THE
HEALTH AND MORTALITY
OF THE
INHABITANTS OF THE DIFFERENT
REGIONS OF THE GLOBE;

SUBMITTED TO THE
MEDICAL FACULTY
OF THE

University of Edinburgh,

IN CONFORMITY WITH THE RULES FOR GRADUATION,

BY AUTHORITY OF THE
VERY REVEREND PRINCIPAL BAIRD,
AND WITH THE SANCTION OF THE
SENATUS ACADEMICUS.

BY
ARTHUR SAUNDERS THOMSON,
CANDIDATE FOR THE
DEGREE OF DOCTOR IN MEDICINE

EDINBURGH :

JOHN CARFRAE AND SON;
LONGMAN, ORME, BROWN, GREEN, AND LONGMANS,
LONDON; AND HODGES AND SMITH, DUBLIN.

MDCCCXXXVII.

THE

DISSERTATION

ON

THE INFLUENCE OF CLIMATE

ON

HEALTH AND MORBIDITY

IN

THE VARIOUS CLIMATES OF THE TROPICS

AND THE EFFECTS OF THE SEASONS

BY

THE MEDICAL FACULTY

AWARDED A GOLD MEDAL FOR THIS THESIS.

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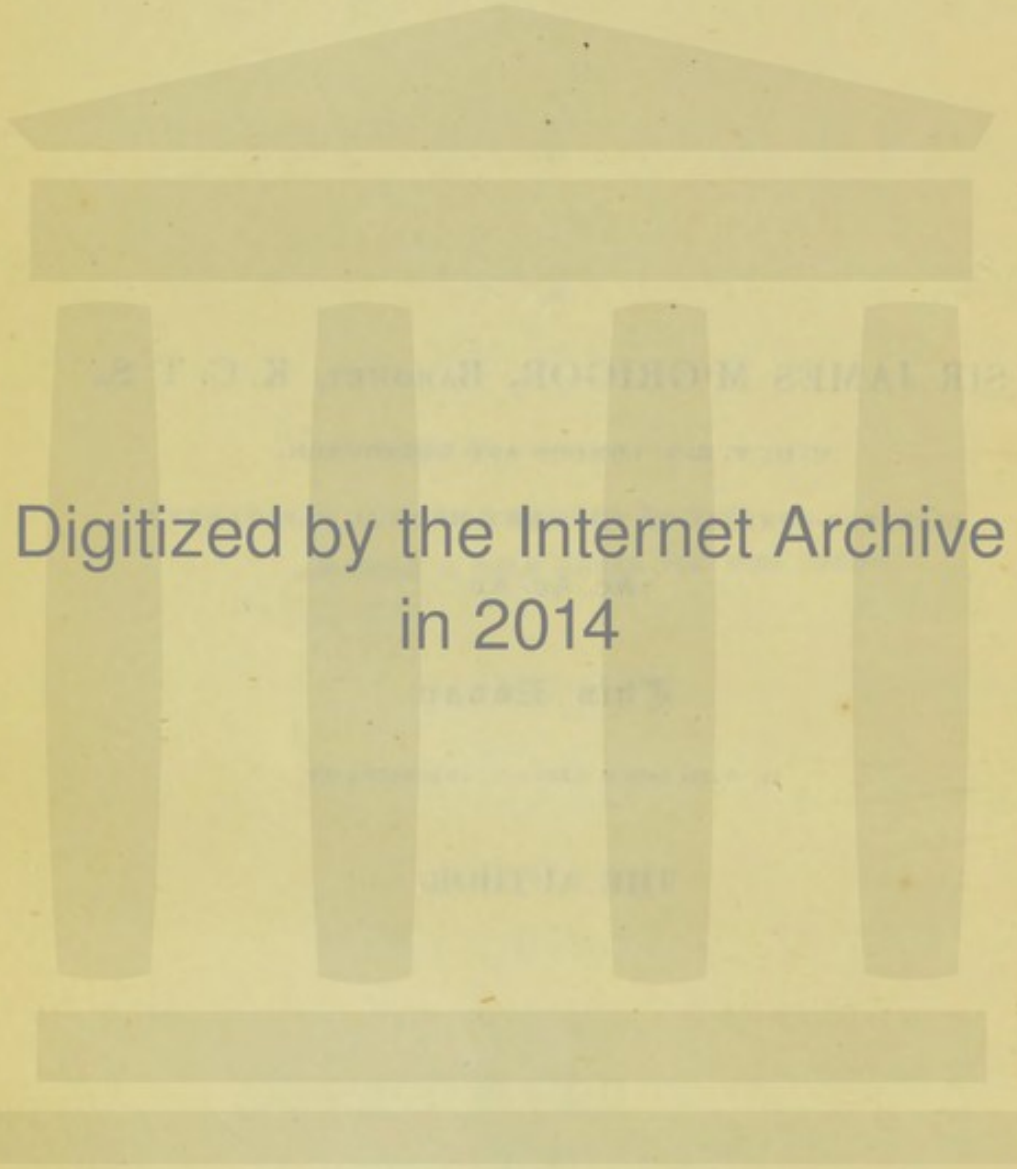
DIRECTOR-GENERAL OF THE ARMY MEDICAL DEPARTMENT,

&c. &c. &c.

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TO

HENRY MARSHALL, Esq.

DEPUTY INSPECTOR-GENERAL OF ARMY HOSPITALS,

WHO ORIGINALLY SUGGESTED THE SUBJECT,

AND FROM WHOSE STATISTICAL RESEARCHES A GREAT PART OF THE

MATERIALS HAVE BEEN OBTAINED,

This Essay is Dedicated,

AS A TRIBUTE OF ESTEEM AND SINCERE GRATITUDE, BY

THE AUTHOR.

HENRY MARSHALL, Esq.

OF THE HOUSE OF COMMONS

AND OF THE HOUSE OF LORDS

AND OF THE HOUSE OF COMMONS

AND OF THE HOUSE OF COMMONS

OF THE HOUSE OF COMMONS

AND OF THE HOUSE OF COMMONS

THE AUTHOR.

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OBSERVATIONS

ON THE

INFLUENCE OF CLIMATE, &c.

THE object of this Essay is, to examine in a very general manner the influence of climate on the health and mortality of the Indigenous Inhabitants of different countries; and to endeavour to show the mortality which takes place when they emigrate from one zone to another, or to climates differing in temperature and other circumstances, from that of their native country. The arrangement adopted is as follows:

First, A description of the climate of the torrid zone will be given, in so far as regards those circumstances intimately connected with the health of man. I shall then briefly describe the indigenous inhabitants, stating the ratio of mortality and prevailing diseases, in so far as I can obtain facts.

Secondly, I shall endeavour in a similar manner to describe the climate of the temperate zones, and the indigenous inhabitants, with the ratio of mortality, and prevailing diseases.

Thirdly, I shall examine the consequences which result from the migration of the natives of tropical regions to the temperate zones.

Fourthly, The influence of the climate of the torrid zone on the indigenous inhabitants of temperate regions will form the last subject for consideration.

CHAPTER 1.

An account of the Climate of the Torrid Zone in so far as regards the Health of Man—Indigenous Inhabitants—Ratio of Mortality—Prevailing Diseases.

GEOGRAPHERS have divided the globe, in relation to its temperature, into Torrid, Temperate, and Frigid Zones ; a division which, although in a certain degree arbitrary, will, from the general view taken in this essay, be adopted. I therefore commence with a description of the climate of the torrid or tropical zone, in so far as the health of the inhabitants is concerned.

SECTION I.—*General Remarks on the Climate of the Torrid Zone.*

The torrid zone extends to about $23\frac{1}{2}^{\circ}$ on each side of the equator. The inhabitants have the sun vertical two seasons in the year, and are of course subject to a high temperature. It contains the greatest portion of Africa, and a considerable part of America and Asia, (see map prefixed.) This region may be said to experience only two seasons in the year, the rainy and the dry.

The temperature of the atmosphere, the fall of rain, and the prevailing winds, may be considered the principal constituents of the climate of a country. Other phenomena, such as electricity, cultivation of the soil, exposure, &c. have no doubt their influence, although in a much less obvious degree. The temperature of the torrid zone will first be considered.

a. Temperature.—The great characteristics of the climate of the tropical regions are, uniformity of temperature, and freedom from aqueous precipitation ; and as the mean temperature of the earth's surface increases gradually from the poles to the equator, it follows that a difference of latitude constitutes the chief causes which occasion a variation of temperature. Sir John Leslie has

deduced from calculation, that within the tropics at the level of the sea, Fahrenheit's thermometer ranges from 84° to 76° ; Humboldt, from a very extensive generalization, estimated the mean temperature of tropical regions at $81\frac{1}{2}^{\circ}$.

The following Table, No. I. shows the mean annual temperature in sixteen different latitudes of the Torrid Zone.*

Places.	Latitude.	Mean An. Temp.
Equator,	0°	82.5
Meranham,	2 29'	81.2
Batavia,	6 12 S.	80.4
Ceylon,	7	80.8
Cumana,	10 27	81.8
Pondicherry,	11 55	85.3
Barbadoes,	13	79.3
Madras,	13 4	80.4
Manilla,	14 3	78.
Senegal,	15 5	79.7
Vera Cruz,	18 50	77.7
Bombay,	18 56	80.
Macao,	22 12	74.
Rio Janeiro,	22 54 S.	74.3
Canton,	23 8	73.2
Havannah,	23 9	78.3

From the above statement it will be observed, that the calculation of Sir John Leslie and the observations of Humboldt nearly coincide.

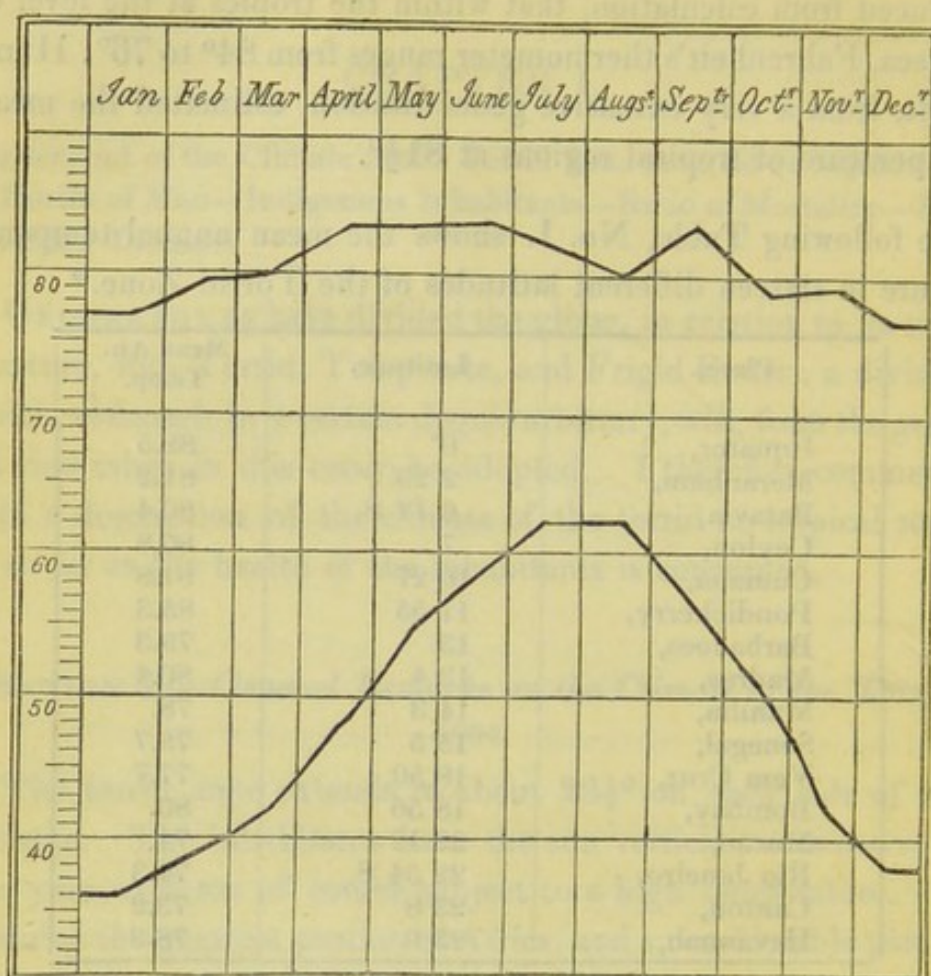
In order to show the limited range of temperature which takes place during the year in tropical regions, and for comparison with that of the temperate zones, I have made the following sketch.

Diagram showing the mean monthly temperature at Trincomalee in Ceylon, (north latitude 7°) from 1st December 1809 to 30th November 1810,† and the mean monthly temperature of London, from observations made during a period from 1797 to 1816.‡

* Murray's Popular Chemistry, p. 188.

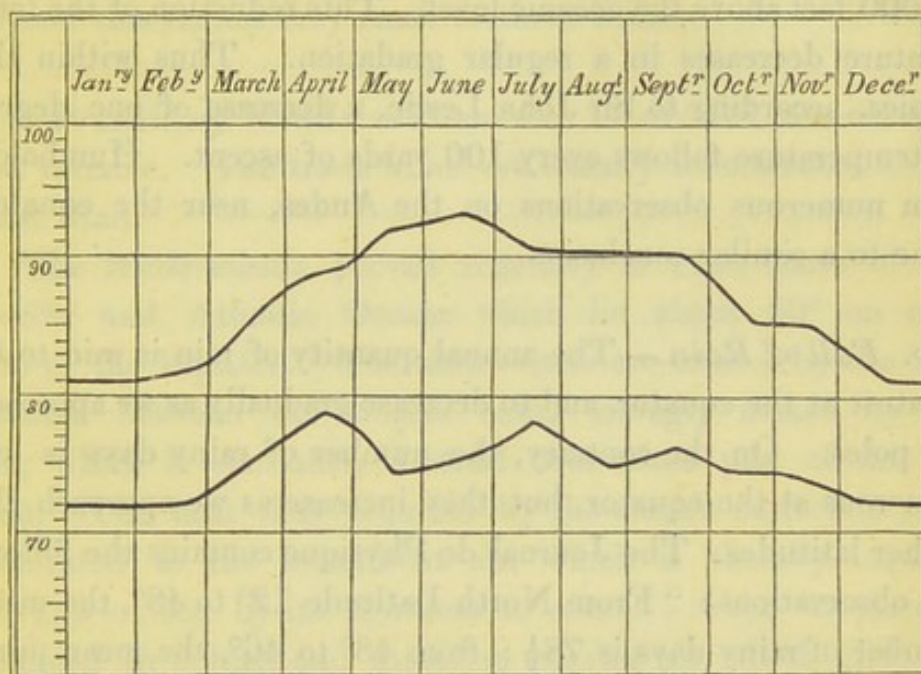
† Marshall's Topography of Ceylon, p. 13.

‡ Howard on the Climate of London, 2d. edit. Vol. i. p. 10.



I have selected the temperature at Ceylon in the construction of this diagram, as a type or example of the temperature of the torrid zone. The superior curve shows the mean monthly temperature at Trincomalee in Ceylon, and the inferior that of London. The mean annual temperature at Trincomalee is $80\frac{1}{2}^{\circ}$, and we may remark, that 3° of Fahrenheit's scale is the greatest variation which occurs above the mean, or 6° during the year. Contrast this with the inferior curve, which illustrates the mean monthly temperature in London, and as the mean annual temperature is about 49.651° , the thermometer consequently ascends and descends 13° from the mean. The variations during the year in the temperate zone, northern hemisphere, are, therefore, in this instance 26° , whereas in the Torrid Zone they are only 6° . With the view of illustrating the variations in the temperature of the different months in a tropical climate, I have subjoined the following diagram, showing the highest and low-

est temperature which occurred during each month of the year at Trincomalee in Ceylon.



The superior curve represents the highest, and the inferior curve the lowest, temperature which occurred during each month in that island. We may remark, that the highest temperature, 93° Fahrenheit, happened during the month of June, and the lowest, 72°, in January and February.

Continents have a colder atmosphere than islands situated in the same degree of latitude. The greatest summer heats are experienced in countries having a sandy dry surface almost destitute of vegetation. On the shores of the Red Sea, and in Arabia, the thermometer, according to some travellers, has stood during mid-day at 110°, and has remained during the night at 94°. At Sierra Leone it has risen to 138°; and Humboldt in many instances has observed the thermometer so high as 118°, 120°, and 129°. The temperature of the surface of the ocean within the tropics, is nearly as high as that of the atmosphere; thus, in the Carribbean sea, latitude 15°, the temperature of the surface is 83°; and of the Pacific, latitude 21° 16', it is 79.5*

As we ascend from the level of the sea the air becomes more

* Murray's Popular Chemistry, p. 192.

rarefied, and the solar heat diminishes until we reach the region of perpetual snow, which, within the tropics, is about 15,000 or 16,000 feet above the oceanic level. This reduction of the temperature decreases in a regular gradation. Thus within the tropics, according to Sir John Leslie, a decrease of one degree of temperature follows every 100 yards of ascent. Humboldt, from numerous observations on the Andes, near the equator, came to a similar conclusion.

b. Fall of Rain.—The annual quantity of rain is said to be greatest at the equator, and to decrease gradually as we approach the poles. On the contrary, the number of rainy days is less numerous at the equator, but they increase as we approach the higher latitudes. The Journal de Physique contains the following observations: "From North Latitude 12° to 43° , the mean number of rainy days is $78\frac{1}{2}$; from 43° to 46° , the mean number is 103; from 46° to 50° , 134; and from 51° to 60° , 161."

In maritime countries, the fall of rain is greater than inland. In mountainous regions, also, it has been ascertained to be greater than in plains. Among the Andes, for instance, it rains almost incessantly; while the flat country of Egypt is parched by long continued drought. Within the tropics, rain falls chiefly at particular seasons. At Bombay, the rainy months are June, July, August, September, and October. A reduction of temperature, and the unusual prevalence of certain winds, influence the quantity of rain in the same locality.

The degree of moisture in the atmosphere, is influenced by the evaporation arising from the earth's surface. The rate of evaporation in the air will increase as the temperature increases; consequently, the evaporation is greater at the equator than in high latitudes. To give an idea of the moisture of the atmosphere of some tropical countries, it may be stated, that in Ceylon, particularly near the sea coast, common salt deliquesces on exposure to the atmosphere; glue loses its hold, and articles of furniture, where this substance has been used, sometimes fall to pieces. Paper made in Europe loses its size, and soon becomes

unfit for writing on. Between the tropics the barometrical fluctuations do not much exceed one quarter of an inch, whereas beyond this region they reach to three inches.

c. Prevailing Winds.—These may be divided into constant and variable. The trade winds are usually denominated a constant wind.

The *trade-winds* prevail regularly in those parts of the Pacific and Atlantic Oceans which lie about 30° on each side of the Equator. The trade-winds are caused by the land situated between the tropics being strongly heated by the sun, which is constantly vertical over some part of this region. The heat thus acquired by the earth's surface is communicated to the incumbent air, which is thereby expanded, and caused by its lightness to ascend; when its place is occupied by colder, and therefore heavier air, which glides in on both sides along the surface from the regions beyond the tropics; while the displaced air thus raised above its due level, and unsustained by any lateral pressure, flows over as it were, and forms an upper current in the contrary direction, or toward the poles; which being cooled in its course, and also sucked down to supply the deficiency in the extratropical regions, keeps up thus a continual circulation in the atmosphere, and hence the cause of the trade-winds.*

Between the 10th and 30th degrees of south latitude, the trade-winds prevail in the Indian Ocean, but towards the north of this line a regular change takes place every half year. These winds are termed *Monsoons*. During the change there are frequent storms, which continue for five or six weeks. The mean height of the barometer is not affected by the trade-winds.†

The *monsoons* prevail in that part of the Indian Ocean lying between Sumatra and the African coast, from the 3° of south latitude to the Asiatic coast, including the Arabian Sea and the Gulf of Bengal, and between the Island of Madagascar and the coast of Africa. They, however, suffer

* Treatise on Astronomy, by Sir J. F. W. Herschell, chap. 3, sect. 195.

† Daniell's Meteorology.

partial changes from local circumstances. The monsoons are not altogether confined to the space above-mentioned, as the winds blow from the east or north-east between September and April, and for the remainder of the year from the south-west, on the coast of Brazil, between Cape St Augustine and the Island of St Catherine.*

In all maritime countries between the tropics, there exists a sea and land breeze, the former blowing towards the land during the day, and the latter blowing back during the night.

There are other winds within the tropics, such as the typhon of the East, the hurricane of the West Indies, and the harmattan of Africa; but the limits of this essay will not permit me to enter more minutely into the subject of winds.

SECTION II.—*Indigenous Inhabitants of the Torrid Zone.*

a. Tropical Africa.—That part of Africa included within the tropics, extends from the great desert of Sahara to near the southern limit of Caffreland. This portion of Africa is estimated to contain between twenty and thirty millions of inhabitants.

Tropical Africa is inhabited by the Ethiopian variety of man, which is characterized by dark-coloured skin, dark eyes, black woolly hair, head narrow and compressed laterally, elongating towards the front, forehead low, narrow and slanting, jaws projecting forwards, with receding chin, nose broad, thick, and flat, lips (particularly the upper,) thick, the facial angle 70° . Under the Ethiopian variety, there are numerous tribes distinguished from each other in a greater or less degree. It is erroneous to suppose that the features of all are exactly similar, for Dr Winterbottom observes, that as great a variety of features occur among the Africans as is to be met with among the nations of Europe.

The Negroes and Caffres are the two most distinctly-marked races indigenous to the tropical parts of Africa. The Negro is

* British Encyclopædia, article Meteorology.

the most widely extended, occupying the centre, and all the west coast from Senegal, latitude 17° , to Cape Negros, latitude $15^{\circ} 50'$, and they are also found in Nubia and Egypt. The Caffres occupy all the east coast, and are distinguished from the negro by having a more obtuse facial angle, convex forehead, and high nose. The Caffres are a tall, stout, muscular race. The Copts, Nubians, and Abyssinians cannot be considered distinct races. The Copts are said to be descendants of the Egyptians: the Nubians and Abyssinians have probably sprung from a mixture of the Asiatic and African nations. The Abyssinians have long and straight hair, tolerably regular features, and a complexion approaching to black. The Gallas, an uncivilized nation, with long black hair, occupy extensive regions under the equator.*

b. Tropical America.—We find in that part of America which lies within the tropics, the States of Colombia, Brazil, Peru, Bolivia, and Mexico, together with numerous islands adjacent to the continent. The tropical parts of continental America are estimated, in a very general manner, to contain between thirty and forty millions of inhabitants.

The indigenous inhabitants of the continent constitute the American variety, which is characterized by a copper-coloured skin, of a more or less tan, or reddish-coloured tint; black, straight, strong hair; small beard; short forehead, (which in some cases is deformed by art,) deep eyes, with a broad face, and prominent cheek bones: the mouth is large, and the lips rather thick. The Americans are said to hold, in their character, a middle place between the Caucasian and Mongolian races. With slight exceptions, the copper or bronze colour of skin is common to all the nations of America. The Indians who inhabit the most elevated Andes in the torrid zone have as dark a complexion as those who people the narrowest valleys of the equinoctial regions of America.

The West India Islands cannot be said to have any indige-

* Lawrence, Lectures on Nat. Hist. of Man.

nous inhabitants. They are now extinct, and their places are supplied by imported Africans. The number of Africans in the West India Islands, and settlements in possession of the British Government, is estimated between 700,000 and 800,000.

c. Tropical Asia.—In that portion of Asia situated within the tropics, we find the Peninsula of Hindostan, the Burman Empire, Cochin-China, the Peninsula of Malacca, &c. the islands of Ceylon, Java, Borneo, and Sumatra, with many others of less extent.

The Mongolian variety composes the greatest number of the indigenous inhabitants of the continental parts of tropical Asia. They are characterized by an olive-coloured brown face; small and flat nose, with lateral projection of the cheek bones; black eyes; black, straight, strong, and thin hair; thin beard; head of a square form, with small and low forehead; facial angle 75° . Under this head are included numerous tribes, distinguished from each other by well-marked physical characters. India, according to Dr Prichard, is inhabited by a mixed race, made up of the aborigines, and others whom the pursuits of war have at various times brought there. These mixtures, he says, have effaced the peculiar character of the original inhabitants.

The peninsula of Malacca, the islands of Sumatra, Java, Borneo, and several other Asiatic islands, together with New Guinea, New Britain, &c. are inhabited by the Malay variety of man, so called, because most of the tribes speak the Malay language.

This variety is characterized by a brown colour of skin, from a light tawny tint (not deeper than that of the Spaniard or Portuguese) to a deep brown approaching to black; thick, black, straight hair; head rather narrow, broad nose, and wide mouth. Under this variety are included races of men very different from each other. The Malay variety forms the connecting link between the Caucasian and Ethiopian. The Polynesian islands are also peopled by the Malay variety.

SECTION III.—*On the Ratio of Mortality which occurs among the Indigenous Inhabitants of the Torrid Zone, with some observations on the prevailing Diseases.*

Man, from the complicated nature of his organs, is liable to innumerable and dangerous maladies, which may destroy life in a moment, from the day of his birth up to a hundred years ; for although the changes indicated by physiology, intimate that the human body may perform its functions regularly, and in a healthy manner, for seventy or eighty years, still it is impossible to form an opinion of the number of years to which any individual man's life will extend.

This conclusion is applicable to individuals, to families, or small communities ; but when we examine the mortality which occurs among the population of a whole country, we shall find there are certain laws that regulate the passing away of one generation and the development of another ; that the sickness to which the human race is liable has certain determinate tendencies in its general operation, which are exhibited in a greater degree at particular periods of life. Thus from birth to about 15 years of age the length of sickness declines, while from 15 upwards to 50 or 60 years the rate of sickness and mortality gradually increases until death. The ratio of mortality in different countries is, however, affected by causes acting either favourably or otherwise to the prolongation of life. To determine in a very general manner the ratio of mortality among the indigenous inhabitants of the torrid zone, is what we now propose.

It is frequently stated, that the proportional number of individuals who attain a given age, differs in different climates ; and that the warmer the climate, other circumstances being equal, so much the shorter is the average duration of human life. According to this opinion, as we approach the equator the mortality increases, and the average duration of life is consequently shorter. For the purpose of illustrating this opinion, M. Moreau de Jonnes presented to the Institute the following table, to which, for the sake of comparison, I have calculated the ra-

tio of deaths per 1000. I may here state, that the mortality of a country is generally estimated by the proportion which the deaths bear to the population.

TABLE II.—Showing the annual ratio of mortality per 1000 which occurred in seven different latitudes of the Torrid Zone.*

Latitude.	Places.	1 death in	Ratio of deaths per 1000.
6° 10'	Batavia	26 inhabitants	or 38
10 10	Trinidad	27	37
13 54	Saint Lucia	27	37
14 44	Martinique	28	36
15 59	Guadaloupe	27	37
18 36	Bombay	20	50
23 11	Havannah	33	30

It is necessary to remark, that in some of the instances given in the above table, the rate of mortality appears greater than that which properly belongs to the climate, as some of the countries mentioned include cities and districts known to be by local situation remarkably unhealthy; and in some the high mortality is principally occasioned by Europeans, who, it will be afterwards seen, suffer in great numbers in a tropical climate. The separate division from which the collective numbers above given are deduced will sufficiently elucidate these observations.

In Batavia, 1805,	Europeans died	1 in 11, or 91 per 1000.
	Slaves, . . .	1 in 13, or 77
	Chinese, . . .	1 in 29, or 34
	Javanese, viz. natives,	1 in 40, or 25
Bombay, 1815,	Europeans, . .	1 in 18, or 55
	Mussulmans. .	1 in 17, or 59
	Parsees, . . .	1 in 40, or 25
Guadaloupe, 1811	Whites, . . .	1 in 22, or 45
to 1824,	Free men of colour,	1 in 35, or 29
Martinique, 1825,	Whites, . . .	1 in 24, or 41
	Free men of colour,	1 in 23, or 43
Grenada, 1815,	Slaves, . . .	1 in 22, or 45
Saint Lucia, 1802,	Slaves, . . .	1 in 20, or 50

* Notice sur la population des états de l'Europe, par M. Moreau de Jonnes. Sur l'Homme et le Developement de ses Facultés, par M. Quetelet. 1835.

To determine whether the ratio of mortality is higher among the indigenous inhabitants of tropical or temperate regions, it would be requisite to deduce observations from very extensive data, collected entirely from the indigenous inhabitants of the country ; for we cannot properly conclude, as is done by Moreau de Jonnes, that the ratio of mortality is higher in tropical than temperate countries, from calculations founded upon the observation of the mortality which occurs among a few Europeans residing in a tropical climate, or among Africans in the West India Islands, whether living in a state of bondage or not ; for to both these races of men, as will be shown in another part of this thesis, the tropical climate in which they exist proves very deleterious. If we take the rate of mortality, however, as given in the preceding table, among the Javanese and Parsees, in countries, latitude 6° and 18° , where those races are either the original inhabitants, or have become naturalized by a residence of some centuries, we find that the annual ratio of mortality is 1 in 40, or 25 per 1000 of the population,—a rate of mortality which exactly corresponds (as may be seen in Table XVII. showing the mortality in the different European nations,) to what occurs in the kingdom of France, latitude 48° . These remarks are deemed necessary before proceeding to examine the ratio of mortality among the indigenous inhabitants of the Torrid Zone.

a. Ratio of Mortality in Tropical Africa.—I am not acquainted with any statistical materials which would enable me to estimate the mean annual ratio of mortality among the indigenous inhabitants of all ages in tropical Africa. It has, however, been supposed by M. Virey, that the negro race is in general more short-lived than the European. Dr Winterbottom informs us, that “few of the inhabitants of Guinea arrive at old age.” M. Adanson makes a similar remark on the natives of Senegambia, and accounts to the same purport are given by Bosman and others respecting the natives of Guinea and Congo.*

* *Researches into the Physical History of Mankind.* By James C. Prichard, M. D. 3d edit. Vol. i. p. 123.

The shortness of life observed by these authors among the Africans, may be the result of local circumstances, without supposing any peculiarity in the race, for we have instances of longevity in Africa given by Winterbottom, Patterson, and Barrow. It is not by such loose statements as the above, or by collecting detached instances of men whose lives have been prolonged beyond a hundred years, that this question can be decided; for these afford no accurate data which can be compared with other countries, in order to observe the difference of the ratio of mortality which occurs.

The following statement will, however, assist us in forming an idea of the ratio of mortality which takes place among the native troops in Africa. The mean annual strength of the black troops on the west coast of Africa, from fourteen years observation, amounted to 469, and the annual ratio of deaths per 1000 to 36, or 1 out of every 27 men. I may here state, for the purpose of comparison, that the annual ratio of deaths among the French troops of the line stationed in France, is 20 per 1000, or one death out of every 50 men; and as it may be safely assumed that in those countries where the ratio of mortality is low, the inhabitants have a longer life than what is experienced by the inhabitants of countries where the rate of mortality is high, we consequently conclude from the above data, that the Africans on the west coast of Africa have a shorter life than the natives of France; but the particular situation of the black troops on the African coast sufficiently accounts for the comparatively high ratio of mortality.

The Island of Bourbon is the only island belonging to tropical Africa from which I have been able to obtain statistical materials. Mr Thomas, who obtained a prize from the Academy of Sciences at Paris for his statistical researches on this island, states, that, among the slave population, (Africans), the annual ratio of mortality is 30 per 1000, and from 1818 to 1824, their number has decreased one-sixth. Among the free blacks in the same colony, the mortality is not so great: thus out of 5069 free blacks, the average deaths (according to Mr Tho-

mas) of four recent years, was 782, which is about 16 deaths out of every 1000 of the population annually. This is little more than one-half the mortality which takes place among the slave population.

Having considered the ratio of mortality which occurs among the indigenous inhabitants in tropical Africa, as fully as our scanty materials would admit, I now proceed to make a few observations on the prevailing diseases.

Prevalent Diseases in Tropical Africa.

Fevers.—Among the Africans, according to Winterbottom,* fevers are not very frequent, Among some of the tribes intermittent fever is entirely unknown. It has been supposed that Africans are not subject to remittent fevers,—a statement which Winterbottom refutes. But there can be no doubt that they are much less liable to this variety of fever than Europeans, for, in the West India Islands, there are medical men of long experience, and extensive practice, who have never witnessed a case of remittent fever occurring in an imported African.

Pectoral Complaints.—According to Dr Winterbottom, consumption is a very rare disease in the neighbourhood of Sierra Leone, but it appears to be more common among the Foulahs and Mandingos, for although Dr Winterbottom was physician to that colony for a number of years, he says, “as an idiopathic disease, I do not recollect to have seen a single case.”†

Diseases of the Bowels.—Dysentery is said to be a common disease among the natives of the gold coast of Africa, which has been attributed to the alleged impurities of the water. This is very probable, for at Sierra Leone, where the water is good, the disease is said to be by no means so frequent. Mr Park, in his account of the interior parts of Africa, says, that the diseases of the negroes appear to be but few in number; that fevers and fluxes are the most common, and most fatal. Mr Old-

* An Account of the Native Africans in the neighbourhood of Sierra Leone, &c. By Thomas Winterbottom, M. D., Physician to the Colony. Vol. ii.

† Ibid. Vol. ii. p. 120.

field* states that the coast of Africa near the River Nunn, is very unhealthy, and that the natives are subject to diarrhœas, dysenteries, and a variety of cutaneous diseases.

Diseases of the Brain, according to Dr Winterbottom, are not frequent among the natives of Africa. He states that the *coup de soleil* is a common disease in the hot countries of Europe, yet, notwithstanding the excessive heat of Africa, it is a disease entirely unknown at Sierra Leone. The Africans are subject to a species of lethargy, which, we are informed by Dr Winterbottom, proves fatal in every instance. It is more common in the interior of the country than in the neighbourhood of the coast. Such is the tendency to stupor in this disease, that even the application of a good whip is hardly sufficient to keep the patient awake. It usually proves fatal in three or four months; sometimes squinting and convulsions occur previous to death. Children are seldom attacked with it. Mania is a rare disease, according to Dr Winterbottom, among Africans in their own country.

b. Ratio of Mortality in Tropical America.—Humboldt has furnished us with some observations regarding the mortality of the tropical parts of South America. Thus in one district of the kingdom of New Spain, the annual rate of mortality was 1 in 26, or 38 deaths per 1000 inhabitants, and in another 1 in 29; while taking the whole of that country, the deaths were 1 for every 30 inhabitants, which is 33 deaths for every 1000. Malthus has adduced this as an example of the early mortality and rapid passing away of each generation in tropical climates, although it will be afterwards seen that this ratio of mortality is not higher than that which occurs in the European countries of Spain, Russia, and the Roman States.

It has, however, been supposed that the native Americans do not live so long as the different races which inhabit Europe. This opinion was entertained by Dr Rush; but we have the testimony of Clavigero, in his Mexican History, Book 1st, who says “that among the Americans, whose great fatigues, and ex-

* Memoirs by Mr Oldfield, Surgeon to the late expedition to explore the Coast of the Niger.

cessive toil do not anticipate their death, there are not a few who reach to the age of eighty, ninety, and a hundred years." M. de Humboldt entertains a similar opinion. Dr Prichard, when examining the longevity of the native Americans, and other races of men, says, "we might be almost inclined to suspect from these statements, that the longevity of some other races of men, instead of falling short of the average duration of life, rather exceeds the term prevalent in those nations who inhabit most of the countries of Europe. But, on the whole, it does not appear that any well-marked differences exist between the several races of men, that can furnish a constant character."*

In the British settlements in the West Indies, the ratio of mortality which occurs among the inhabitants (who it will be recollected are not natives but imported Africans) may be seen from the following valuable table compiled by Lieutenant Tulloch, from materials published in Mr M. Martin's work on the West Indies.

TABLE III.—Showing the aggregate strength and aggregate number of deaths for several years, and the annual ratio of mortality per 1000 among the slave population of all ages in the following colonies :—

Colonies.	Periods of observn.			Aggregate.		Annual ratio of Deaths per 1000
	Years.	From	To	Strength.	Deaths.	
Demerara,	15	1817	1831	1,171,095	34,709	29½
Berbice,	12	1819	1830	265,461	8,259	31
Trinidad,	12	1816	1827	290,763	8,774	30
Tobago,	13	1819	1831	177,753	7,385	41½
Grenada,	15	1817	1831	380,858	12,764	33½
St Vincents,	14	1817	1830	332,283	10,797	32½
Barbadoes,	15	1817	1831	1,191,321	35,432	30
Dominica,	9	1817	1825	150,681	4,768	31½
Antigua,	14	1817	1830	432,329	10,323	24
St Lucie,	15	1816	1830	217,488	6,416	29½
St Kitts,	14	1817	1830	276,769	7,648	27½
Jamaica,	12	1817	1828	4,067,712	101,762	25
Total,				8,954,513	249,037	
The mean annual ratio of mortality is						28 per 1000.

* P. 129, 3d edit.

From this table, deduced from the observation of a large strength, and for a considerable number of years, we learn that the highest ratio of mortality among the slave population in the West Indies belonging to the British Government, occurs in the Island of Tobago, namely, 41 per 1000 annually; and in Grenada, which has the next highest ratio of mortality, it is 33 per 1000; from this it descends to 24 per 1000, which is the mortality occurring among the slave population in Antigua. The mean of the whole colonies is 28 per 1000, or 1 death out of every 35 annually.

The ratio of mortality among the slave population is therefore considerably higher than among the inhabitants of Great Britain. This was popularly attributed to the harsh treatment which the slave received, and the great fatigue he was forced to undergo when toiling in the field. But it may safely be assumed that these circumstances have little influence in raising the mortality, when it is known that the ratio of deaths among the native troops in the same colonies (who are well fed, and receive pay equal to the British soldier,) is much higher than that which occurs among their brethren in bondage. The following statement will render this obvious:—

Colony	Native Troops	Slave Population	Ratio of Mortality
Tobago	1000	1000	41
Grenada	1000	1000	33
St. Vincent	1000	1000	28
Antigua	1000	1000	24
Barbados	1000	1000	22
St. Kitts	1000	1000	21
Nevis	1000	1000	20
St. Lucia	1000	1000	19
St. Eustace	1000	1000	18
St. Pierre	1000	1000	17
St. Martin	1000	1000	16
St. John	1000	1000	15
St. Thomas	1000	1000	14
St. James	1000	1000	13
St. George	1000	1000	12
St. Andrew	1000	1000	11
St. Philip	1000	1000	10
St. Nicholas	1000	1000	9
St. George	1000	1000	8
St. Andrew	1000	1000	7
St. Philip	1000	1000	6
St. Nicholas	1000	1000	5
St. George	1000	1000	4
St. Andrew	1000	1000	3
St. Philip	1000	1000	2
St. Nicholas	1000	1000	1
St. George	1000	1000	0
St. Andrew	1000	1000	0
St. Philip	1000	1000	0
St. Nicholas	1000	1000	0
St. George	1000	1000	0
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TABLE IV.—Showing the Mean Strength and number of Deaths which occurred among the African Troops employed in the Windward and Leeward Islands, and Jamaica, during a period of nineteen years, (from 1810 to 1828,) together with the Annual Ratio of Mortality per 1000. *

Years.	Strength.	Deaths.	Ratio of deaths per 1000.
1810,	4841	163	33
1811,	4610	291	63
1812,	5143	281	54
1813,	4898	325	66
1814,	3661	266	72
1815,	5727	325	56
1816,	5319	450	84
1817,	2584	180	70
1818,	2299	98	39
1819,	1528	123	80
1820,	1414	59	41
1821,	1321	48	36
1822,	1306	65	50
1823,	1229	56	49
1824,	1185	22	18
1825,	995	29	30
1826,	1108	44	40
1827,	1163	54	46
1828,	1403	59	42
Total,	51,734	2938	
Mean of 19 years,	2723	154	56

From this table we learn that the mortality among the African troops varies considerably ;—thus, during the year 1816, it was 84 per 1000, while during 1824 it was only 18. Taking the mean of the preceding nineteen years, there was an annual mortality of 56 for every 1000 men, or 1 out of every 18. The mortality among the negro soldiers in the West Indies is, therefore, considerably higher than among the slave population of all ages ; and, as the rules of the service protect the soldier from receiving harsh treatment, we may conclude that the mortality among the slave population does not depend on any of the cir-

* Edin. Med. and Surg. Journal, Vol. xlv. p. 355.

cumstances which have been alleged, but on the unfavourable nature of the climate. A careful examination into the influence which the climate of the West Indies exerts on the negro population would be highly interesting, if viewed only as illustrating the natural history, and the influence of climate on man ; but it is also an important subject to the people of Great Britain, for, notwithstanding the means which have been adopted by Government to ameliorate the condition of the slave, it is a remarkable fact, that their numbers, year after year, are gradually decreasing ; and if the decrease continues in the same proportion which it has already been doing for the last twelve years, the negro population in the West Indies will soon be annihilated,—a fate which formerly befel the indigenous inhabitants of these islands. *

Prevalent Diseases in Tropical America.—The native tribes of America, according to Dr Rush and others, are subject to remittent and intermittent fever, dysenteries, and other diseases which attack Europeans under similar circumstances. The yellow fever seems to have been known in America long before the arrival of the Spaniards. It is the opinion of M. de Humboldt, from the information he obtained, that the pestilence which was termed Matlazahautl, and which ravaged the empire of Aztecas, before the arrival of the Spaniards, was the yellow fever.† M. Say and Professor Keating inform us, that the native tribes of America are subject to the same constitutional diseases as other races of men.

Having considered the ratio of mortality which occurs among the African population and negro soldiers in the West India Islands, I shall now briefly examine the rate of mortality occasioned by different classes of disease among the African troops ; and for this purpose the following statement is subjoined :

* There is an excellent paper on this subject, by Mr Tulloch, in the *British Annals of Medicine*.

† Prichard on Man, 3d edit. Vol. i. p. 159.

TABLE V.—Showing the annual ratio of Mortality per 1000 occasioned by each of the following classes of disease among the African troops in Jamaica, and the Windward and Leeward Islands, during a period of fifteen years (from 1817 to 1831.)*

Classes of Disease.	Annual ratio of mortality per 1000.	
	In Jamaica.	In Windward and Leeward Islands.
Fevers,	8.0	4.4
Diseases of the lungs,	9.8	16.6
of the liver,	0.5	1.0
of the bowels,	2.5	7.3
Cholera morbus,	0.2	0.1
Diseases of the brain,	0.9	1.3
Dropsies,	3.1	2.0
Other diseases,	5.0	7.3
Total,	30.0	40.0

Fevers.—From this table it appears that the annual ratio of mortality among the negro soldiers in Jamaica from fever, is 8 per 1000, and in the Windward and Leeward Islands 4.4. In Dr Alison's paper on Scrofulous Disease,† there is a communication from Dr Fergusson, Inspector of Hospitals, showing the mortality which occurred from March 1816 to March 1817 among the African troops in the Windward and Leeward Islands. The strength during that period was 5772, of whom 38 died from fever, which is about 6 deaths annually out of every 1000 men by this class of diseases.

It therefore appears that the negro race are not exempt from the fatal influence of fever, but it does not occasion nearly such a large mortality as occurs among Europeans residing in these islands. Dr Clark of Dominica, in describing the yellow fever which prevailed in that island in 1793-6, observes, that the "new negroes" who had lately been imported from the coast of Africa were all attacked by it, whereas the negroes who had been long in the town or the island escaped.‡

Diseases of the Lungs, it may be observed, occasion among

* Edin. Med. Journal.

† Transactions of the Medico-Chirurgical Society of Edin. Vol. i.

‡ Medical Tracts, Vol. viii.

the black troops in the Windward and Leeward Islands, 16 deaths annually out of every 1000 men; while in Jamaica the ratio of mortality from this class of diseases is about 10 per 1000. In Dr Fergusson's statement above alluded to, we find that, from March 1816 to March 1817, there occurred 128 deaths from pulmonic disease in the Windward and Leeward Islands out of 5772 black troops, which is 22 deaths per 1000 per annum. This ratio of mortality by pectoral diseases is somewhat higher than that indicated in Table V.; but Dr Fergusson's materials do not comprehend a longer period than one year. We learn from the above statement, that pectoral affections are by far the most destructive disorders among the African population in the West Indies. The evidence collected in the parliamentary documents attributes a large proportion of the deaths among the slave population to their peculiar liability to diseases of the lungs, particularly between the ages of 30 and 45. This may in some measure account for the high ratio of mortality we have estimated among the African soldiers who are generally about this period of life. From a calculation by Dr Clark, founded on data which relate to the British troops in the West Indies, it appears, that in every 1000 deaths among natives of Europe, 120 arise from pulmonic disease, while in every 1000 deaths among the blacks, 472 are attributed to the same cause. This predisposition of the negro race to consumption is not confined to those inhabiting the West India Islands, for it manifests itself in a still greater degree among the African population employed in Ceylon, and it has also been productive of a high mortality among those negroes inhabiting the tropical climate of the Mauritius.

When considering the prevailing diseases among the indigenous inhabitants of tropical Africa, we quoted the following passage from Dr Winterbottom's account of the native Africans in the neighbourhood of Sierra Leone: In regard to the prevalence of consumption among the Africans, he says, "As an idiopathic disease, I do not recollect to have seen a single case." From this statement it appears that the negro population in their native country enjoy a remarkable exemption from consumption.

To what cause, then, can we attribute the high ratio of mortality which occurs from pulmonary disease among the African population when they are removed to countries even within the tropics, having an equally high temperature compared with their native country? The climate of the West India Islands is considerably loaded with moisture: it may be a question for inquiry, whether an excess of moisture may not affect the constitution of the African more than a reduction of temperature. Mr Marshall, in a Geographical Sketch of the Distribution of Diseases,* states, "that even in Ceylon, where the mean temperature of the coast is $80\frac{1}{2}^{\circ}$ Fahrenheit, four-fifths if not nine-tenths of the mortality of Africans is occasioned by pectoral diseases, and chiefly by tubercular consumption." The saturated state of the climate of Ceylon with moisture, may be learned on referring to page 6 of this essay, where it is remarked that common salt deliquesces on exposure to the atmosphere, that glue loses its hold, and articles of furniture, where this substance has been used, sometimes fall to pieces. A high temperature appears not to be so essential to the health of the negro as has been generally supposed; for the Cape of Good Hope, latitude 34° , and the southern portions of the United States, are the only countries to which the African race has been transported where they seem to thrive and perpetuate the population,† although the mean annual temperature in these countries is much below that of their native land. It does not follow, however, that the negro will flourish in climates having a similar temperature, for at Gibraltar the mortality from disease of the lungs was very great, as will be illustrated in another part of this essay.

Diseases of the bowels among the negro soldiers, as will be observed in the preceding table, occasion a mortality of 7 men per 1000 in the Windward and Leeward Islands, while in Jamaica the ratio of mortality from disease of the bowels, is 2 per 1000. The ratio of deaths from cholera in both these stations is low. Diseases of the bowels are not nearly so fatal as consumption

* Edin. Med. Journal, Vol. xxxviii.

† Marshall's Parliamentary Digest. Martin's History of the Colonies. Mr Tulloch's Paper on the Slave Population.

among the negro soldiers. The abdominal disorders differ from the pulmonary in this respect, that the pectoral affections, from the evidence we can adduce, do not prevail among the Africans in their native country, but are engendered in the West Indies; whereas we have the testimony of Winterbottom and Oldfield, that the negroes on the African coast suffer greatly in unhealthy districts from dysenteries and diarrhoea.

Regarding the other diseases contained in the preceding table, there is nothing worthy of observation. Dropsies occasion a greater proportion of deaths among the Africans in the West Indies, than occurs among the inhabitants of London or the natives of tropical Asia.

Having considered the rate of mortality and prevailing diseases, as fully as the data will admit, among the indigenous inhabitants of tropical Africa and America, I now come to examine the ratio of mortality and prevailing diseases among the natives of tropical Asia.

c. Ratio of mortality in Tropical Asia.—With the exception of India, I am not aware of any statistical materials which are published, that would enable me to estimate the ratio of mortality among the indigenous inhabitants of tropical Asia.

The ratio of mortality which occurred among the native inhabitants of Madura and Dindigul provinces, in the peninsula of India, will be rendered obvious by the following statement:

TABLE VI.—Showing the Population and Deaths which occurred among the native inhabitants of two districts of the Peninsula of India for one year, extracted from the Medical Geographical and Agricultural Report by the Madras Government.

	Population.	Deaths.	Ratio of deaths per 1000.
Madura,	245,654	3933	16
Dindigul,	295,654	3438	11
Total,	541,308	7371	
Mean,			13

From this statement it will be observed, that the annual ratio of mortality of all ages among the population of Madura is 16 per 1000, and in Dindigul 11 : when we take the mean of these two districts, it will be remarked, that 13 deaths take place annually for every 1000 inhabitants, or 1 death for every 76. This is an exceedingly low ratio of mortality ; 4 per 1000 less than what occurs (as will be afterwards seen) among the population of England, as estimated from the census of 1821. As the materials from which this conclusion is deduced are not very extensive, nor the period of observation long, I am inclined to think some slight inaccuracy has crept into the data from which it has been drawn up. I regret not being able to adduce more extended observations on the rate of mortality among the population in some other district of India, so as to test the accuracy of the above table.* We may assume, however, that the ratio of deaths among the native troops will approximate in some degree to what happens among all ages ; and I shall now proceed to examine the ratio of mortality which occurs among the native troops in India.

The subjoined table will illustrate the mortality which occurs among the natives of India, from the age of 20 to 40, and was compiled by Mr Marshall from an abstract of the returns of the sick among the troops belonging to the Presidency of Fort St George for the year 1827, 1828, 1829, and 1830, published in the *Edinburgh Medical and Surgical Journal*, Vol. xxxix.

* Since writing the above I have learned that Colonel Sykes stated, in a paper read before the Statistical Section of the British Association, which met at Liverpool in September last, that in the four collectorates of the Deccan, within the province of Bombay, containing a population of above 3,000,000 of inhabitants of all ages, the annual ratio of mortality was 1 in 37, or 27 per 1000. He stated that this estimate was formed during an unhealthy season, and when the cholera was very prevalent, consequently no conclusion can be inferred from this regarding the average annual ratio of mortality. Colonel Sykes also gave some facts, showing the very low ratio of mortality among the native troops in India.

TABLE VII.—Showing the mean Strength of the Native Troops employed in the Presidency of Madras, during the year 1827–28–29 and 30, the number of Deaths and the annual ratio of Mortality per 1000 :

Years.	Strength.	Died.	Annual ratio of mortality per 1000.
1827,	84,128	1362	16
1828,	76,224	1129	14
1829,	71,945	841	11
1830,	67,106	709	10
Totals,	299,403	4041	
Mean of 4 years,	74,850	1010	13.5

We may remark, that the ratio of deaths among the native troops in the above table, corresponds with what has been estimated to occur among all ages in Madura and Dindigul. The ratio of mortality in these districts is rather below the mortality which occurred among the population in the Deccan, as stated by Colonel Sykes. There can be little doubt, however, that the rate of mortality is as low among the population in India as England, if we reason from the proportion of deaths which take place among the native troops; for the ratio of mortality among the native troops, as indicated in the above table, is considerably below that which occurs among the troops of Great Britain employed in their native country. It is, however, requisite to examine other materials referring to this subject, before we can speak with confidence. The following statement, showing the ratio of mortality among the native troops in Bengal, confirms the preceding statement. It was compiled by Mr Marshall from a "Report on the Medical Management of the native Jails throughout the Presidencies of Bengal and Agra. By James Hutchison, A. M. Secretary to the Medical Board of Bengal."*

* British Annals of Medicine.

TABLE VIII.—Showing the mean Strength of the Native Troops employed in the Presidencies of Bengal and Agra during the year 1833, the number of Deaths, and the ratio of Deaths per 1000 at each station.

Stations.	Strength.	Died.	Ratio of deaths per 1000.
Presidency,	1405	82	58
Barrackpore,	9649	188	19
Berhampore,	5762	76	13
Dinapore,	4280	54	12
Benares,	5169	40	7
Allahabad,	6000	33	5
Cawnpore,	12980	98	7
Meerut,	12728	80	7
Agra,	5269	40	7
Kurnawl,	7304	58	8
Sangur,	6367	44	6
Neemuch,	13162	162	12
Totals,	90075	955	
Mean ratio of deaths per 1000			10.6

We learn from this table, that in Bengal and Agra the total strength of the native troops in 1833 was 90,075, and the total deaths 955, which is an annual ratio of mortality of 10.6 per 1000 of the strength, or 1 out of every 100.

Again let us take Mr Annesley's return of the Madras army (native troops) for the year 1821, the strength of which was 82,046, and the deaths 1929, which is a ratio of 23 per 1000. This is a higher rate of mortality than that indicated in the two preceding tables ; but if we deduct from Mr Annesley's report 830 deaths occurring from cholera, which was endemic in 1821, the annual ratio of mortality will be reduced to exactly 14 per 1000.

From the data adduced in Table VI., we infer that the ratio of deaths among the indigenous inhabitants of Madura and Dindigul, (provinces situated in the tropical climate of Asia,) is not so high as that which occurs among the population of great Britain. This opinion is confirmed in a certain degree by the examination of the mortality which occurs among the native troops of India. From Tables VII. and VIII. it

appears that the mortality is from 3 to 4 per 1000 annually less than that which occurs among British troops stationed in Great Britain, and as these two classes of men are about the same period of life, and are similarly circumstanced in regard to everything but climate, they are fair subjects for comparison. We may rely, I think, on the accuracy of the results, as they are adduced from pretty extensive data, and from several years observation.

It therefore appears, that, although the tropical climate of India proves very injurious to the natives of a temperate zone, still it is peculiarly adapted to the indigenous inhabitants of the country, for the mortality is as low as that which occurs among the indigenous inhabitants of the most cultivated parts of Europe. This fact is opposed to the opinion of those who ascribe to the natives of a tropical climate, a much higher ratio of mortality than what usually happens among the indigenous inhabitants of temperate countries. On referring to page 12 of this essay, it will be observed that the above conclusion differs considerably from that estimated by Moreau de Jonnes. But we have already attempted to explain the cause of the high ratio of mortality, as indicated to have taken place among the inhabitants of tropical regions in Table II.

The next subject which comes under consideration is the most prevalent diseases among the indigenous inhabitants of Tropical Asia.

Prevalent Diseases in Tropical Asia.—I am not aware of there being any published materials showing the deaths which occur among the indigenous inhabitants of all ages in India from certain diseases, consequently I am unable to adduce any conclusions on this subject. The following table will, however, convey a very good idea of the amount of mortality caused by eight classes of disease among the native troops of India, compiled from an abstract of the returns of the sick troops belonging to the Presidency of Fort St George, for the years 1827-28-

29-30, published in the Edinburgh Medical Journal, Vol. xxxix. page 135.

TABLE IX.—Showing the principal fatal Diseases which occurred among the Native Troops employed in the Presidency of Madras during a period of four years, from 1827 to 1830 inclusive, together with the ratio of Mortality by particular classes of disease; the average annual strength being 74,850, for which see Table VII.

Classes of Diseases.	Fatal Diseases.	Died.	Tot. deaths by each class of diseases during 4 yrs.	Annual ratio of mortality per 1000.
Fevers,	Febris quot. inter. tertian, remittens, cont. com. ictorides,	745	745	2.5
Rheumatism,	Typhus et synochus,	239	239	0.8
Pectoral complaints,	Thoracic inflammation, Pneumonia, Hæmoptysis, Phthisis pulmonalis, Catarrh, acute, chronic,	184	184	0.6
Diseases of liver,	Asthma, Hepatitis acute, chronic,	63 29	29	0.1
Diseases of bowels,	Enteritis, Dysentery, acute, chronic,	29 436	495	1.1
Cholera morbus,	Diarrhœa, Colica,	30 990	990	3.3
Diseases of brain,	Apoplexia, Paralysis, Delirium tremens, Insanity, Cephalic inflammation,	51 11 9	71	0.2
Dropsies,	Anasarca, Ascites, Hydrothorax,	232	232	0.8
Injuries and ulcers,		248	248	0.9
Other diseases,		808	808	2.7
	Total.,	4041	4041	13.5

Fevers.—Under this head are included in the above table intermittent, remittent, &c. In some districts of India where fevers prevail among the natives, their production is supposed to be connected with emanations from the soil, defective crops, &c.; and they occur more frequently during the rainy season. Children, females, and those advanced in years are said to be in a certain degree exempt; but I am not aware of any published materials which would enable me to estimate the amount of mortality caused by fevers in the general population. Among the native troops in the Madras Presidency, it may be observed, in the preceding table, No. IX. that out of 74,850 men, the deaths from fever during one year were 185, which is 2.5 deaths for every 1000 of the strength. In Mr Annesley's work on the Diseases of India, the ratio of mortality from fever among the native troops in different stations, is estimated to have amounted in 1821 from 3 to 6 per 1000.

Pectoral complaints.—The indigenous inhabitants of the peninsula of India would appear to be little liable to pectoral disease; for out of 4041 deaths which occurred among the native troops in the Madras Presidency during four years, the total deaths from diseases of the lungs were only 184, which is an annual mortality of about 1 out of every 2000 men. This is very small compared with what occurs among the indigenous inhabitants of temperate countries. Thus, among the British troops quartered in Scotland, the mortality occasioned by pectoral disease is 4.6 per 1000 of the strength; and we have already stated how remarkably fatal pectoral complaints are among the African population in the West India Islands.

Diseases of the Bowels.—Dysentery occurs at all seasons of the year in India, and attacks indiscriminately natives and Europeans. In Table IX. it appears that diseases of the bowels occasion little more than 1 death annually out of every 1000 natives. This proportion, as will be afterwards taken notice of, is low when contrasted with the mortality occasioned by bowel complaints among the natives of temperate countries, residing in the tropical climate of India. The severity and prevalence of dy-

sentery among the native troops may be estimated from the circumstance, that the number of deaths in the Madras army during 1821 was 3 per 1000, and the proportion of deaths to the number treated, 1 in 12. Cholera morbus first attracted particular notice in India during the year 1817, since that period it has been frequently epidemic. In Table IX. the mean of four years gives an annual ratio of mortality from cholera of about 3 for every 1000 of the strength.

There are few deaths from *diseases of the brain* among the natives of India,—the annual ratio of mortality being only 0.2 per 1000, or 1 death annually out of every 10,000 men.

SECTION IV.—*On the Ratio of Sickness among the Indigenous Inhabitants of the Torrid Zone.*

The proportion which the sick bear to the healthy, is an interesting and highly important circumstance for estimating the influence of climate on the health of man. I regret, therefore, not having been able to obtain materials for the illustration of this subject, with the exception of some relating to the indigenous inhabitants of tropical Asia. These, however, are very limited, which prevents me entering on the consideration of the subject so extensively as its importance demands. The following tables are interesting, in so far as they furnish conclusions which we can compare with the ratio of sickness among the indigenous inhabitants of temperate climates. As I could obtain no data referring to the rate of sickness among all ages in India, the subjoined observations are confined to the native troops.

From an abstract of the returns of the sick of the troops belonging to the Presidency of Fort St George,* (Madras,) I have compiled the subjoined table, for the purpose of estimating the ratio of admissions into hospital among the natives of India.

* Edin. Med. Journal, Vol. xxxix.

TABLE X.—Showing the mean Strength of the Native Troops employed in the Presidency of Madras during the years 1827–28–29 and 30, the number of Admissions into Hospitals, together with the ratio of Sickness per 1000 of the strength.

Years.	Strength.	Total admissions into Hospitals.	Ratio of admissions per 1000.
1827,	84128	53221	632
1828,	76224	40848	536
1829,	71945	32982	458
1830,	67106	30745	450
Total,	299,403	157,796	
Mean of 4 years.	74850	39449	527

The above table may be thus read : During 1827 the strength of the native troops in the Presidency of Madras was 84,128, and the number of admissions into hospital during the year was 53,221—which being calculated shows there was annually 632 men out of every 1000 admitted into the hospital, and so on with the other years. From the examination of this table it may be observed, that the ratio of admissions among the native troops from an average of four years, was 527 annually out of every 1000 men, or that about one-half of the native troops in the Madras Presidency are liable to an attack of disease annually. To render this conclusion more satisfactory, it is necessary to state whether the attacks of the disease were of a severe or fatal nature. This question is ascertained by calculating the proportion which the deaths bear to the number treated, as may be seen in the following statement :—

TABLE XI. Showing the total Admissions into Hospital among the Native Troops employed in the Presidency of Madras during the years 1827-28-29, and 30,—the number of Deaths, together with the proportion which the deaths bear to the number treated, compiled from the sick returns above-mentioned.

Years.	Admissions into Hospitals.	Number of deaths.	Intensity of disease.
1827,	53,221	1362	1 death in 39 treated
1828,	40,848	1129	1 in 36
1829,	32,982	841	1 in 39
1830,	30,745	709	1 in 43
Total and mean	157,796	4041	1 death in 39 treated.

By this table we learn what may be denominated the intensity or severity of the disease among the native troops in the Madras Presidency. Thus, in 1827, there was one death for every 39 treated; in 1828 1 death for every 36 treated, &c.

The average of four years shows that 1 death occurred for every 39 admissions into hospital.

The preceding materials, although limited, will convey a good idea of the number of cases, and severity of the diseases which occur among the indigenous inhabitants of India, between the age of twenty and forty. There is another question relating to the subject under consideration of no less interest than the above. I allude to the mean sick, or the number of men constantly sick and unable to perform their daily labour. From a report by Mr Hutchison on the native jails throughout the Presidencies of Bengal and Agra, the following table is compiled, which will render obvious the number or proportion constantly sick among the native troops in these Presidencies :

TABLE XII.—Showing the mean Strength of the Native Troops employed in the Presidencies of Bengal and Agra during the year 1833, together with the mean number of Sick, and the ratio of Sick per 1000 at each station.

Stations	Strength.	Mean sick.	Ratio of sick per 1000.
Presidency, -	1,405	144	103
Barackpore, -	9,649	814	84
Berhampore, ..	5,762	290	50
Dinapore, -	4,280	187	43
Benares, -	5,169	263	50
Allahabad, -	6,000	284	47
Cawnpore, -	12,980	488	37
Meerut, -	12,728	466	36
Agra, -	5,269	182	34
Kurnawl, -	7,304	225	30
Sangur, -	6,367	329	51
Neemuch, -	13,162	566	43
Total and mean, -	90,075	4238	47

The above table may be thus read : The strength of the native troops in the Presidency station, during the year 1833, was 1405, and the number constantly confined to hospital, 144, which being calculated, shows a ratio of 103 constantly sick out of every 1000 men, and so on. It will also be observed in this table, that the number constantly sick varies at different stations, being highest in the Presidency station, and lowest in Kurnawl. Taking the mean, we find there was 47 constantly sick out of every 1000 native troops in the Presidencies of Bengal and Agra. When we estimate the ratio of sickness among the natives of temperate climates, and the proportion which the number constantly sick bear to the healthy, some conclusion may be drawn in regard to the question, whether the sickness among the indigenous inhabitants of tropical climates is greater than among the natives of the temperate zones ?

SECTION V.—*On the Influence of the Seasons in a Tropical Climate on Health and Mortality.*

The only method by which we can estimate the influence of

the seasons on health and mortality, is by compiling such facts as show the number of attacks of disease, and the number of deaths which occur during the different months of the year. Were we able to obtain accurate monthly returns of the sickness and mortality which takes place in different climates, it might enable us to appreciate the influence which certain seasons, and the meteorological changes of the atmosphere, have on the health and mortality of the human race. I have entered on the examination of this subject more for the purpose of following out the general plan of the essay, than from being able to adduce any satisfactory results, owing to the want of materials. Under this head, the influence which the seasons have both upon the natives of the torrid and the natives of the temperate zones are considered.

The following Table, XIII., compiled from Mr Annesley's work on the Diseases of India (London, 1825,) will show the influence of the seasons on the number of sick.

A.

B.

Out of 3149 admissions into hospital among the native troops in the Presidency division of Madras during the year 1815, the number and the relative ratio of admissions per 1000 in each month were as follows :			Out of 3017 admissions into hospital among the British troops in the Presidency division of Madras during the year 1815, the number and the relative ratio of admissions per 1000 in each month were as follows :		
Months.	Number of admissions.	Relative monthly ratio of admissions per 1000.	Months.	Number of admissions.	Relative monthly ratio of admissions per 1000.
January,	394	125	January,	223	74
February,	199	63	February,	194	64
March, -	190	60	March, -	212	70
April, -	152	48	April, -	223	74
May, -	171	54	May, -	253	84
June, -	267	85	June, -	263	87
July, -	328	104	July, -	330	109
August, -	294	93	August,	243	81
September,	233	74	September	221	73
October,	354	113	October,	318	105
November,	293	94	November	246	82
December,	274	87	December,	291	97
Total,	3149	1000	Total,	3017	1000

The above table, A, may be thus read : Of every 1000 ad-

missions into hospital among the native troops in the Madras Presidency, 125 occur in January, 63 in February, 60 in March, and so on. The other table, B, shows, that of 1000 admissions into hospital among the British troops, 74 occur in January, 64 in February, 70 in March, &c. From these tables we learn that July, August, October, and January, are the months during which the number of admissions into hospital are greatest among the indigenous inhabitants of India; and that July, October, and December, are the most sickly months among the natives of Great Britain residing in that climate.

As the endemic causes of disease are so destructive to British troops in the West India Islands, it will be interesting to learn what season of the year proves most generally fatal. This is well illustrated by the following table:

TABLE XIV.—Showing that out of 24,916 deaths occurring among the British troops serving in the Windward and Leeward Islands, the number and the relative ratio of deaths per 1000 in each month were as follows: *

	Number of Deaths.	Relative ratio of deaths per 1000.
January, -	1614	65
February, -	1197	48
March, -	1036	42
April, - -	1429	57
May, - -	1459	59
June, - -	1724	69
July, - -	2253	87
August, - -	2991	119
September, -	2826	114
October, -	3279	133
November, -	2712	109
December, -	2402	97
Total, -	24916	1000

From this table, we may conclude that the greatest mortality takes place among the natives of Great Britain residing in the West Indies, during the months of August, September, October, and November; and that January, February, March, April,

* Farr's Medical Almanack, 1837, p. 185.

May, June, and July, are the most healthy months. The data from which this opinion is formed being extensive, we can therefore with safety draw the following conclusion :

Much discussion has taken place regarding the cause of disease in the West India Islands. It has been stated that intemperance is one of the most powerful. Intemperance cannot fail to occasion much injury to the constitution ; but the above table furnishes sufficient evidence against the inference that intemperance is the principal cause of the mortality ; for if the mortality were induced by any accidental cause, such as intemperance, why does it happen that such a variation occurs in the amount of the monthly mortality ? Thus the deaths are three times more numerous during October than March ; and I cannot find it stated that the soldier is less given to intemperance during March, when the mortality is lowest, than in October, when it is highest. We may therefore conclude, that the insalubrity of the West Indies depends chiefly upon some permanent cause, which, in all probability, exists in the atmosphere.

CHAPTER II.

An Account of the Climate of the Temperate Zones, in so far as regards the Health of Man—Indigenous Inhabitants—Ratio of Mortality, and Prevailing Diseases.

HAVING submitted these observations regarding the climate and mortality of the inhabitants within the tropics, I now proceed to give a brief account of the climate of the temperate zones, indigenous inhabitants, ratio of mortality, and prevailing diseases, in a manner similar to that which has been adopted in the preceding chapter.

The temperate regions extend from the $23\frac{1}{2}^{\circ}$ to the $66\frac{1}{2}^{\circ}$ of latitude, on each side of the equator, consequently there is one in the northern and one in the southern hemisphere. There is a much larger proportion of land in the northern than in the temperate zone of the southern hemisphere. The northern temperate zone comprehends a large portion of Europe, Asia, and Ame-

rica, with a part of Africa. The southern temperate zone comprehends only a small part of South America, a few degrees of the southern point of Africa, and about one-half of New Holland.

SECTION I.—*Climate of the Temperate Zone, Northern Hemisphere.*

As was formerly observed, the principal obvious agents which influence a climate are, temperature, fall of rain, and prevailing winds. We shall therefore examine the

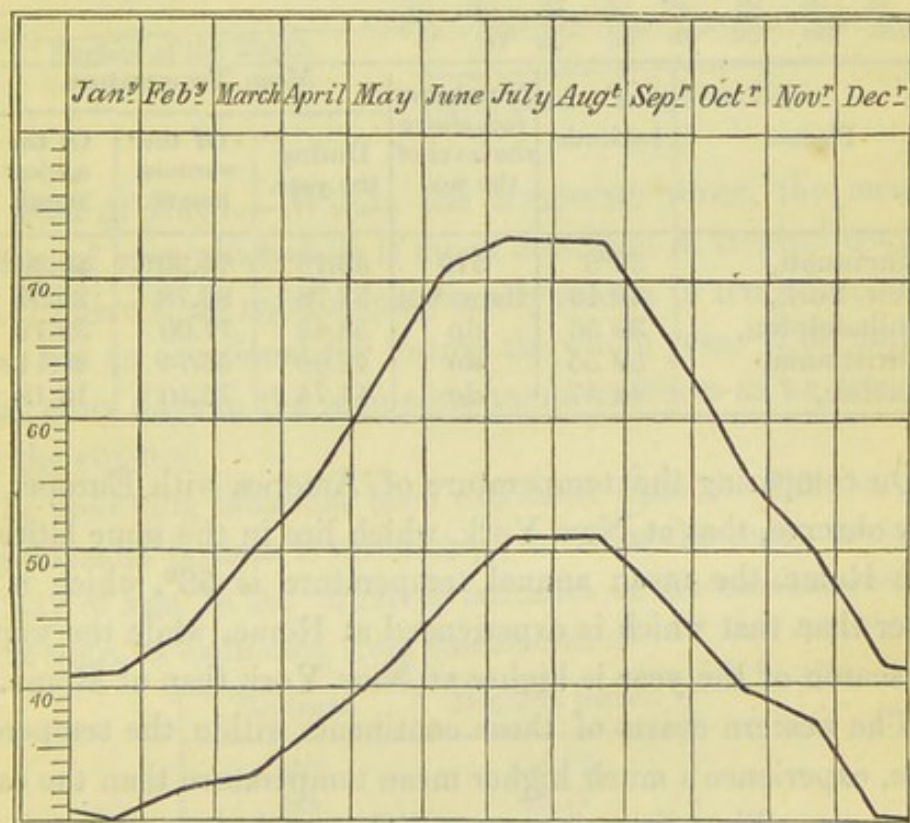
a. Temperature of the Northern Temperate Zone.—Europe possesses a warmer climate along its western coasts, than is experienced in corresponding latitudes of America or Asia.

The subjoined Table XV. extracted from the Metropolitan Encyclopædia, shows the mean annual temperature in several European countries, together with the mean temperature of the warmest and coldest month.

Places,	Latitude.	Number of feet above the level of the sea.	Mean temperature.		
			During the year.	Of the warmest month.	Of the coldest month.
Rome,	41°53'	none.	60°	77.00°	42.26°
Montpelier,	43 36	do.	59	78.08°	42.08
Milan,	45 28	do.	55	74.66	36.14
Brussels,	50 50	do.	51	67.28	35.60
Amsterdam,	52 22	do.	51	66.92	35.42
London,	51 30	do.	50	64.40	37.76
Paris,	48 50	222	51	65.30	36.14
Vienna,	48 12	420	50	70.52	26.60
Berne,	46 5	1650	49	67.28	30.56
Dublin,	53 21	none.	49	61.16	35.42
Warsaw,	52 14	do.	48	70.34	27.14
Edinburgh,	55 57	do.	47	59.36	38.30
Copenhagen,	54 41	do.	45	65.66	28.14
Moscow,	55 45	do.	40	70.52	6.08
St Petersburg,	54 56	do.	38	65.66	8.10
Hospice de St Gothard,	46 30	6390	30	46.32	15.08

This table affords a comprehensive and accurate statement of the mean annual temperature at a number of places in Europe, together with the temperature of the warmest and coldest month during the year. We learn that at Moscow, latitude 55° , the mean temperature during the year is 40° , and the mean temperature of the warmest month is 70° Fahr. which is nearly as high as the temperature of the warmest month at Milan, latitude 45° .

The subjoined diagram shows the highest and lowest temperature of each month, as found from observations made in London from 1817 to 1823 : *



At page 4 we inserted a diagram, which may be consulted regarding the mean temperature of each month in Great Britain. The mean greatest temperature indicated in the above sketch is 57° , and the greatest cold 40° , consequently the difference is 17° of Fahrenheit's scale. The highest temperature during the five

* Howard on the Climate of London, Vol. i. p. 53.

years above given was 73° , which occurred in July and August, and the lowest temperature, 31° Fahr. occurred in January.

The continent of North America extends but a few degrees into the torrid zone, but far into the frigid, hence a polar climate approaches the very confines of the tropics, and here winter and summer struggle for the ascendancy. Thus in the United States it is not uncommon for the temperature to vary from 20° to 25° during the course of the day.

The following Table XVI. shows the mean annual Temperature, and the mean Temperature of the warmest and coldest month in five different places of North America.

Places.	Latitude	Number of feet above the level of the sea.	Mean Temperature.		
			During the year.	Of the warmest month.	Of the coldest month.
Cincinnati,	$39^{\circ}6'$	510	53.78°	74.30°	30.20°
New York,	40 46	Sea coast	53.78	80.78	25.34
Philadelphia,	39 56	do	53.42	77.00	32.72
Christiania,	59 55	do	42.80	56.74	28.41
Quebec,	46 47	do	41.74	73.40	13.18

On comparing the temperature of America with Europe, we may observe, that at New York, which lies in the same latitude with Rome, the mean annual temperature is 53° , which is 7° lower than that which is experienced at Rome, while the warmest season of the year is higher at New York than at Rome.

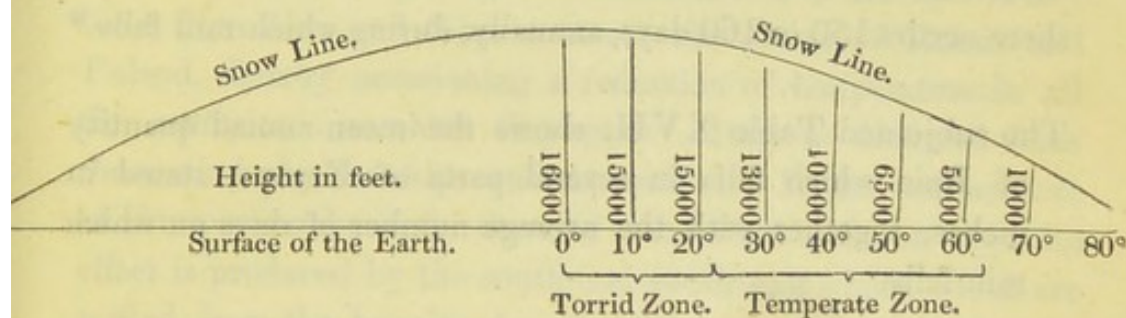
The western coasts of those continents within the temperate zone, experience a much higher mean temperature than the eastern coast. Thus there is a great difference between the temperature of the western coast of North America, and that of the opposite coast of Asia.

It was stated when considering the temperature of the torrid zone, that 100 yards of ascent occasions a decrease of 1° of temperature; but in temperate countries, we require to ascend only 90 yards in order to cause the thermometer to fall 1° .

The snow line ranges, within the temperate zones, from 5000

to 15,000 feet above the level of the sea. This line in the torrid zone, where the variations of temperature are inconsiderable during the year, is strongly marked; but in temperate latitudes, from the comparative warmth of different seasons and years, it becomes an oscillating line.

The follow sketch is intended to show this line over the surface of the globe.



b. Fall of Rain.—Within the temperate zones, the mean quantity of rain which falls is much less than in tropical countries. There is no regular rainy or dry season in temperate climates, but an occasional fall during the whole year. The number of rainy days in the temperate zones increases as we recede from the equator.

The following table has been extracted from the Edinburgh Encyclopædia (article Hygrometry,) to show the mean annual quantity of rain in the different latitudes of the northern temperate zone, as estimated from calculation :

Latitude.	Depth in inches.
25°	55.12
30	46.77
35	40.58
40	34.92
45	29.77
50	33.36
55	21.72
60	18.69
65	16.32

This table, it is stated, coincides very nearly with observations made in these latitudes.

M. Schow estimates 25 inches as the ordinary quantity of rain falling annually in that part of Europe north of the Alps. To the south of these mountains, he has estimated it at 35 inches. Rain descends more slowly and uniformly in countries to the north than to the south of the Alps. In the southern countries of Europe, the descent of rain resembles in some degree that of tropical regions; the number of rainy days during a year do not exceed 90 or 100; while in countries to the north of the Alps, there occurs 150 or 160 days, annually, during which rain falls.*

The subjoined Table XVII. shows the mean annual quantity of Rain which falls in several parts of Europe, stated in inches, together with the average number of days on which rain falls.

Places.	Mean annual quantity of rain in inches.	Number of days in which rain falls.	Names of observers and periods of observation.
London,	24	178	Howard, 20 years.
Edinburgh,	23	...	Adie, 1824-25.
Kinfauns,	24	137	Lord Gray, 1824-25.
Bristol,	31	...	Dr Cole.
Sidmouth,	27	135	Dr Clark, 1813-1814.
†Paris,	18	...	Dalton, 15 years.
Toulouse,	25	...	
Montpelier,	29	82	Poitevin, 1796-1806.
†Marseilles,	15	55	Blanpain, 10 years.
Turin,	32	...	Vassali Eandi, 1803-18.
Florence,	31	103	Ximinian Observatory, 1824-25.
†Rome,	31	117	Calandrelli, 1811-1825.

The most copious rains in Europe are in the months of June, July, and August. The most permanent rains in Great Britain come from the southern regions.

I have been unable to procure any satisfactory materials relating to the quantity of rain which falls in the temperate latitudes of North America and Asia.

* Malte Brun's Geography, Vol. vi. p. 150.

† The rain-gauge stood at those places where this mark is placed, at a considerable height above the ground.

e. Prevailing Winds.—In this zone, the direction of the winds is by no means so regular as within the tropics. They seem to obey no fixed laws, for even in the same latitude we find them often blowing in different directions, while their change is so sudden that we can offer no good reason for it; the effect of winds in modifying the temperature of a country must be considerable.

An east and a north-east wind are common to Europe. They blow from Asia and Siberia, across the plains of Russia and Poland, thereby occasioning a reduction of temperature in all the countries over which they pass. Italy is sheltered from these winds by the Alps and Apennines. If the temperature of Europe is reduced by the cold wind from Asia, an opposite effect is produced by the south and south-east winds, which are wafted from the burning deserts of Sahara, and the arid rocks of Nubia and Egypt, to the shores of southern Europe. This wind would be oppressive were its temperature not reduced during the passage across the Mediterranean. But this does not entirely subdue it, for the coast of Spain is subject to a sultry and unwholesome wind called the Solano, and hence the frequent degree of dryness to which the Mediterranean coast is liable.*

There is a constant movement in the air, caused by the continental and oceanic atmosphere having different temperatures. Thus, Great Britain and most of the north-western countries of Europe have northerly and easterly winds frequent during March, April, and May, owing to the current flowing to replace the warmer air as it rises from the surface of the Atlantic and more southerly countries of Europe.†

In Great Britain, upon an average of ten years, westerly winds exceed the easterly in the proportion of 225 to 140, and upon the same average the northerly winds are to the southerly as 192 to 173.‡

* Malte Brun, Vol. vi.

† Thomson's Chemistry.

‡ Daniell's Meteorology.

Asia has no sea on its western side, consequently the north-east winds which predominate, blow over the land during the greater part of the year. This quarter of the globe, like America, extends far into the polar regions, and is continuous with Europe. Owing to this proximity, the temperature of some European countries is greatly reduced. For example, on the western coast of France, lat. 48° , the mean temperature of the year is the same as at Pekin, the latitude of which is 40° . The mean temperature of the winter months is $14\frac{1}{2}^{\circ}$ higher on the coast of France than at Pekin.

SECTION II.—*Climate of Temperate Zone, Southern Hemisphere.*

This zone, as we before stated, contains only a small portion of land, namely, part of South America, about one-half of New Holland, and a small portion of Africa.

a. Temperature of the Southern Temperate Zone.—It is generally thought that the mean annual temperature of this zone is considerably lower than that of the temperate zone, northern hemisphere,—the difference amounting at least to 10° of Fahrenheit's scale. This diminution of temperature is supposed to arise from the very unequal distribution of sea and land, which tends to equalize the seasons and diminish the annual temperature; and hence the polar ice advances nearer the equator in this zone than in the northern. It is not here meant that the cold at 30° south latitude is greater than at 30° north latitude, but that the division of heat between the different seasons of the year gives to the southern zone a climate similar to that of insular regions. Thus the inhabitants of 46° and 50° south latitude, have summers equal in temperature to that which is experienced in the northern hemisphere at 35° and 40° of latitude.*

* Prout's Bridgewater Treatise.

Baron Humboldt, who has made numerous observations on this subject, thinks that the temperature of this zone is even more than 10° less than the temperate zone, northern hemisphere. But from the observations lately made by Captain Scoresby and Captain Weddell, we learn that the supposed difference in the temperature of both hemispheres in the higher latitudes, does not exist in *the open sea*; and as most of Humboldt's facts were collected from experiments made near the shores of America, we can have no doubt that this circumstance must materially diminish the temperature in the adjacent sea, and of course affect his conclusions. We are unacquainted with the mean annual temperature of the southern zone beyond 51° of latitude, (Falkland Islands.)

b. Fall of Rain.—I am not aware of any observations on this point which are published.

c. Prevailing Winds.—It is probable that the winds are more constant in the south temperate zone, which in a great measure is covered with water, than in the north, where their direction must be so frequently altered by mountains and coasts; but on this point we cannot speak with certainty.

SECTION III.—*Indigenous Inhabitants of the Temperate Zones.*

The next subject to be considered is the indigenous inhabitants of the temperate zones.

a. Temperate Zone, Northern Hemisphere.—I have already stated that a greater proportion of terra firma is situated in this zone than in the southern, and that it contains the temperate parts of Europe, Asia, North America, and part of Africa.

The boundaries of Europe are well known. Its surface extends over 2,793,000 geographical square miles, and contains a popu-

lation of 227,700,000 inhabitants. Europe is peopled by the Caucasian variety of man, which is characterized by a white skin (either with a fair rosy tint or inclining to brown;) brownish hair, sometimes dark, copious, and soft; head of a square form, with features moderately separate from each other; expanded forehead; front teeth of both jaws perpendicular; lips gently turned out, and chin full and rounded. The Caucasian variety includes all the ancient and modern Europeans, with the exception of the Laplanders and the rest of the Finnish race.

For the last 2500 years, Europe has been inhabited by the Celtic, German, and Slavonic races, which, although distinguished from each other by their language, physical and intellectual characters, evidently belong to the Caucasian variety. The Celtic races inhabit the west of Europe. They formed the ancient and modern inhabitants of France, Spain, Portugal, and the greater part of Italy, the ancient Britons, Welsh, Bretons, Irish, Scotch, and Manks. They are characterized by having black hair verging to brown.

The German race inhabits the central parts of Europe, and includes the Swedes, Norwegians, Icelanders, and Danes, the ancient and modern Germans, Saxons, English, Picts, and Lowland Scotch, the inhabitants of the Low Countries, the Vandals and Goths. They are distinguished by having blue eyes, yellow or reddish hair, with fair and red skin.

The third European race is the Slavonic, which embraces the Russians, Poles, Lithuanians, and all who speak the Slavonic language. The Slavonic race is characterized by dark hair and eyes, and they have a darker colour of skin than that of the Germans. The Laplanders and Samoiedes are sprung from the Mongolian variety.

Temperate Asia.—The indigenous inhabitants of Western Asia, extending from the Caspian sea to the Ganges, are of the Caucasian variety. They were in ancient times denominated Assyrians, Medes, Chaldeans, Sarmathians, Parthians, &c. &c. The several tribes occupying the chain of the Caucasus, as the

Georgians, Circassians, Armenians, Turks, Persians, &c. are also Caucasians.

The middle and northern parts of Asia are peopled by the Mongolian variety, usually denominated Tartars, characterized, as we before-mentioned, by an olive colour of skin, black eyes, black, straight and thin hair. This variety is subdivided into numerous tribes, who generally lead pastoral lives. The inhabitants of that part of Africa comprehended in the north temperate zone, who are usually denominated Arabians and Egyptians, are said to have the physical characters of the Caucasian race.

The indigenous inhabitants of temperate North America have the characteristic copper or bronze colour, which is confined to the New World.

b. Temperate Zone, Southern Hemisphere.—This zone comprehends but a very small portion of terra firma, namely, about one-half of Australasia, and a few degrees of the extremities of Africa and America. These three parts of the world contain few inhabitants; and, so far as my reading extends, I have not been able to acquire any thing of much importance, respecting the inhabitants, in so far as regards the ratio of mortality which occurs amongst them.

SECTION IV.—*On the ratio of Mortality which occurs among the Indigenous Inhabitants of the Temperate Zones, with some observations on the prevailing Diseases.*

1. *Northern Temperate Zone.*

Ratio of Mortality in Europe.—In the following account of the ratio of mortality which takes place among the inhabitants of the different countries of Europe, I have endeavoured to be very general, for the purpose of keeping this essay with-

in moderate bounds; my object being to give an outline of the plan of the essay, rather than a detailed inquiry into any particular part. Within the limits of Europe the difference of mortality is considerable. In some instances, according to the calculation of M. Moreau de Jonnés, the rate of mortality, and inversely the duration of life, differ by one-half from the proportions found in other countries of Europe. This will be elucidated in the following table, the materials of which are extracted from a table presented by M. Moreau de Jonnés to the Institute, and Dr Hawkins' work on medical statistics.

TABLE XVIII.—Showing the annual ratio of Deaths, together with the annual ratio of Mortality per 1000, which occurs in the under-mentioned countries of Europe.

Countries.	Period of observation.	Ratio of deaths.	Annual ratio of mortality per 1000.
Russia,	1829	1 death in 26 inhab.	or 38
Roman States,		1 28	35
Spain,		1 30	33
Two Sicilies,		1 31	32
Wirtemberg,		1 33	30
Naples,	1825 to 1827	1 34	29
France,		1 40	25
Prussia,		1 39	25
Holland,		1 40	25
Austrian }		1 43	23
Empire, }	1825 to 1830	1 45	22
Lombardy,		1 45	22
Sweden,	1821 to 1825	1 45	22
Denmark,	1819	1 45	22
Germany,	1825	1 45	22
Canton de }	1824	1 47	21
Vaud, }		1 51	19
England,	1821	1 51	19

This table shows that England has a lower ratio of mortality than any of the European countries above enumerated. It may not be out of place to remark, that those spots most celebrated on the continent as the fountains of health, and which have been long resorted to by invalids, are in fact more fatal to their in-

habitants, than even the city of London. Norway, Canton de Vaud, Denmark, and Sweden follow next to England in this respect. Russia has the highest ratio of mortality in Europe, namely, 38 deaths annually for every 1000 inhabitants, which is more than double that of England.

It will be interesting to know whether the mortality in the cities of Europe, corresponds to what happens among the whole inhabitants of the country. I have with this view subjoined the following

TABLE XIX.—Showing the ratio of Mortality per 1000, in the under-mentioned cities of Europe.

Cities.	Ratio of deaths.	Annual ratio of mortality per 1000.
Vienna,	1 death in 22 inhab.	45
Amsterdam,	1 24	41
Rome,	1 25	40
Brussels,	1 25	40
Naples,	1 28	35
Madrid,	1 29	34
Nice,	1 31	32
Paris,	1 32	31
Strasburg and Lyons, }	1 32	31
Berlin,	1 34	29
Leghorn,	1 35	28
Liverpool,	1 40	25
Geneva,	1 43	23
London,	1 46	21
Manchester,	1 50	20

We may conclude from the above table, that the ratio of mortality is higher in cities than in the general population of countries. In the county of Middlesex, which includes London, the deaths are annually 1 in 47, or 21 per 1000, while in Sussex, a purely rural district, they are 1 in 72, or 13 per 1000.

The greater fatality of towns than the country will be rendered obvious by taking, for example, the mortality among the inhabitants of Belgium. *

* Quetelet sur l'Homme, page 139.

Thus in towns the annual mortality is 1 in 36, or 27 per 1000 ;
Whereas in the country it is 1 in 46, or 21 per 1000.

The earliest account we have of the mortality in England is for the year 1349. This related to the plague which spread from Asia over all Europe. It is estimated that one-half of the population of England then perished. But we have no good data on this subject until a very recent period.

The ratio of mortality has been gradually decreasing in England since 1780, as may be concluded from the following table, showing the annual ratio of mortality, and the annual ratio of deaths per 1000, as calculated from the returns obtained under the population acts.

In 1780, the deaths were 1 in 40, or 25 per 1000.

1790,	1	45,	22	do.
1801,	1	47,	21	do.
1811,	1	52,	19	do.
1821,	1	51,	19	do.

This diminution of the ratio of mortality in England indicates the influence of some gradually operating cause. The decreasing mortality in cities has materially assisted in occasioning this effect. Thus in 1697 the total deaths in London were 21,000, whereas 100 years afterwards, or 1797, when the population had greatly increased, the deaths were only 17,000. From 1720 to 1750 the mortality in London was estimated at 1 in 20 ; at present it has decreased to 1 in 46. Again, Manchester has more than quadrupled its inhabitants since the middle of last century, but notwithstanding this the mortality has declined from 1 in 25 to 1 in 50.

Military returns possess a degree of accuracy which cannot be obtained in the statistical investigation of the whole inhabitants of a country. They are also the best materials for estimating the influence of climate on the mortality, sickness, and health of man. The men of one regiment in different countries are similar in age,—at least they are at the most vigorous and active period of life,—their food, exercise, and general habits are similar, so that when we find the mortality is higher among

the troops of one country than another, we can safely attribute it to the influence of climate. For "to enable us to deduce the effect of climate upon mortality, from the observed relations between the annual deaths and the population in different places, those places (in regard to the condition of the inhabitants) should be circumstanced as similarly as possible in every other respect, but should differ considerably in climate." * For the purpose of comparison, the following statement of the mortality which occurred among British troops serving in the united kingdom is subjoined.

TABLE XX.—Showing the Mean Strength and the annual ratio of Mortality per 1000, which occurred among British Troops stationed in Great Britain and Ireland, together with the periods of observation.†

Station.	Mean annual strength.	Period of observation.	Annual ratio of mortality per 1000.
Great Britain,	46,460	10 years	15
Ireland, -	39,921	32	15
Scotland, -	2,975	7	11

The mean age of British soldiers is about 28. From this statement we learn that the ratio of deaths during this period of observation, was lower in Scotland than in Great Britain or Ireland.

The mortality in the British army stationed in Great Britain, is therefore about 15 per 1000 annually. This is a lower ratio of mortality than that of the general population. But as the age of soldiers extends only from 20 to 40, it is necessary, before drawing any conclusion, to estimate the ratio of deaths among the civil population during this period of life. From the Carlisle Tables, we find that the annual ratio of deaths among people from 20 to 40 years of age is about 10 deaths annually out of every 1000. This statement shows that there is an excess of mortality among the troops over the civil popu-

* Milne on Annuities, Vol. ii. p. 786. † Edin. Med. Journ.

lation of 5 per 1000 annually. To what cause can we attribute this high mortality among the troops over the civil population, for it is known that the soldier is better fed, better clothed, and less laboriously employed than the great proportion of the labouring classes?

On the continent of Europe, a reduction of the ratio of mortality among the general population has also taken place since 1770, although not in an equal degree with that of the united kingdom. Thus in France the annual ratio of deaths

In 1781 was 1 in 29, or 34 per 1000.

1801 1 in 30, or 33 do.

1823 1 in 40, or 25 do.

In Paris, about the middle of last century, the ratio of deaths was 1 in 25, or 40 per 1000, while at present, as may be seen in Table XIX. it is 31 per 1000.

The limits of this essay will not permit me to enter more minutely into the examination of the mortality of Europe. It is gratifying to think that the industry of man in cultivating the soil, modifies the climate and reduces the ratio of mortality. Macchiavelli has anticipated this result; for he observes, that "unhealthy countries become wholesome by the multitude of men who inhabit them, who at the same time are occupied in cultivating the earth, and who make the earth salubrious. The fires which they kindle purify the air. These advantages nature herself does not produce."* We have numerous instances of the truth of this remark. At Guiana, in South America, situated within 5° of the line, the inhabitants, surrounded on all sides by immense forests, were a century ago obliged to alleviate the cold of their climate by evening fires. But by clearing the country of wood, the temperature has been increased, so that a fire would now be oppressive.†

Europe has also had its climate materially altered in modern times. We are told by Cæsar that the vine could not be cultivated in Gaul on account of the severity of the winter. The

* Hawkins' Medical Statistics, p. 202.

† Ure's Dictionary of Chemistry, 3d edit. p. 329.

rein-deer, now found only in Lapland, was then an inhabitant of the Pyrenees. The Tiber was frequently frozen over, and snow for several weeks covered the ground around Rome, which almost never happens in modern times.*

From the nature of the climate of Europe during the period above alluded to, we have little doubt that the ratio of mortality was higher, and the period of life shorter than what is experienced among the inhabitants at present occupying the greatest portion of Europe. This fact will be rendered obvious by the following statement :

TABLE XXI.—Showing the expectation of Life in Ancient Italy, as given by Ulpian, the expectation of Life in England, as deduced from the Carlisle Tables, and in France as deduced from the Table of M. Duvillard.

Age.	Expectation of life in Ancient Italy.		Expectation in England.		Expectation in France.	
	Years.	Months.	Years.	Months.	Years.	Months.
20	30		41	6	34	3
25	28		37	10	31	4
30	25		34	4	28	6
35	22		31	0	25	9
40	20		27	7	22	10
45	14		24	5	20	3
50	9		21	1	17	6
55	7		17	6	14	11
60	5		14	4	11	0

From this table we learn that the ancient inhabitants of Italy had not so long a life, nor did so large a portion of their population survive beyond 60 years of age, as at present happens in England and France. In ancient Italy, at 40 years of age, the expectation of life was 20 years ; in England at present it is 27 ; and in France 22. At 60 years of age, the expectation of life in ancient Italy was 5 years more ; in England at present it is 14 ; and in France 11.

It may not be out of place here to remark, that the low estimated ratio of mortality in England, compared with other

* Ure's Dictionary of Chemistry, 3d edit. p. 329.

European countries, may be partly attributed to its high state of cultivation, and to the general population enjoying better food, clothing, and accommodation, than the poorer classes on the continent of Europe. That an easy and affluent condition has a powerful conservative influence, is well illustrated by the mortality among those insured in the Equitable Office. Thus, from 1800 to 1821, the annual deaths did not exceed 1 in 81, or 12 per 1000; and at the University Club, for a space of three years, the deaths did not exceed 1 in 90, or 11 per 1000.

I shall now make a few observations on the most *Prevalent Diseases in Europe*.

In the following pages, I have endeavoured to show the annual ratio of deaths from particular classes of disease, as often as the data would admit. The difficulty of obtaining the number of the population, and the number of deaths by each disease in different countries, (two requisites absolutely necessary in calculating the ratio of deaths by each class of disease,) have rendered the following observations of a very limited nature. I am quite aware that information on these two points could have been ascertained by more extended research, but the magnitude and variety of the subjects included in the plan of this essay necessarily prevented me from going more into detail.

The idea of keeping a registration of the births, deaths, and diseases which occur among the entire population of a country, originated in the days of Bacon. The London Bills of Mortality (from which I have calculated the following tables,) are founded on the reports of sworn searchers, who viewed the body after death, and delivered their report to the parish-clerk. These reports began on the 21st December 1592, and in 1594 the weekly amount of deaths was first made public. This publication of the weekly deaths, was, in December 1595, discontinued on the ceasing of the plague: in 1603, they were resumed, and have been kept regularly ever since. Although the means adopted for obtaining a return of the nature of the diseases which prove fatal, renders the bills of mortality somewhat liable to error, they are nevertheless calculated to throw much light on the laws of dis-

ease and mortality, from the circumstance, that they have now been persevered in for about three centuries. The subjoined table is compiled from this source.

TABLE XXII.—showing the principal fatal Diseases which occurred among the inhabitants of London during the year 1831, together with the annual ratio of Deaths by particular classes of disease per 1000 of the whole population, included in the bills of mortality, which amounted in 1831 to 1,178,374.

Classes of Disease.	Specific Diseases.	Died.	Total Deaths by each class of diseases.	Annual ratio of mortality per 1000.
Fevers, -	Febris intermit. -	36	1224	1.4
	typhus, -	223		
	fever, -	965		
Eruptive fevers,	Scarlet fever, -	143	1544	1.3
	Small-pox, -	563		
	Measles, -	750		
	Erysipelas, -	88		
Pectoral complaints, -	Consumption, -	4807	7865	6.6
	Inflammation of lungs and pleura, }	16		
	Asthma, -	1061		
	Hooping-cough, -	1732		
	Disease of heart, -	127		
Diseases of liver,	Hydrothorax, -	122	340	0.2
	Disease of Liver, -	296		
Diseases of bowels,	Jaundice, -	44	230	0.1
	Dysentery, -	11		
	Diarrhœa, -	33		
	Inflammation of bowels and stomach, }	138		
Diseases of brain,	Cholera, -	48	1864	1.5
	Apoplexy, -	485		
	Paralysis, -	246		
	Insanity, -	226		
	Epilepsy, -	54		
Inflammation, -	Dropsy in brain, -	853	3280	2.7
	Inflammation, -	2812		
	Abscess, -	161		
Convulsions, -	Mortification, -	307	2980	1.6
Age and debility, -	- - -	2980		
Still-born, -	- - -	2677		
Other diseases, -	- - -	898		
		2439	2439	2.0
Total, -		25341	25341	21.

As the observation of one year's mortality is not sufficient to entitle us to make any general inferences, I have calculated in the same manner as the foregoing table, the ratio of deaths in London from eight particular classes of disease, during the years 1832, 33, and 34. The same classification has been adopted in the following as in the preceding table; the only difference being, that the number of deaths by each disease has been omitted, so as to condense the three years into one table.

TABLE XXIII.—Showing the number of Deaths, and annual ratio of Mortality per 1000, which occurred from eight classes of disease among the inhabitants of London, during the years 1832, 33, and 34, calculated from the London Bills of Mortality :—

Classes of Disease.	1832.		1833.		1834.	
	Total Deaths by each class of disease.	Annual ratio of mort. p. 1000.	Total Deaths by each class of disease.	Annual ratio of mort. p. 1000.	Total Deaths by each class of disease.	Annual ratio of mort. p. 1000.
Fevers,	1156	0.9	643	0.5	599	0.5
Eruptive fevers,	1909	1.6	1661	1.4	1436	1.2
Pectoral compts.	6660	5.6	7640	6.4	5875	4.9
Diseases of liver,	392	0.3	357	0.3	341	0.2
Diseases of the bowels, }	708	0.6	549	.4	426	0.3
Cholera,	3200	2.7	1150	0.9	630	0.5
Disease of brain,	1886	1.6	1920	1.6	1600	1.3
Inflammation,	3002	2.5	2979	2.5	2075	1.7
Dropsy,	978	0.8	860	0.7	836	0.7
Age and debility,	2948	2.5	2952	2.5	2333	1.9
Convulsions,	2075	1.7	2140	1.8	1875	1.5
Still-born,	912	0.7	934	0.7	1009	0.8
Miscellaneous diseases, }	2779	2.3	2792	2.3	2644	2.2
Totals,	28,605	24.	26,577	22.	21,679	18.

These tables will be referred to as I proceed.

Fevers.—Under this class are included in the table, intermittent, typhus, and common continued fever.

It may here be remarked, that remittent or yellow fever seldom or never occurs in temperate latitudes, unless the temperature has been for some time ranging from 70 to 80° of Fahrenheit's

thermometer, and when it has been epidemic in temperate latitudes, as in North America, Spain, or the Greek Archipelago, it has always disappeared on the approach of winter or cold weather.

The annual ratio of deaths from fever in London, as may be observed in the tables No. XXII. and XXIII. are not so numerous as we might at first expect, being rather less than 1 death annually out of every 1000 inhabitants, which is not one-twentieth of the whole mortality.

At Paris during the year 1818, there died from fevers, denominated putrid or adynamic, malignant or ataxic, 6224; which is about 6 deaths for every 1000 inhabitants, reckoning the population at 800,000. Malte Brun estimated the population of Paris in 1815 at 714,000.

According to Krafft, fevers occasion one-third of the whole deaths in St Petersburg. At Berlin, typhus fever is said to be very fatal. Its introduction into that capital is attributed to the French army during their retreat from Russia. The deaths from fever among the British troops stationed at Gibraltar, from several years' observation, is about 2 per 1000 annually. The mortality from fever in London has decreased greatly in modern times, as will appear from the following statement, the materials of which are compiled from M'Culloch's Statistics of the British Empire, article Vital Statistics.

Statement showing the mean annual number of Deaths in London from Fevers, out of every 1000 inhabitants living at the period marked at the head of each column.

Annual Ratio of Deaths per 1000 by Fever.					
From					
1629 to 1635	1660 to 1679	1728 to 1757	1771 to 1780	1801 to 1810	1831 to 1835
6.3	7.8	7.8	6.2	2.6	1.1

From this we may remark, that in 1660-79, the deaths from fever in London were 7 annually out of every 1000 inhabitants,

and in 1831-35 there was only 1 death annually out of the same number of persons. I may state, as an instance of the prevalence of fever in former times, that King James I. and Oliver Cromwell both died in London of intermittent fever.

Eruptive Fevers.—The ratio of mortality from this class of diseases in London during the period of our table nearly corresponds,—being little more than 1 death annually out of every 1000 inhabitants.

The number of deaths from measles in London gradually increased during the eighteenth century, but after vaccination was introduced, which took place between 1801 and 1810, twice as many died of measles as had died of this disease in 1771-80. But, although scarlet fever and measles have somewhat increased in frequency, the mortality at present from measles, scarlet fever, and small-pox, taking them altogether, is not half so great as the numbers of deaths formerly occasioned by small-pox alone. In 1771-80, not less than 5 out of every 1000 inhabitants died annually in London of small-pox; in 1801-10, the mortality sunk to 2; and in 1831-35 to 0.83.*

Pectoral Diseases occasion a higher ratio of mortality in temperate countries, than any other class of diseases. They are comparatively frequent from the 30° of north latitude to Nova Zembla.

Dr Woolcombe estimates, that 1 in 220 of all ages die of consumption in Great Britain. This is about 4 deaths annually for every 1000 inhabitants. Mr Marshall states, that $4\frac{1}{2}$ per 1000 of the general mortality of the troops in Scotland, arises from diseases of the lungs; and Sir James M'Grigor remarks, that he has seen the deaths from consumption in the army quartered in Britain, amount to one-fifth, one-fourth, and in some regiments so high as one-half of the mortality. Foreign writers appear to think consumption more frequent in Great Britain than on the continent. Of the four years we have examined the London bills of mortality, it appears that from 5 to 6 deaths

* M'Culloch's Statistics, p. 593.

take place annually out of every 1000 inhabitants, from pectoral diseases.

Are the deaths from consumption increasing in Great Britain?

Dr Clark in his treatise on Pulmonary Consumption, remarks, "whether tuberculous diseases have diminished or not during the last century among the labouring part of our population, I am of opinion that they have increased in the middle and upper ranks." It is the opinion of this physician, whose experience has been extensive, that consumption and scrofula are stationary among the labouring classes of the country.

That consumption has decreased among the general population of London, will be seen from the following statement, showing the annual number of deaths in London from consumption out of every 1000 inhabitants, living during the period marked at the head of each column.

Annual ratio of deaths per 1000 by consumption. From.					
1629 to 1635	1660 to 1679	1728 to 1757	1771 to 1780	1801 to 1810	1831 to 1835
10.2	12.5	9.05	11.2	7.1	5.6

From this statement, we observe that consumption has gradually decreased in London. From the period 1660-79 to 1831-35, the mortality has diminished from 12.5 to 5.6 deaths annually out of every 1000 inhabitants.

Are the deaths from consumption increasing among the middle classes?

Mr Morgan, the Actuary of the Equitable Insurance Office, has lately published a table showing the causes of death of those persons insured in that office from the year 1800 to 1821. Their number amounted to 152,000 of all ages. They were composed chiefly of the middle classes, people generally in easy circumstances.

From Mr Morgan's table, we have observed that the total deaths from all diseases were 1930; the number of deaths

from consumption 153, which is only 1 in 12. This is a much smaller relative proportion of deaths from consumption, than the bills of mortality exhibit; for if we take the period when the mortality from consumption was low, (1831-35,) we find that about one-fifth of the whole deaths occurred from consumption, which is very different from Mr Morgan's table, where the deaths from consumption are only one-twelfth of the whole mortality. We are therefore inclined to think, that this low relative mortality from consumption, indicates the influence of the comforts which affluence bestows in mitigating and decreasing that disease.

From Nicander's table of the deaths in Sweden, it appears that 134 die annually from consumption out of every 100,000 inhabitants. This is little more than 1 death per 1000. It is probable that some error has crept into this estimate of Nicander's.

Various authors mention the frequency of consumption among the natives of Madeira, Naples, and Sicily. The British troops at Gibraltar lose annually 5.8 per 1000 from diseases of the lungs, which is nearly 2 deaths more per 1000 than occurs among the troops in Scotland.

Diseases of the Bowels.—The mortality by this class of diseases in the London bills of mortality is 0.1 per 1000, or 1 death out of every 10,000 of the population.

In Table XXIII. it may be observed that in 1832, the deaths from cholera were $2\frac{1}{2}$ out of every 1000 inhabitants. Cholera morbus was as fatal in London in 1660-79, as in 1831-5. In 1831-35 out of every 1000 inhabitants 1.35 are stated to have died of cholera. In 1660-79, the deaths from this disease were 1.48. Dr Craigie, in the Edinburgh Medical Journal for 1832, has demonstrated the antiquity and identity of cholera all over the world.

On examining the London Bills of Mortality we find that there has been a gradual decrease of dysentery during the eighteenth century.

From 1700 to 1710 there were 1070 deaths annually from dysentery.

1710	1720	770	do.	do.
1720	1730	700	do.	do.
1730	1740	350	do.	do.
1740	1750	150	do.	do.
1750	1760	110	do.	do.
1760	1770	80	do.	do.
1780	1790	40	do.	do.
1790	1800	20	do.	do.

In 1831, there were only 11 deaths from dysentery. Heberden attributes our present exemption from dysentery to greater cleanliness. Bowel complaints and gastritis add considerably to the mortality in Paris.

Diseases of the Brain.—Authors have stated that certain diseases are more frequent in modern than they were in ancient times:—for instance, scarlet fever, consumption, gout, dropsy, palsy, mania, and all those disorders of which the brain and nerves are presumed to be the seat.

On examining the London Bills of Mortality during the four years over which the table in this essay extends, the singular uniformity which occurs in most of the classes, and particularly diseases of the brain, is obvious. This we assume as a proof of the correctness of the data from which they are drawn up. About one and a-half deaths occur annually from diseases of the brain. Dr Fabret has found in Paris, from 1794 to 1822, that apoplexy has been more frequent by one-third, during the ten years following 1804, than during the ten years which preceded it.

Insanity is said to be on the increase in this country. Sir Andrew Halliday, who has collected much information on this subject, states that in England there is one insane person (idiot or lunatic) in every 1000 of the population. In Wales 1 in 800, and in Scotland 1 in 574.

The insane are more numerous in agricultural than in manufacturing districts.

	Population.	Insane.
12 Agricultural counties, -	2,012,979	2526, or 1 in 797
12 Manufacturing or mining counties,	4,493,194	3910, or 1 in 1149

The next subject for consideration is the mortality and prevailing diseases among the indigenous inhabitants of the temperate parts of Asia ; but as I have not been able to procure any accurate statistical information on this subject, I shall proceed to consider the mortality and prevailing diseases among the indigenous inhabitants of America, within the limits of the temperate zone of the northern hemisphere.

b. Ratio of Mortality in the Temperate parts of North America.—Mr Bristed states, that the average annual deaths in the United States is 1 in 40, or 25 per 1000, a mortality which corresponds to that which occurs in France. In some of the districts of the United States of America, the ratio of mortality is 1 in 56, or 17 per 1000, while in other districts it is 1 in 35, or 28 deaths for every 1000 of the population. At New York, the annual ratio of mortality among the white population is 1 in 40, or 25 per 1000 ; at Philadelphia, it is 1 in 34, or 29 per 1000 ; at Baltimore, it is 1 in 39 or 25 per 1000. The ratio of mortality in the temperate parts of North America appears to be very similar to that of France.

Prevalent Diseases in Temperate America.

Fevers.—At New York the annual mortality from fevers, taken from an average of eleven years, as given by Drs Niles and Rush, is 291, * which is about 2 deaths annually for every 1000 inhabitants, the population being 140,000. Among the British troops employed in Canada, the annual ratio of mortality by fever from seven years observation, is very nearly 2 men per 1000.

Pectoral Diseases.—In New York the annual number of deaths from *phthisis pulmonalis*, acute disease of the lungs, croup, and hooping-cough is 1045, which is about 7 deaths for every 1000 inhabitants. This ratio is very nearly the same as that which occurs in London, vide Table XXII. From seven years observation of the mortality which occurs among

* Medical Statistics, or Comparative View of the Mortality in New York, &c. New York, 1827.

British troops in Canada, we learn that 5 men per 1000 die annually from disease of the lungs, which is nearly one-half of the whole mortality. We thus observe that in all temperate countries from which I have been able to obtain materials showing the fatal diseases, a high ratio of deaths results from pectoral complaints. Turning to Table IX. in a former part of this essay, showing the fatal diseases among the native troops of Madras, it may be observed that the ratio of deaths from pulmonary complaints is comparatively low, the deaths from pectoral diseases not amounting even to 1 man per 1000 per annum.

I have not been able to obtain any definite statement regarding the amount of mortality occasioned by diseases of the bowels in temperate America. The British troops in Canada lose annually about 1 man out of every 10,000 from this class of diseases.

Temperate Zone of the Southern Hemisphere.

I have already stated the boundaries of this zone, and the countries which it contains; but, with the exception of that part of Africa within its limits, I have not been able to obtain any account either of the ratio of mortality, or of the most fatal diseases.

According to official returns, the number of inhabitants (natives and Europeans) in the Colony at the Cape of Good Hope, in 1834, was 153,027, and the deaths during that year 2053, which is only 1 death in 74, or 13 deaths annually out of every 1000 inhabitants. This is a less ratio of mortality than that of Great Britain, and is about the same as that occurring among the natives of Madura and Dindigul provinces in the Peninsula of India. (See p. 24.)

SECTION V.—*On the Ratio of Sickness among the Indigenous Inhabitants of Temperate Climates.*

When we enter on the consideration of the influence which a tropical climate has on the natives of the temperate zones, we in-

tend to confine our observations solely to the elucidation of the influence which an intertropical climate has on the natives of Great Britain. For this reason, the following remarks are limited to the investigation of the ratio of sickness among the indigenous inhabitants of the united kingdom.

Ratio of Sickness in Great Britain.—The average proportion of sickness in human life, was assumed by Dr Price to hold a constant relation to the mortality ; and Mr Edmonds,* from a great extent of observation, states, that two years of sickness to each death appears to be the law of nature, from which there is little deviation, unless in very unhealthy localities.

It appears from tables published by the Highland Society, that the period of sickness increases gradually as age advances. The diseases which affect people in the prime of life are generally acute, and soon terminate either in health or death. This is partly the case why the relative length of sickness from birth to 40, is comparatively short when contrasted with the period of sickness from 40 to 60 years. From 30 to 40 years of age, a man suffers about six days of sickness annually ; but when he passes 60, on an average he is confined about five weeks and a-half annually to the sick-bed. This may be attributed to the diseases of old age being generally of a chronic nature.

From the examination and experience of the best regulated sick societies, such as the East India Company's Labourers (London, 1823–32 ;) the Bennet Street School, Manchester, 1830–32 ;† and of the Artisans' Club, Germany, it appears that 100 of the efficient male population are not liable to more than 25 severe attacks of disease during the year. Each man is subject to a protracted disease disabling him from work during every four years. This, however, does not include those temporary attacks of sickness which follow drunkenness, or the many slight disorders which make men apply for medical aid without stop-

* Life Tables founded on the discovery of a numerical law, by T. R. Edmonds, Esq. 1832.

† Factories' Inquiry Report, by Dr Hawkins, Sup. p. 1, p. 276.

ping their daily occupation. If we include all these as cases of disease, it would raise the ratio of sickness among the labouring population of Great Britain, to about 50 per cent., or 500 slight cases of disease annually out of every 1000 inhabitants.* The attacks of disease vary greatly in healthy and unhealthy situations.

In a former part of this essay, we estimated the ratio of admissions among the native troops in the tropical climate of India. I shall now examine, for the purpose of comparison, the rate of admission, and the severity of the diseases which occur among British troops stationed in Scotland. The following table is subjoined for that purpose.

TABLE XXIV.—Showing the mean annual Strength of the British Troops stationed in Scotland during a period of seven years (1816 to 1822), together with the number of admissions into Hospital, and the annual ratio of admissions per 1000 of the strength; compiled from official documents published in the London Medical and Physical Journal for 1823.

Years.	Strength.	Admissions into Hospital.	Ratio of Admis- sions per 1000.
1816,	2591	2869	1107
1817,	3143	2032	646
1818,	2939	2281	742
1819,	2714	1780	630
1820,	4853	3980	820
1821,	2903	2092	720
1822,	1680	1357	807
Total,	20823	16391	787

From this table it may be observed, that in 1816 there were 1107 admissions into hospital, out of every 1000 of the strength. This comparatively high ratio of admissions into hospital, is attributed to the occurrence among some of the troops of intermittent fever, which circumstance was owing to the return of a regiment from Belgium, where the men had suffered

* Statistical Account of the British Empire, by J. R. McCulloch, 1837, Vol. ii. p. 582.

severely from endemic fever, a disease to which it is stated they continued very liable for some time. The average of seven years, shows that 787 cases of disease occurred annually out of every 1000 men. We have already stated that the ratio of admissions among the native troops in India, was 527 annually out of every 1000 of the strength, which is about 200 less per 1000 than that indicated in the above statement. The intermittent fever, to which some of the troops in Scotland continued liable for some time after their arrival from Belgium, must have somewhat increased the admissions into hospital. Among the labouring population, as has been previously stated, there occurs about 500 slight cases of disease annually out of every 1000. The following statement will show the intensity of the disease among the troops in Scotland.

Table XXV.—Showing the total admissions into hospital among the troops in Scotland during seven years, (1816 to 1822,) the number of deaths, together with the proportion which the deaths bear to the number treated; compiled from returns previously mentioned.

Years.	Admissions into Hospital.	Number of deaths.	Intensity of disease.
1816,	2869	38	1 death in 75
1817,	2032	19	1 do. 106
1818,	2281	19	1 do. 120
1819,	1780	33	1 do. 53
1820,	3980	61	1 do. 65
1821,	2092	39	1 do. 53
1822,	1357	21	1 do. 67
Total of seven years,	16391	230	1 do. 71

In 1816, 1 death occurred among the troops in Scotland for 75 treated; in 1817, 1 out of 106. Taking the average of the septennial period over which this table extends, we find that there occurred 1 death for every 71 admissions into hospital. When we compare the two preceding tables with Tables X. and XI. showing the ratio of sickness, and the severity of the disease among the native troops in India, we infer that the

attacks of disease among the troops in Scotland, were more numerous than among the native troops in India, but that the diseases of India were much more severe or fatal than those in Scotland. Thus in Scotland, 1 death occurred for every 71 attacked with disease, whereas in India, 1 death took place for every 39 attacked. The annual ratio of mortality which occurs among both classes of troops, is very similar. The information conveyed by such statements as Table XXV. are of great importance to medical men, for it is only by following such a method as this, that we can accurately determine the influence of any particular remedy or mode of treatment in reducing the mortality from disease.

The preceding observations refer to the ratio or number of attacks of disease annually. I shall now examine the proportion or ratio constantly sick among the natives of Great Britain.

TABLE XXVI.—Showing the ratio of Sickness among the British Troops stationed in Great Britain during 1823 and 1824, as deduced by Mr Finlaison from 24 monthly musters. *

	Strength accounted for in 24 monthly musters.	Sick at the time the muster took place.	Ratio of sick per 1000.
Cavalry,	94,393	3791	40
Foot Guards,	92,889	3961	42
Infantry,	126,513	6297	49
	313,695	14,049	44

By this statement it appears that 40 men out of every 1000 in the cavalry are constantly sick, among the Foot Guards 42, and among the infantry 49. The total ratio constantly sick among all classes of troops during the period of the above materials, was 44 per 1000, or 1 in 22. The mean ratio constantly sick among the troops in Ireland, estimated during a pe-

* Evidence before the Select Committee on Friendly Societies, 1825.

riod of thirty-two years (from 1796 to 1829,) from an annual force of 36,921 men, amounted to 51 per 1000.* This is a somewhat higher ratio than that indicated in the preceding table. From the above statement it consequently results, that the length of time each man was confined to hospital was on an average $18\frac{1}{2}$ days.

When we compare the number constantly sick among the troops, with the ratio constantly sick among the civil population, between the same periods of life (20 to 40,) we find that the proportion constantly sick, is much greater among the troops than the civil population. Thus, out of 1000 labourers in the Portsmouth and Woolwich dock-yards, there are about 20 constantly confined at home by sickness. It was to be expected that the mean sick among the troops, must be greater than among the civil population, for a soldier is confined to hospital with a disease which would not detain a labouring man from his occupation. It is calculated that the total number constantly sick and unable to labour for their daily support in Great Britain and Ireland, amounts to upwards of one million.

When the ratio constantly sick among the troops of Great Britain, is compared with the estimate previously made of the number constantly sick among the native troops of Bengal and Agra, it will be observed how nearly they correspond. Thus the ratio per 1000 constantly sick among British troops in Great Britain is 44, and among the native troops of Bengal 47; and as we have already seen how similar the ratio of mortality and admissions into hospital among the native troops of India, is to that which occurs among the British troops, I think we may safely conclude, that the ratio of sickness, &c. among the indigenous inhabitants of India, is similar to what occurs among the natives of Great Britain.

SECTION VI.—*On the Influence of the Seasons in a Temperate Climate on Health and Mortality.*

In a former part of this thesis, we entered on the considera-

* Edin. Med. Journal, Vol. xl. p. 39.

tion of the influence which the seasons, in a tropical climate, have in occasioning sickness and mortality. We shall now attempt to elucidate in what degree the mortality is influenced by the seasons in a temperate climate.

The great difficulty in following out this investigation, is the want of requisite materials ; for unless the data be adduced from extensive observation, and for a long period of time, no reliance can be placed on the conclusions to which we may arrive. I have therefore, in the following section, adduced only those facts which are compiled from the examination of a series of years, and from a large number of deaths.

The London Bills of Mortality afford data from which we can estimate the influence of the seasons on the mortality. The following table is compiled from that source, and shows the seasons or months of the year during which the greatest mortality occurs in London.

TABLE XXVII.

A.

B.

Of 405,951 deaths occurring among the population of London from 1728 to 1743, the number and the relative ratio of deaths per 1000 in each month were as follows :			Of 94,150 deaths occurring among the population of London from 1795 to 1799, the number and the relative ratio of deaths per 1000 in each month were as follows :		
Months.	Deaths.	Relative ratio of deaths per 1000.	Months.	Deaths.	Relative ratio of deaths per 1000.
January,	37,682	93	January,	9056	96
February,	36,157	89	February,	9114	97
March,	37,126	92	March,	9089	96
April, -	34,242	85	April, -	8017	85
May, -	33,410	82	May, -	7820	83
June, -	30,197	74	June, -	6671	71
July, -	28,210	70	July, -	6585	70
August,	30,829	75	August,	6483	69
September,	33,375	82	September,	6684	71
October,	34,590	85	October,	7516	80
November,	34,181	84	November,	7687	82
December,	35,952	89	December,	9428	100
Total,	405,951	1000	Total,	94,150	1000

The above table may be thus read : Out of 405,951 deaths occurring among the inhabitants of London from 1728 to 1743, A—37,682 deaths took place in January, 36,157 deaths occur-

red in February, and 37,126 in March. The columns marked "relative ratio of deaths per 1000," show that out of 1000 deaths in London during the period of this table, 93 occurred in January, 89 in February, and 92 in March. The right hand table, B, is read in a similar manner, and illustrates the mortality in London for a different period.

As the data from which this table has been calculated is extensive, we may therefore conclude that the most fatal months are December, January, February, and March. This increased mortality in London during these months, may by some be attributed to the greater number of people residing in London during the winter than the summer months. But from the examination of the mortality of 25 different country towns in England, including the burials of a great many years, collected by Dr Short, it is found that the result corresponds nearly with the above conclusion.* In both tables, June, July, August, and September, are the most healthy months. The most fatal month in the left hand table is January, and in the other December. The extremes vary from 93 to 70 in one, and from 100 to 70 in the other. This distribution of the mortality in London, appears to have only existed within the last 100 years, for Graunt observed at the close of the seventeenth century, that in London "the unhealthful season was the autumn," which was occasioned by the small-pox, plague, and remittent fever being most prevalent during the autumnal months.

In cities, from the shelter afforded by the buildings, and from the number of fires, the atmosphere must be preserved in a more equal state of temperature than in the country, at least the slight variations of temperature, and the influence of the winds, &c. will not be so acutely experienced. It is, therefore, to be expected, that, if the seasons possess any influence on the mortality, it will be rendered more obvious by the examination of the deaths which occur at the different seasons in the country. With the view of illustrating whether the mortality is greater at par-

* Heberden on the increase and decrease of different diseases in London, 1801, p. 48.

ticular seasons of the year in countries than towns, I subjoin the following table :

TABLE XXVIII.

Out of 620,395 deaths occurring among the inhabitants of the towns in Belgium, from 1815 to 1826, the number and the relative ratio of deaths per 1000 in each month were as follows :			Out of 1,149,865 deaths occurring among the population of the country in Belgium from 1815 to 1826, the number and the relative ratio of deaths per 1000 in each month were as follows :		
Months.	Deaths.	Relative ratio of deaths per 1000.	Months.	Deaths.	Relative ratio of deaths per 1000.
January,	59,892	97	January,	116,129	101
February,	56,267	91	February,	114,758	100
March,	54,277	88	March,	114,244	100
April,	51,818	84	April,	107,264	93
May,	48,911	79	May,	93,714	81
June,	46,607	76	June,	84,464	73
July,	45,212	73	July,	7,755	68
August,	47,032	75	August,	78,802	69
September,	50,191	80	September,	85,131	74
October,	51,649	83	October,	89,514	77
November,	52,908	85	November,	89,585	78
December,	55,631	89	December,	98,705	86
Tot. deaths from 1815 to 1826.	620,395	1000		1,149,865	1000

The above tables show, in a very striking manner, that the seasons have a greater influence on the mortality of the inhabitants in countries than in towns. In both town and country, the preceding table corresponds with No. XXVII. as indicating the months of January, February, March, and April, as the most destructive to life. The extent of variation in the mortality of towns, is small compared with that of the country. Thus out of 1000 deaths occurring during the year in the towns of Belgium, 97 occurred in January, and 73 in July, consequently the mortality of the month of January is 24 per 1000 more fatal than in July. Whereas in the country, out of 1000 deaths during the year, 101 take place in January, and 68 in July, consequently the mortality of July in the country is 33 per 1000 less than in the month of January.

The annual ratio of mortality which occurs in the towns in Belgium, is greater than that of the country,—a fact which the mortality of Europe confirms. It is interesting to observe, that the preceding table confirms the popular opinion, that the country is most healthy during the summer months, and that the shelter and comparatively equable climate afforded by the town, tends to reduce the ratio of mortality in the winter ~~and summer~~ months, compared with that of the country. The inference which may be adduced from this is obvious: That invalids and people of weakly constitution should reside in the country (Belgium,) during the months of June, July, August, September, October, November, and December; and that they should resort to the towns for the remaining months of the year.

The influence which the seasons have in occasioning an increase of mortality at particular ages, is an important subject for investigation, but the very general plan of this essay prevents my entering on the inquiry.

It has been remarked by Villermé, that in all marshy countries, the months of July, August, September, and October are the most fatal to the inhabitants; and although we have seen that these months in London and Belgium are the least destructive to life, it will be remarked, that a very different conclusion must be drawn from the subjoined statement, showing the most fatal months among the French troops stationed in France, and among the inhabitants of New York,

TABLE XXIX.

Table showing that out of 24,852 deaths occurring among the population of New York, the numbers and the relative ratio of deaths per 1000 in each month were as follows: *			Table showing that out of 17,092 deaths occurring among the French Infantry stationed in France, the number and the relative ratio of deaths per 1000 in each month were as follows: †		
Months	Number of deaths.	Relative ratio of deaths per 1000.	Months.	Number of deaths.	Relative ratio of deaths per 1000.
January,	1868	75	January,	1402	82
February,	1874	76	February,	1334	78
March,	1846	74	March,	1432	84
April,	1816	73	April,	1475	86
May,	1784	72	May,	1450	85
June,	1616	65	June,	1257	73
July,	2372	95	July,	1279	75
August,	2692	108	August,	1607	94
September,	2720	110	September,	1577	92
October,	2402	97	October,	1638	96
November,	1973	79	November,	1381	81
December,	1889	76	December,	1260	74
Total,	24,852	1000	Total,	17,092	1000

From the examination of these tables it will be observed, that the highest ratio of deaths occurred during the months of August, September, and October. The most healthy month in both these tables was June. It may also be observed, that the mortality among the French troops did not vary so much as among the inhabitants of New York. Thus in New York the extremes are 65 and 110, whereas among the French Infantry the extremes are only 73 and 96.

By comparing Tables XXVII. and XXVIII. with XXIX. we remark the influence which the seasons have on the mortality, spring being in one case the most unhealthy season, and autumn in the other. In a preceding part of this essay, when considering the influence of the seasons in a tropical climate on mortality, we found that August, September, October, and November were the most unhealthy in the West India Islands. A question naturally arises, are the causes of disease more obvious in New York and the West Indies during August and

* British Medical Almanack, 1837, p. 185. † Annals of Medicine,

September, when the mortality is high, than during the spring, when the relative ratio of mortality is low ?

It would be interesting to examine at some length, did the limited nature of this essay permit, into the influence which the different seasons of the year have on the mortality occasioned by certain diseases ; and as the most fatal months in New York are the most healthy in London, I shall here compare the relative monthly mortality from fever in these two cities. By making a minute examination into the relative mortality from disease, we might be able to appreciate, in some degree, the causes which occasion such a remarkable difference in the fatality of the different seasons of the year. The under-mentioned tables will illustrate the seasons at which the greatest mortality occurs from fever in London and New York.

TABLE XXX.

Table showing that out of 8522 deaths from fever, occurring among the population of London, from 1795 to 1799, the number and the relative ratio of deaths per 1000 in each month were as follows :			Table showing that out of 3205 deaths from fever, occurring among the population of New York, from 1816 to 1826, the number and the relative ratio of deaths per 1000 in each month were as follows : *		
Months.	Number of deaths from fever.	Relative monthly ratio of deaths per 1000 from fever.	Months.	Number of deaths from fever.	Relative monthly ratio of deaths per 1000 from fever.
January,	856	101	January,	178	53
February,	785	92	February,	137	43
March,	708	83	March,	158	49
April,	677	79	April,	186	57
May,	666	78	May,	211	66
June,	625	73	June,	245	77
July,	626	73	July,	262	82
August,	561	66	August,	374	117
September,	627	74	September,	497	156
October,	804	95	October,	441	137
November,	717	84	November,	305	96
December,	870	102	December,	211	67
Total deaths.	8522	1000	Total deaths,	3205	1000

* Drs Niles and Rush's Comparative View of the Mortality of New York, Philadelphia, Baltimore, and Boston.

We learn from the preceding statement, that in London, December, January, February, and March are the months during which the greatest mortality occurs from fever. That in New York, the greatest number of deaths from fever occur in August, September, and October; whereas in London, August and September present a lower ratio of mortality from fever than any other month. During January, February, and March, the deaths from Fever at New York were remarkably few. Fever occasioned about three times the number of deaths in New York during September, than that which occurred in February or March.

Villermé is of opinion, that in healthy districts, winter and spring are the most healthy seasons of the year, and that winter is more fatal in the north than in the south. He remarks also, that in marshy countries, July, August, September, and October are the most fatal months. If any conclusion can be drawn from the materials adduced, we think it tends, in a certain degree, to confirm the above opinion of Villermé. But before any attempt is made to draw conclusions on the influence of the seasons on health and mortality, it is necessary to compile data not confined to cities where the local exciting causes of disease are abundant, but materials should be drawn from the observations made on the mortality of a whole country, and for a long series of years.

CHAPTER III.

On the Influence of a Temperate Climate on the Indigenous Inhabitants of the Torrid Zone.

THE next subject to be taken into consideration, is the influence which a temperate climate has on the indigenous inhabitants of the tropical regions. Although the examination of this topic forms a part of the general plan of this essay, I regret not being able to obtain sufficient data to illustrate the subject. There are numerous individual instances of the emigration of

the natives of tropical regions to that of temperate climates, but no satisfactory conclusion can be drawn from such cases. The only instance which has come under my knowledge, where a body of natives were transported from the tropical to the temperate regions, was that of the 4th West India Regiment (Africans,) which was employed for some time in the garrison of Gibraltar. Unfortunately, the materials which have been published in regard to this regiment, are so limited and imperfect that no very specific result can be deduced. Mr Frazer, principal medical officer, states, that out of 31 deaths, which occurred during the year (1810) 24 were from pulmonary disease. To use his own words, "of a total of 14 deaths from pulmonary disease in the garrison, during the half year from January to June, 10 were blacks; and in the succeeding half year, out of 28 deaths, 17 were in the same regiment, and 14 of these died of *phthisis pulmonalis*." An ingenious writer, speaking on this subject, says, "Our Indians are so tender, and habituated to a certain way of living, that they do not bear transplantation; for instance, the Spanish Indians captured in the St Augustine war, anno 1702, and sold for slaves in New England, soon died of consumption. *

Among the Africans employed as slaves in the temperate climates of New York and Philadelphia, the annual average mortality is 53 per 1000, or 1 death out of every 19.† At Baltimore the annual mortality of the blacks is 1 in 33, or 30 per 1000. The most prevalent disease is *phthisis pulmonalis*, for out of 718 blacks who died at New York in 1827, about 100 were victims of consumption, or one-seventh of the whole mortality.‡

This ratio of deaths from consumption cannot be attributed, as is commonly done, to the low temperature of the country; for I have already stated to what extent pulmonary disease prevails among Africans, in countries only a few degrees from the equator, as in Ceylon; and it has also been re-

* Gordon's Polit. Summary, Vol. i. p. 174.

† Hawkins' Medical Statistics, p. 71.

‡ Ibid. p. 179.

marked, that pectoral complaints occasion an annual ratio of mortality of 16 per 1000 among the Africans in the Windward and Leeward Islands, or nearly one-half of the whole mortality. It has been stated by some authors,* that the mortality from consumption is confined, in the West India Islands, to those inhabiting the interior and more elevated situations, where the mean temperature is not so high. But we have, in another part of this essay, alluded to the fact, that the Cape of Good Hope, and the southern portions of the United States, are the only countries to which the African race have been transported, where they keep up the original numbers, although the mean temperature in these places must be considerably below that of their native country.

It is stated that the migration from a torrid to a temperate climate, will have a hurtful effect upon emigrants, in proportion to the suddenness of the change and the low degree of temperature of the new climate. It is alleged that Africans who are removed from their native country direct to Europe, seldom live over two winters; while the negroes who have been conveyed to the West Indies, and subsequently to the southern states of North America, previously to their arrival in more northern climates, often do not suffer materially from the change.†

From the preceding observations, we conclude, that, although man differs from many brute animals in being able to exist in every variety of climate which produces vegetation, he is peculiarly adapted to the climate of his native country, or, more properly, of his race.

* Transactions of the Medico-Chirurgical Society of Edinburgh, Vol. i.

† Copland's Dictionary, article Climate.

CHAPTER IV.

On the Influence of an Intertropical Climate on the Indigenous
Inhabitants of the Temperate Zones.

I SHALL now endeavour to illustrate the influence of the climate of the torrid zone on the indigenous inhabitants of temperate climates, and the principal diseases to which they are liable.

The following observations are confined to the examination of the influence which a tropical climate exerts on the natives of Great Britain. This arrangement I have found it requisite to adopt, partly from the want of accurate materials, and also for the sake of brevity.

We have drawn our conclusions on this subject solely from the examination of the influence of climate on troops. Military statistical materials, from their comprehensive and accurate nature, are well calculated for deducing correct results in regard to the influence of climate on the health of man. The mean age of soldiers in the British army may be estimated at about 27 or 28 years, and varying from the age of 19 to 41, a period which is certainly the most vigorous and healthy part of life. It has been already stated that the mean annual ratio of mortality among British troops in the united kingdom, is about 15 per 1000 of the strength; so that the amount of the increased ratio of mortality which takes place among them when they are employed in a tropical country during a period of peace may, to a certain degree, be reckoned a *measure* of the deleterious influence of the climate to which they are exposed.

SECTION I.—*On the Influence of the Climate of Tropical
Africa on the Natives of Great Britain.*

The ratio of mortality which has occurred among British settlers and soldiers at Sierra Leone, Gambia, and Isle de Los, on

the coast of Africa, is comparatively very high. It appears from the returns of the European corps serving in the colony in 1825, that during a period of eight months, or from May to December* inclusive, out of a force of 1150 men there occurred 412 deaths, which being calculated in the same ratio for a year, shows an annual mortality of about 537 per 1000 of the strength. In the United Service Journal there is a statement showing the mortality, during several years, among the officers stationed in this colony, but from their limited number, no result can be deduced.

The principal fatal diseases which happened during the eight months above alluded to, out of 1150 men, were as follows: 378 deaths occurred from fever, 26 from dysentery, 15 from hepatitis, and 3 from diarrhœa. The total admissions into hospital out of 1150 British troops during eight months, were 1432, which is an annual admission into hospital of 1866 men per 1000, or nearly 2 attacks of disease annually for every native of Great Britain in the colony. We may form an opinion of the severity or intensity of the disease from the fact, that out of 1432 admissions into hospital 412 died, which is nearly 1 death for every 3 treated. When it is recollected that in Great Britain there is about 700 admissions into hospital per annum out of 1000 of the troops, and that there is only 1 death for every 71 treated, the unfavourable nature of this climate will be rendered more obvious.

From the preceding statement it is evident that the climate of the west coast of Africa, north latitude 7°, is very injurious to the health of the natives of the united kingdom, the annual ratio of mortality being rather more than 50 per cent. of the strength. Captain Owen, who was employed in exploring the coast of Africa, states in his Journal, that "during the voyage of about three months, two-thirds of the officers and one-half of the crews of the three vessels had fallen beneath the curse of Africa." And in another part of the Journal he remarks, that an exploring party ascended the stream Mapoota, and after they had been

* Annesley on the Diseases of India, 1828, Vol. i. p. 185.

doing so for some days, several of the crew took ill, and before the vessel could be got out of the river, one-half of the men were attacked with disease. The Journal of Captain Owen abounds with instances of the fatal nature of the climate of the coast of Africa to the natives of Great Britain.

SECTION II.—*On the Influence of the Climate of Tropical Asia on the Natives of Great Britain.*

Having considered the influence of the climate of tropical Africa on the natives of Great Britain, we shall now proceed to estimate the influence which the climate of tropical Asia has on the indigenous inhabitants of a temperate climate. The ratio of mortality which takes place among British troops employed in several parts of tropical Asia, will be learned from the following tables.

TABLE XXXI.—Showing the mean annual strength of British Troops employed in the Presidency of Bengal, the number of Deaths, and the Ratio of Deaths per 1000, of the mean strength during a period of seven years, (1826 to 1832,) compiled from Dr Burke's Observations on the Mortality of the Troops in India.*

Years.	Strength.	Died.	Ratio of mortality per 1000.
1826,	7976	774	97
1827,	8761	522	60
1828,	8916	549	62
1829,	8680	575	66
1830,	9520	362	38
1831,	9095	393	43
1832,	7956	311	40
Totals,	60,904	3486	
Mean of 7 years.	8700	498	57

* Edin. Med. Jour. Vol. xli. p. 386.

According to this table, the annual ratio of mortality was 57 per 1000 of the strength, or 1 death annually out of every 17 men. The subjoined statement will show the mortality among British troops in the Presidency of Madras :

TABLE XXXII.—Showing the mean Strength of the British Troops employed in the Presidency of Madras, the number of Deaths, and the annual Ratio of Deaths per 1000, for a period of four years, from 1827 to 1830 inclusive.*

Years.	Strength.	Died.	Ratio of mortality per 1000.
1827,	11,702	836	71
1828,	12,171	651	53
1829,	11,748	413	35
1830,	11,650	384	33
Total,	47,272	2284	
Mean of 4 years.	11,818	571	48

The annual ratio of mortality among British troops in the Presidency of Madras is a little lower than that indicated in the preceding table, showing the mortality among British troops in Bengal.

The following table, which was compiled from a Report on the Medical Management of the Native Jails throughout the Presidencies of Bengal and Agra, by James Hutchison, A. M. Secretary to the Medical Board of Bengal, will show the mortality among Europeans during a period of one year.

* Compiled from an abstract of the returns of the sick belonging to the Presidency of Madras. Edin. Med. Journal, Vol. xxxix. p. 135.

TABLE XXXIII.—Showing the mean strength of the European Troops employed in the Presidency of Bengal and Agra, during the year 1833, together with the number of Deaths, and the ratio of Deaths per 1000, at each military station.

Stations of Troops.	Strength.	Died.	Ratio of deaths per 1000.
Presidency,	709	56	79
Dumdum,	772	54	70
Chensura,	577	49	85
Berhampore,	811	27	33
Dinapore,	1020	59	58
Benares,	1277	78	60
Allahabad,	112	6	53
Cawnpore,	2057	176	86
Meerut,	1995	43	21
Agra,	1089	27	25
Kurnawl,	1166	33	28
Sangur,	89	2	22
Neemuch,	325	22	67
	11,999	632	
The ratio of mortality is therefore			53 per 1000.

From the preceding Tables XXXI. XXXII. and XXXIII. we may conclude, that from 50 to 60 deaths occur annually out of every 1000 European troops employed in the climate of tropical India. Lieutenant Tulloch, in a paper published in the United Service Journal for February 1835, estimates the mean annual mortality among British troops in India at about 6.3 per cent. or 63 per 1000. It therefore appears that when 1000 natives of Great Britain are transferred to the tropical climate of India, the ratio of deaths increases from 15 to about 60 per annum. The insalubrity of the climate may therefore be stated at 45, which is the increase of mortality over what would have occurred had they resided in their native country.

A question naturally arises here, which will be answered by the subjoined table, namely, what diseases occasion this high mortality among the natives of Great Britain residing in the climate of India?

TABLE XXXIV.—Showing the principal Diseases which occurred among European Troops employed in the Presidency of Bengal during a period of seven years, from 1826 to 1832 inclusive, with the annual ratio of deaths per 1000, by eight particular classes of disease, compiled from Dr Burke's Observations on the Mortality of the Troops in India;* total strength 60,904. See Table XXXI.

Classes of Disease.	Specific Diseases.	Died.	Tot. deaths by each class of disease during 7 yrs.	Annual ratio of mortality per 1000.
Fevers, . . .	Feb. quot. inter. tertian, remittens, cont. com. icterides, typh. et synoch.	937	937	15.4
Pectoral diseases,	Thoracic inflam. Pneumonia, Hæmoptysis. Phthisis pulmonalis, Catarrh, acute, chronic,	162	162	2.5
Diseases of liver,	Asthma, Hepatitis, acute, chronic,	258	258	4.2
Diseases of bowels,	Enteritis, Gastritis, Dysentery, acute, chronic,	29 10 996	1122	18.4
	Diarrhœa, Dyspepsia	81 6		
Cholera morbus,		693	693	11.5
Diseases of brain,	Apoplexia, Phrenitis, Paralysis, Delirium tremens, Insanity, Cephalic inflammation,	105 8 8 2	123	2.0
	Anasarca,	19		
Dropsies, . . .	Ascites, Hydrothorax,	16 4	39	0.6
Other diseases,		152		
	Total,	3486	3486	57.0

* Edin. Med. Journal, Vol. xli. p. 386.

As the annual ratio of mortality in the Madras Presidency was compared with that of Bengal, I shall also compare the mortality arising from particular classes of disease in these two military stations. The following table was compiled from the sick returns of the troops in the Presidency of Fort St George by Mr Marshall.*

TABLE XXXV.—Showing the total Deaths which occurred from each of the following classes of Disease among the European Troops in the Presidency of Madras during a period of four years (1827 to 1830,) together with the annual ratio of mortality per 1000 of the strength. See Table XXXII.

Classes of Disease.	Total deaths by each class of disease during four years.	Annual ratio of mortality per 1000.
Fevers, - -	310	6.5
Diseases of the lungs,	103	2.2
liver, -	283	6.0
bowels,	894	18.7
Cholera morbus, -	301	6.4
Diseases of the brain, -	58	1.2
Dropsies, - -	36	0.8
Other diseases, -	299	6.2
Totals, -	2284	48.

These two tables, XXXIV. and XXXV., show the ratio of mortality occasioned by particular classes of disease among the European troops in the Presidencies of Bengal and Madras.

Fever.—The ratio of mortality from this class of disease appears by the tables to be much more fatal to British troops in the Presidency of Bengal than in Madras. In the former, the annual ratio of mortality is 15 per 1000; in the latter $6\frac{1}{2}$.

Diseases of the Lungs.—The ratio of mortality from this class in the two Presidencies is very similar, namely, little more than 2 deaths per 1000 annually, or about 1-26th part of the

* Edin. Med. Journal, No. 114.

whole mortality, which is a very low ratio compared with that which occurs from pulmonary disease in Great Britain or in other temperate latitudes. Thus, from Tables XXII. and XXIII. compiled from the London Bills of Mortality, we learn, that from 5 to 6 die annually from pectoral affections out of every 1000 inhabitants, which is about one-third part of the whole mortality. But as this ratio of mortality from pectoral disease is estimated from all ages, it cannot properly be compared with men from the age of 19 to 41. I shall therefore compare it with a statement showing the annual ratio of mortality from eight particular classes of disease among the troops in Scotland, which was estimated from seven years' observation (1816 to 1822,)* and, for the convenience of reference, I subjoin the following statement.

TABLE XXXVI.—Showing the annual ratio of mortality per 1000 which occurred from eight classes of Disease among the British Troops in Scotland, the British Troops in Madras, and the Native Troops in Madras.

Classes of Disease.	Annual ratio of mortality per 1000		
	Among British troops		Among native troops in Madras.
	In Scotland.	In Madras.	
Fevers, - -	2.6	6.5	2.5
Diseases of lungs, -	4.7	2.2	0.6
liver, -	0.2	6.0	0.1
bowels, -	0.5	18.7	1.7
Cholera morbus, -		6.4	3.3
Diseases of brain, -	0.7	1.2	0.2
Dropsies, - -	0.7	0.8	0.8
Other diseases, -	1.7	6.2	3.6
Total deaths, -	11.0	48.0	13.0

The above table may be thus read: Of every 1000 men employed in Scotland, 2.6 die annually from fever; among the British troops in Madras, 6.5 from the same disease; among the native troops 2.5, and so on. We may remark, that the ra-

* London Med. and Physical Journal, 1823.

ratio of mortality from fever in Scotland corresponds to that which takes place among the native troops in Madras. Diseases of the lungs show that 4 deaths per 1000 are occasioned by this class in Scotland, which in Madras decreases to 2; and among the native troops in Madras we see only 1 death annually out of every 2000 men from pectoral disease.

About 6 deaths occur annually for every 1000 British troops in India from disease of the liver, while the mortality from this disease among the native troops in Madras is about 1 death out of every 10,000 of the strength.

Diseases of the Bowels occasion about one-third of the whole mortality among the British troops in Bengal and Madras. The relative proportion of mortality from particular classes of disease among the European troops in the Presidency of Madras will appear from the following statement, extracted from Table XXXV. Thus out of 1891 deaths,

1195 occurred from diseases of the bowels.

310 fever.

283 disease of the liver.

103 disease of the lungs.

*On the Ratio of Sickness among British Troops in the
Climate of Tropical Asia.*

Although the increase of mortality which occurs among the natives of temperate countries residing in a tropical climate may be taken as the best test of the deleterious nature of the climate, still it is necessary, to render our observations more satisfactory, to examine into the influence which the tropical climate has, on the number of attacks of disease and their severity, together with the ratio constantly sick; and as we formerly estimated the ratio of sickness, &c. among the indigenous inhabitants of Great Britain, it will enable us to compare our observations, by which means the influence of the tropical climate of India will be rendered more strikingly obvious. The following table will illustrate the number of attacks of disease to which

the natives of Great Britain residing in the tropical climate of India are annually liable.

TABLE XXXVII.—Showing the mean annual strength of the British Troops employed in the Presidency of Bengal during a period of seven years (1826 to 1832), together with the number of admissions into Hospital, and the annual ratio of admissions per 1000 of the strength, compiled from Dr Burke's Observations on the Mortality of the Troops in India.

Years.	Mean Strength	Admissions into Hospital.	Ratio of Admission per 1000 of the Strength.
1826,	7976	16,498	2192
1827,	8761	16,439	1876
1828,	8916	16,728	1876
1829,	8680	16,849	1930
1830,	9520	14,037	1474
1831,	9095	12,753	1402
1832,	7956	11,287	1418
Total and mean.	60,904	104,591	1717

By examining the preceding table we find that, in 1826, there were 2192 admissions into hospital for every 1000 British troops in Bengal; in 1827 there were 1876. If we take the average of the seven years over which this table extends, it will be found that there were 1717 cases of disease out of every 1000 of the strength, or nearly two attacks of disease annually for every European in Bengal; and as there are 787 cases of disease annually out of 1000 British troops in Great Britain, we therefore conclude that the attacks of sickness among the natives of Great Britain employed in the tropical climate of India are twice as numerous as if they were residing in their native country. It was formerly stated that the attacks of disease are more numerous among the troops in Great Britain than among the native troops in India, but that the ratio of mortality in both these classes of men was very similar. This fact shows that the intensity or severity of the attacks of disease are greater among the natives of India than the natives of Great Britain. The

following table will give some idea of the intensity of the diseases which attack the natives of Great Britain residing in the climate of tropical Asia.

TABLE XXXVIII.—Showing the total Admissions into Hospital among the British Troops in Bengal during seven years (1826 to 1832 inclusive), the number of Deaths, together with the proportion which the deaths bear to the number treated, compiled from Dr Burke's Observations. See Table XXXI.

Years.	Admissions into Hospitals.	Number of deaths.	Intensity of disease.
1826,	16,498	774	1 death in 21 treated.
1827,	16,439	522	131
1828,	16,728	549	130
1829,	16,849	575	129
1830,	14,037	362	139
1831,	12,753	393	132
1832,	11,287	311	136
Total,	104,591	3486	1 death in 30 treated.

From the above table it will be observed that the intensity or fatal nature of the diseases is subject to considerable variety. Thus, in 1826, 1 death occurred for every 21 treated, and in 1829 there was 1 death for every 39 treated. If we take the average of the whole table it shows that there was 1 death for every 30 treated. Among British troops in Great Britain there is 1 death for every 71 treated, whereas when they migrate to the tropical climate of India, the severity of the disease increases, and there occurs 1 death for every 30 treated.

The *ratio or number constantly sick* is an interesting circumstance in the examination of the health of every community. Information relating to this subject is also of great importance to those who would wish to employ masses of men with effect under different climates. The subjoined table will show the number constantly sick among the European troops at each station in the Presidencies of Bengal and Agra, compiled from

materials in Mr Hutchison's Report on the Jails throughout the Presidencies.

TABLE XXXIX.—Showing the mean Strength of the European Troops employed in the Presidencies of Bengal and Agra during the year 1833, together with the mean number of Sick, and the ratio of Sick per 1000 at each military station.

Stations.	Strength.	Men sick.	Ratio of sick per 1000.
Presidency,	709	115	162
Dundum,	772	131	169
Chensura,	577	88	152
Berhampore,	811	92	113
Dinapore,	1020	128	125
Benares,	1277	172	134
Allahabad,	112	27	241
Cawnpore,	2057	395	192
Meerut,	1995	157	78
Agra,	1089	96	88
Kurnawl,	1166	73	62
Sangur,	89	23	258
Neemuch,	325	54	166
Total and mean,	11,999	1551	129

From the above table we learn that the number constantly sick varies considerably at each station. When we take the mean of the two Presidencies, it appears that there were 129 constantly sick out of every 1000 European troops in Bengal: consequently each patient is confined to hospital 47 days annually; and, for the purpose of comparison, I may here again state, that among British troops in Great Britain, each man attacked with sickness, is on an average only $18\frac{1}{2}$ days in hospital. With the view of rendering more obvious the influence of the tropical climate of India in increasing the number constantly sick I subjoin the following

TABLE XL.—Showing the ratio per 1000 constantly sick among British troops stationed in Great Britain, the same Troops employed in the Bengal Presidency, and the Native Troops in Bengal.

Mean ratio per 1000 constantly Sick.		
British troops in Great Britain,	British troops in Bengal,	Native troops in Bengal,
44	129	47

This statement renders very obvious the influence of the tropical climate of Bengal in increasing the ratio constantly sick among the natives of a temperate climate. Thus out of 1000 men in Great Britain, there are 44 constantly disabled by sickness, whereas if they were transported to Bengal, the number constantly sick would increase nearly three times, or to 129, which is 1 sick for every 8 healthy.

SECTION III.—*On the influence of the Climate of the West India Islands on Natives of Great Britain.*

Ever since the discovery of the West India Islands the climate has been found to be unfavourable to Europeans. Columbus suffered severely, and the armies which have been sent by the different European Powers have been also unfortunate. The greater number of the soldiers sent by Oliver Cromwell against Hispaniola, and afterwards against Jamaica, perished by sickness. In modern times the mortality which takes place among British troops stationed in these islands is also great, as will appear in the sequel.

The Islands of Barbadoes, Trinidad, Grenada, St Vincent's, St Lucie, Dominica, Antigua, St Christopher's, the Bahamas, and the settlements of Demerara and Berbice, constitute what is called the Windward and Leeward Island command.* The mor-

* Ed. Med. Journal, Vol. xliv.

tality which occurs among British troops in these islands will be seen from the following statement :

TABLE XLI.—Showing the Strength and number of Deaths which occurred among British Troops serving in the Windward and Leeward Island command, from 1810 to 1828 inclusive, a period of nineteen years, together with the Annual Ratio of Mortality per 1000, compiled from Returns transmitted to the Adjutant-General's Office, by order of the House of Commons, dated June 1829.*

Years.	Strength.	Deaths.	Ratio of deaths per 1000.
1810,	10,691	1688	157
1811,	9733	1515	155
1812,	10,807	1031	95
1813,	11,277	870	77
1814,	9204	791	85
1815,	8931	1048	127
1816,	6153	969	157
1817,	3882	909	234
1818,	3423	487	142
1819,	3344	319	95
1820,	3108	358	115
1821,	2804	427	152
1822,	2880	223	77
1823,	3421	163	47
1824,	4051	309	76
1825,	3688	375	101
1826,	4298	316	73
1827,	4044	380	94
1828,	3858	308	80
Total,	109,597	12,486	
Mean of 19 years.	5768	657	113

We may estimate the mortality during the whole period included in this table as indicating the influence of climate; for although the war did not terminate until 1814, there were no military operations carried on against these colonies after 1810.

Taking the mean of the above nineteen years, we observe that

* Ed. Med. Journal, Vol. xliv. p. 353.

113 men per 1000 died annually in the Windward and Leeward Island command. It will be observed that the ratio of mortality varied greatly during different years. The subjoined table will show the mortality which occurs in Jamaica :

TABLE XLII.—Showing the Strength, Deaths, and ratio of Mortality per 1000 among the British Troops stationed in Jamaica, from 1810 to 1828, a period of nineteen years, compiled from returns transmitted to the Adjutant-General's Office.*

Years.	Strength.	Deaths.	Ratio of deaths per 1000.
1810,	2952	371	125
1811,	3006	413	137
1812,	3131	504	160
1813,	2878	402	139
1814,	3621	341	94
1815,	3129	374	119
1816,	4485	459	102
1817,	2179	321	147
1818,	1956	207	105
1819,	1910	800	418
1820,	1788	295	165
1821,	2116	446	210
1822,	2128	311	146
1823,	2086	174	83
1824,	2500	251	100
1825,	1697	802	472
1826,	2110	165	78
1827,	2132	640	300
1828,	2243	184	82
Total,	48,047	7460	
Mean of 19 years,	2,528	392	155

This table may be thus read : Of every 1000 men employed in Jamaica in 1810, 125 died ; in 1811, 137, and so on,—the mean of nineteen years being 155. The annual ratio of mortality in Jamaica, as in the Windward and Leeward Islands, is

* Edin. Med. and Surg. Journal, Vol. xlv. p. 355.

liable to great variations ; for example, in 1826, the deaths were 78 per 1000, and in the following year, 1827, they were 300.

Puerto Rico, north latitude 18° , one of the West India Islands, belongs to the Spanish government, and is garrisoned with Spanish troops. It will be interesting to compare the mortality which occurs among the natives of Great Britain employed in the West India Islands with natives of a more southern latitude of the temperate zone, exposed to a similar climate.

From the examination of the mortality which occurs among the Spanish troops in Puerto Rico,* we learn from the mean of fourteen years (1817 to 1830,) that the annual strength was 803, and the annual number of deaths 48, consequently the ratio of mortality was 59 per 1000 of the strength, or about $5\frac{3}{4}$ per cent. This is little more than one-half of the mortality which has been estimated to occur among soldiers of Great Britain employed in the West India Islands.

The southern limit of Spain, from which kingdom the Spanish regiment is recruited, is about 36° of north latitude, the mean temperature of which is 66° ; whereas the southern limit of the united kingdom is 50° north latitude, and the mean temperature 53° . We thus observe that the difference of 16° of latitude, and 12° of temperature, appears to render the natives of Spain less liable to the injurious influence of the tropical climate of the West Indies than the inhabitants of Great Britain. It is requisite, however, before this comparatively low rate of mortality can be attributed to the constitution of the Spaniards, to institute a comparison betwixt the natives of Great Britain and Spain residing in the same tropical climate ; for we have already seen how materially different the mortality among the natives of Great Britain employed in the Windward and Leeward Islands is to that occurring in Jamaica ; and if we had materials showing the mortality in each island separately, the difference, we have little doubt, would be still more striking. Colonel Flinter, who served with the British and Spanish armies for a period of twenty years in the West India

* Edin. Med. Journal, Vol. xliv. p. 39.

Islands, remarks, "that the Spanish soldier suffers less, and the British soldier more, from the effects of the West India climate than those of any other nation. This (he continues) may partly be attributed to the climate of Spain being warmer than that of England, and partly to the habitual abstinence of the Spanish troops."*

Having adduced these facts as illustrating the influence of the climate of the West India Islands on European troops, I shall now briefly examine the principal diseases which occasion this high ratio of mortality, and for this purpose the following statement is subjoined :

TABLE XLIII.—Showing the mean annual ratio of Mortality per 1000 from eight classes of Disease among European troops in the Windward and Leeward Islands and Jamaica, from eighteen years observation, (1817 to 1834.) †

Classes of disease.	Annual ratio of Mortality per 1000.	
	In Windward and Leeward command.	In Jamaica.
Fevers, - - -	38.6	112.6
Diseases of lungs, - -	10.5	7.4
liver, - - -	1.9	.8
bowels, - - -	19.0	4.5
Cholera morbus, - - -	.2	.1
Disease of brain, - -	3.2	1.7
Dropsies, - - -	2.	1.1
Other diseases, - - -	4.6	2.8
Total, - - -	80.	131.

Fever prevails to a much greater extent among British troops in the West than the East Indies. We have seen that the annual ratio of mortality from fever among European troops in the Presidency of Bengal was 15 per 1000, and in Madras 6. In the former Presidency fever occasioned about one-fourth part of the whole deaths, and in Madras one-eighth; whereas we

* Edin. Med. Journal, Vol. xliv. p. 40.

† Ibid.

find from inspecting the above table, that the annual ratio of mortality from fever in the Island of Jamaica is 112 per 1000, and in the Windward and Leeward Islands 28. In Jamaica, therefore, fever occasions nearly the whole mortality, and in the Windward and Leeward Islands more than one-half. The predominance of fever over every other fatal disease among the British troops in the West Indies is well illustrated by the following abstract of Dr Adolphus's return of the strength and mortality of the troops serving in Jamaica from 1823 to 1825 inclusive. The mean annual number of deaths by all diseases was 371, and of these

341 occurred from fever.

15 ————— pulmonary disease.

12 ————— bowel complaints.

3 ————— hepatitis.

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It was formerly stated, when estimating the prevailing diseases among the African troops in the West India Islands, that the great mortality arose from disease of the lungs, and that the deaths from fever held but a secondary place. Thus among the African troops in the Windward and Leeward Islands, fever occasioned only one-tenth part of the whole mortality, whereas in the same islands disease of the lungs occasions nearly one-half of the whole mortality.

Diseases of the Lungs.—We have seen that among British troops in the climate of tropical India, the rate of mortality from pulmonary affections is not so high as that which occurs in Great Britain. This fact might be attributed to the genial influence of a tropical climate on those subject to pulmonary disease, did we not know that pectoral diseases are more fatal among British troops in the tropical climate of the West Indies than in Great Britain. Thus in Jamaica the annual ratio of mortality from disease of the lungs is 7.4 per 1000, and in the Windward and Leeward Islands, 10.5. The climate of the West Indies appears to be a powerful cause of pulmonary dis-

ease, for it will be recollected that the greatest proportion of deaths among the negro troops in the West Indies is occasioned by pectoral complaints.

Disease of the Bowels.—In the West India Islands, abdominal diseases do not cause so high a ratio of mortality as occurs among Europeans residing in the peninsula of India and the oriental islands. The above table shows that during the period over which its observations extend, the mortality from disease of the bowels has been much greater in the Windward and Leeward Islands than Jamaica. The ratio of deaths from cholera, it will be observed, is comparatively low. Regarding the other classes of disease indicated in the preceding table, I have nothing particular to remark. If we compare the above table with Table V. showing the mortality from eight classes of disease among the African troops in the West Indies, it will be observed that the ratio of mortality from each class of disease differs among these two races of men, although residing under the same climate, and having similar food, accommodation, and exercise.

Recapitulation.—Having concluded our observations on the influence which an intertropical climate has on the health and mortality of the natives of a temperate country, I shall now briefly state the facts which have been collected on this subject, so as to render them of more easy comparison. The ratio of mortality which occurs among the natives of Great Britain residing in countries situated within the tropics is much greater (in all the instances we have examined) than that which happens in their native country. This will be rendered obvious at one glance by the following statement :—

TABLE XLIV.—Showing the mean annual Strength and annual ratio of Mortality per 1000 which occurred among British Troops serving in the under-mentioned countries, together with the period of observation, and the increase of Mortality over that of Great Britain.

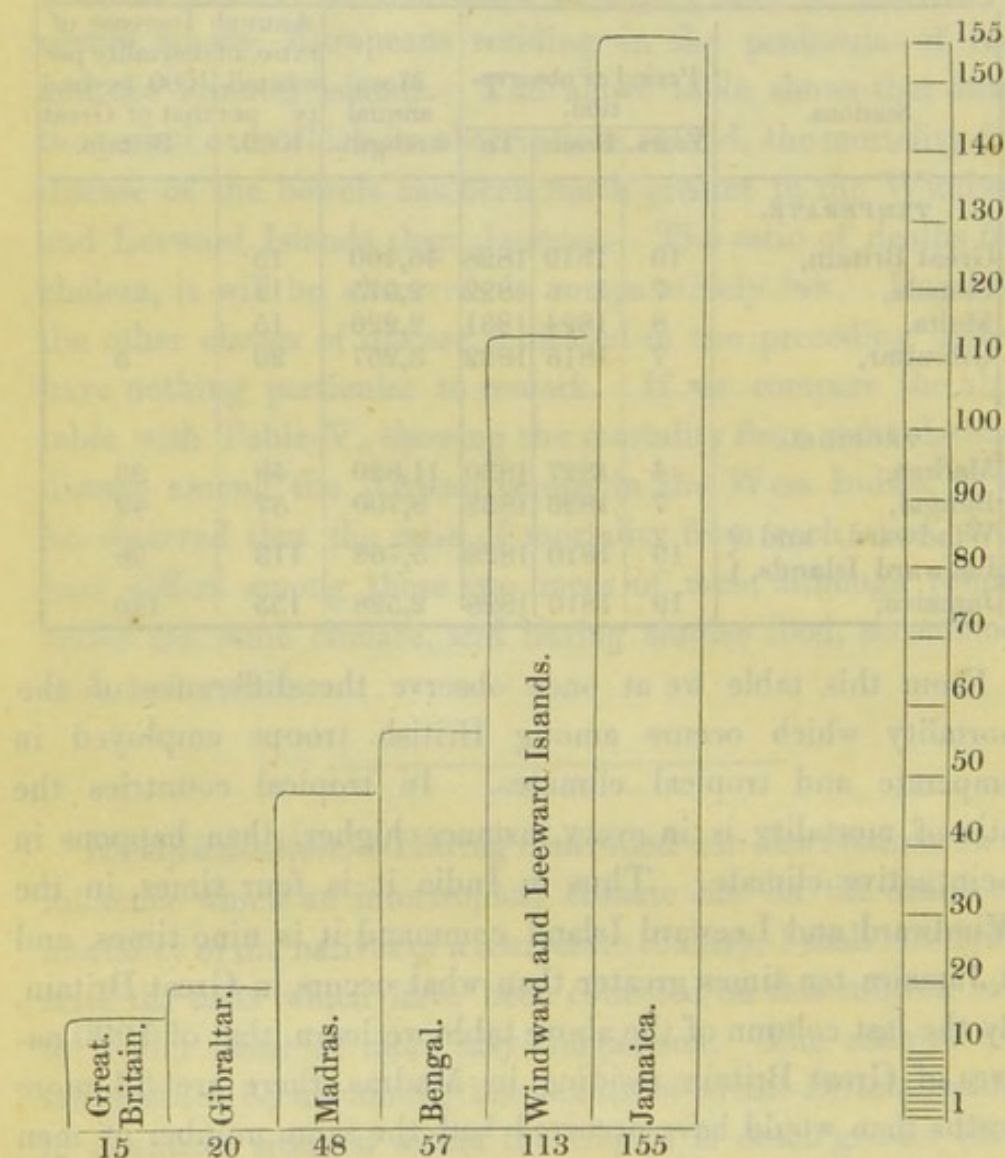
Stations.	Period of observation.			Mean annual strength.	Annual ratio of mortality per 1000.	Increase of mortality per 1000 beyond that of Great Britain.
	Years.	From	To			
TEMPERATE.						
Great Britain,	10	1819	1828	46,460	15	
Canada,	7	1 6	1822	2,975	11	
Malta,	8	1824	1831	2,226	15	
Gibraltar,	7	1816	1822	3,267	20	5
TROPICAL.						
Madras,	4	1827	1830	11,820	48	33
Bengal,	7	1826	1832	8,700	57	42
Windward and } Leeward Islands, }	19	1810	1828	5,768	113	98
Jamaica,	19	1810	1828	2,528	155	140

From this table we at once observe the difference of the mortality which occurs among British troops employed in temperate and tropical climates. In tropical countries the ratio of mortality is in every instance higher, than happens in their native climate. Thus in India it is four times, in the Windward and Leeward Island command it is nine times, and in Jamaica ten times greater than what occurs in Great Britain. By the last column of the above table we learn, that of 1000 natives of Great Britain residing in Madras, there are 33 more deaths than would have occurred had the same number of men been living in Great Britain, so that the insalubrity of the climate of Madras may be stated at 33.

Again, of 1000 natives of the united kingdom residing in Jamaica, there are 140 more deaths than would have occurred had the same number of men been stationed in Great Britain; the insalubrity of the climate of Jamaica is therefore 140. The following sketch will render more obvious the increased morta-

lity which occurs in tropical countries, among the natives of a temperate climate.

Diagram, showing the relative annual Mortality among British Troops at the under-mentioned stations.



We formerly stated that Mr Edmonds had assumed, from a great extent of observation, that there occurs about two years of sickness to each death, and that there is little deviation from this rule, except in very unhealthy climates. In the English army, at home and inactive, there are two years and a-half of alleged sickness to each death. In the English army in the East Indies,

there is one year and eight months of sickness to each death ; and in the English army in the West Indies, the sickness is estimated at one year and four months.* From these facts, we conclude that the diseases which attack Europeans in the East and West Indies prove more rapidly fatal than occur among them in their native country.

It may not be out of place here to observe, that the mortality among officers of the British army serving in tropical climates is not so high as that of the soldiers. Thus taking the mean of all the tropical stations where British troops are employed, the annual ratio of mortality per 1000 among the officers is about 29, whereas among the soldiers it is 78.† I may state, however, that there are many causes which tend to diminish the mortality among officers which the private soldier cannot avail himself of, such as returning to England when sick, additional comforts, &c. ; but I refer the reader for an explanation of this to the paper above alluded to.

This comparatively low ratio of mortality among the officers serving in tropical climates, compared with that of the private soldier, shows how the influence of a tropical climate may have its deleterious influence ameliorated by care ; and although we cannot attribute the increased mortality which occurs among the natives of Great Britain residing in tropical climates entirely to their habits and condition, it is to be expected that the mortality might be materially diminished by careful attention to the diet, clothing, and accommodation. Thus, Isert (in his *Voyage to Guinea*) attributes the mortality of the Europeans in that region to their licentious mode of living, which is totally misplaced in that climate. Colonel Flinter regards the habitual abstinence of the Spanish soldiers as the cause of the comparatively low ratio of mortality which occurs among them in the West Indies.—Niebuhr, also, who saw all the companions of his travels perish around him, remarks in his *Account of Arabia*, that

* British Medical Almanack, 1836, p. 111.

† Data obtained from a paper on this subject in the *United Service Journal*, by Lieut. Tulloch, 45th Regiment.

their diseases arose from their European mode of life, such a eating too much animal food, and exposing themselves to the night air. *

Concluding Observations.

From the foregoing statement of facts or results we may conclude :

1st. That the annual ratio of mortality which occurred among the slave population of all ages in the British settlements in the West Indies varied from 25 to 41 per 1000, or, taking the mean, to be 28 per 1000 annually, which is about 1 death out of every 35. (The period of observation was about thirteen years.)

2d. That the mean annual mortality which occurred among the black troops, Africans, employed in the Windward and Leeward Island command, for a period of nineteen years, was 55 per 1000, or 1 death annually out of every 18 men.

3d. That one-third of the mortality among the negro troops in Jamaica is caused by pulmonary disease, one-tenth by disease of the bowels, and about one-fourth from fever.

4th. That the annual ratio of mortality among the population (all ages) in Madura and Dindigul provinces in India, was 13 per 1000.

5th. That the mean annual ratio of mortality which occurred among the native troops in the Presidency of Madras for a period of four years was 13.5 per 1000, or 1 in 74.

6th. That of the 13.5 per 1000 that died in Madras, 2.5 per 1000 died from fevers, 0.6 from diseases of the lungs, 4.4 from disease of the bowels, and 6 from other diseases.

7th. That the mortality which occurred among the native troops in the Bengal Presidency for a period of one year was 10.6 per 1000.

8th. That out of every 1000 native troops in the Presidency of Madras, 527 have an attack of disease annually, and that

* Rudolphi, Grundriss der Physiologie, i. as quoted in Hawkins' Medical Statistics.

there occurs 1 death for every 39 treated. (Period of observation four years, 1827 to 1830.)

9th. That out of every 1000 native troops in the Presidency of Bengal and Agra, 47 are constantly confined to hospital with sickness.

10th. That the most fatal season of the year among the natives of Great Britain residing in the West India Islands, are the months of August, September, October, and November.

11th. That the annual ratio of mortality which occurs in sixteen countries of Europe varies from 1 in 26, or 38 per 1000, to 1 in 51, or 19 per 1000.

12th. That the annual ratio of mortality among British troops stationed in Great Britain is 15 per 1000.

13th. That the expectation of life in ancient Italy was shorter than the expectation of life at present estimated for England and France.

14th. That the most fatal class of diseases among the inhabitants of London is pectoral complaints, after which come fever, (idiopathic and exanthematous.)

15th. That the annual ratio of deaths per 1000 of the inhabitants in London from consumption and fever have gradually decreased since the middle of the fifteenth century.

16th. That the annual ratio of mortality among the inhabitants of all ages in the Cape of Good Hope in 1834 was 1 in 74, or 13 per 1000.

17th. That out of every 1000 British troops in Scotland, 787 have an attack of disease annually, and there occurs 1 death for every 71 treated. (Period of observation seven years, 1816 to 1822.)

18th. That out of every 1000 British troops stationed in Great Britain, 44 are constantly confined to hospital with sickness.

19th. That the most fatal season of the year in London and Belgium are the months of December, January, February, and March.

20th. That the seasons have a greater influence on the mortality in countries, than towns.

21st. That the annual ratio of mortality among British troops serving in the Presidency of Bengal is 57 per 1000, or 1 death out of every 17 men. (Period of observation seven years.)

22d. That of the above mortality of 57 per 1000 among British troops in Bengal, 15 per 1000 died from fever, 18 from disease of the bowels, and 24 from other diseases.

23d. That the annual ratio of mortality among British troops serving in Madras is 1 in 21, or 48 per 1000. (Period of observation four years.)

24th. That of the above mortality of 48 per 1000 among British troops in Madras, 6.5 per 1000 occurred from fever; 18.7 from disease of the bowels; and 2.2 per 1000 from disease of the lungs; the remaining 21 of other diseases.

25th. That out of every 1000 British troops in the Presidency of Bengal, there are 1717 admissions into hospital, or nearly two attacks of disease annually, for every European soldier in Bengal, and there occurs 1 death for every 30 treated. (Period of observation seven years.)

26th. That out of every 1000 British troops in Bengal, 129 are constantly confined to hospital with sickness.

27th. That the annual ratio of mortality among British troops serving in the Windward and Leeward Islands is 113 per 1000, or 1 in 9. (Period of observation nineteen years.)

28th. That the annual ratio of mortality among British troops in Jamaica is 155 per 1000, or 1 in 6. (Period of observation nineteen years.)

29th. That seven-eighths of the mortality among British troops in Jamaica is caused by fever, and about one-eighteenth by disease of the lungs.

THE END.