THE

Etymology

of

Climate

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Preface

To all beings endowed with reason the physical phenomena of creation afford a field of study and research in which it rejoices the mind to be exercised; and so varied and peculiarly adapted are the provinces of this wide realm to the capacities of different minds, that one almost deems it strange that the attention of each thinking being is not arrested by the symmetry, the beauty and the grandeur of Nature.

Besides the wonderful and perfect laws which govern matter in its purely physical condition (I mean uninfluenced by created being) there are other substances and other laws no less wonderful than those controlling material phenomena, and in some respects analogous to these.

It has been doubted indeed whether the mind has any existence apart from matter, and such doubts as still entertained by many eminent authorities in science; but, doubt as these philosophers may
most authorities upon the subject agree
that the existence of mind is at least
as certain as that of matter;—still I
think it will be admitted that of the
nature of mind when separate from a
material organization we know less, than
we do of it as inhabiting the human form.
Of the wonderful effect of mind we have a
good example if we compare or rather
contrast the many contrasts of the human
body with the much larger muscular de-
velopment of many of the lower animals,
his servants, and again contrast the
many efforts of the animal with the
prodigious and complicated contrivance
and gigantic achievements which man
is enabled to employ & accomplish.
In pursuing the study of man, as
all must more or less do who engage in
the pursuits of medicine, this observer has
no light task before him—
Mind and the laws thereof are little
understood—And even the laws of matter
with which philosophers are better acquainted
are but little known comparatively in relation to vitality and reason.
It is not my purpose in the few following pages to enter upon such a wide field as the relation of organism to life and mind opens up, nor yet to investigate any of the aberrations from the standard, which occur in either but rather to enquire into some of the causes which produce in the human family such varieties as obtain in various parts of the globe, and point out a few of the agents producing changes in health and disease, in as far as these changes are attributable to the influence of climate.
The Etiology Of Climate

In many treatises professing to deal with the subject of "Climate," the writers overlook the importance of having a definition of what they mean by the term. But it will not do in writing upon this or any subject to go upon the supposition that everybody knows what the terms employed mean. They are used by everybody — before entering upon the consideration of some of the causes of Climate let us have a definition of what the term means — In books it is seldom defined so that we are compelled to define it ourselves. By the Climate of any place we mean the sum of the atmospheric influences acting at that place, including in them the operation of substances suspended in the air, or acting through it or transmuted by it — as light heat — electricity, etc.
In this sense the atmosphere in which an individual is, produces his climate for the time being, so that the farmer, the Lucifer-match maker, and the needle-pointer, have each a distinct climate differing very materially in the effects produced. But a consideration of the subject from that point of view would open up too wide a field for consideration here.

According to this definition, climate may be of various kinds it may be hot or cold, mild or rigorous, bracing or relaxing, healthy or unhealthy. What most people desire who have any wish in the matter is, to have a good climate. But what is a good climate? That the climate depends upon several circumstances—what would be a good climate to an Indian or an Equinoxant. And promote their health and happiness should not suit the Arab or the Negro of Tropical Africa, nor could the farm withstand the
invaded sun and burning soil of tropical lands. The Swiss, though thriving among their own mountain-valleys, could not so well sustain life among the plains and Pampas of South America, and as little would the inhabitants of these endure a transplantation to the hot Alps. We see in this as in many other respects how much man is the creature of habit, and, (upon the supposition of our parent stock) how his constitution may be strangely altered to suit the various climates which obtain in different regions of this world.

Besides the directly climatic, other elements exercise much effect upon men of different climes under various circumstances: for instance where animal food is abundant and the soil rich in vegetable life, the habits of the people and their consequent development will be widely different from those of a race whose sustenance is from its scarcity to be bought over a wide area. Thus certainly much exercise and
Causing great hardness and physical development. We will thus influence affect the bodies, alone of the letter, but their imagination and the whole tenor of their intellectual and mental operations will be moulded by the physical phenomena around them, and the modifications produced by those in their domestic and other arrangements.

Among the phenomena which are most important in producing or maintaining different kinds of climate, that of temperature or sensible heat is perhaps the first. The heat of the surface of the earth is now known to be chiefly, we may say wholly due to the sun's rays, and the temperature of any place is directly according to the amount of these rays, their vertical direction, and the time during which they fall. Besides these modifying circumstances there are various others, hereafter to be mentioned, which interfere with the universal application of this rule.
The direction of the sun's rays, the most important of the causes of heat, (at the sea level at least) is chiefly affected by latitude. The temperature of places between the tropics is, as a general rule, greater than those further removed from the equator, although the points of equal average temperature are not all equidistant from the equator; the lines of equal temperature or isothermals are not parallel to it.

It is an obvious fact that the nearer to the perpendicular that rays fall upon any surface the more are absorbed and that when the angle of incidence gradually is enlarged there and more of the impinging light and heat are thrown off and lost. Now the sun being perpendicular for the longest period over the equatorial region, that (coolly) is the line of greatest heat. In other parts of the tropics while his beams fall vertically during a shorter period the average heat of the year is proportionately less.
less, and in the Temperate zones his heat
and light-giving power are still more di-
iminished--; but it is in the Polar region,
the home of eternal ice and snow that
the marked obliquity of the sunlight
together with its total absence during
considerable periods point most plainly
of the sun as the source of heat to this
planet. Besides affecting the general
temperature of the zones of the globe, the
lengthened or shortened time of exposure
to his beams, and their greater or less
obliquity, have also marked influence
upon the climate of particular districts
and localities. This is familiar to
farmers and gardeners in this country,
who for this reason prefer land with
what is called a southerly exposure—
that is sloping toward the sun.
The influence of the slope of the land
upon its climate is likewise visible
in the greater warmth and milder
climates of those European countries
which border on the Mediterranean and
in the Southern Portions of our own shores Altitude has much to do with the temperatute of a place.

From various observations it would appear that the temperature of the air diminishes in a fixed ratio as we ascend, so that even at the tropics Equator the Climate of a place will vary (as far) as its height above the sea. Altitude though interfering with the temperature which would exist were the surface of the earth uniform in contour, affords by its modifying influence a confirmation of the opinion that the air is the source of heat to the earth and also supports the view that the air is heated chiefly by contact with the heated earth. From its effects we also see that the direction of the sun's rays is not the only essential for a warm climate an yet situation between the tropics.

As in different latitudes we see distinct forms of animal and vegetable life so from the lofty Equatorial lands to the sea level we have a similar arrangement.

The
The Conditions induced by Altitude being such as to prevent the existence of ever-alpine forms at the Equator. When the elevated region is a single mountain, or a chain of three, the effects of its elevation are seen much lower than in the case of table lands of the same cause;—for the former can like ancient memonics of the body, or line oftinets of grass on a Forty Night—be readyed part with their heat. We find for instance that the Himalayas have the spirit of perpetual snow, much nearer the sea-level on the south side of the range than it is to the north—but the cause of this appears in the elevated table land to the northward.

The surface of the earth is as little uniform in composition as it is in configuration—and as different substances have different relation to heat so the temperature varies somewhat according to composition; The nature of the surface—most obvious variations in noticable when the temperatures of sea level are compared.
It is matter of common observation that land is more quickly heated than water but that the latter does not cool so readily. Water heated through the day retains its heat till late in the night, long after the surface of the Earth has cooled and in the following week already the Earth is warm the water remains cold.

Now what is the effect of that upon the air? It is simply this, that the air which exchanges water exposed to the Sun’s rays, sympathizes with it, so to speak, and is more equally heated during the twenty-four hours than the air over land in similar regions. Extreme degrees of heat and cold are to be met with over land most removed from sea, while ocean temperatures are much more uniform.

The atmosphere of which we are now led to speak derive almost chiefly from the Earth and sea while but little of its sensible heat is derived from the Sun’s rays — as light passes through the
The atmosphere much of it retained. Horizontal bands of snow through about 200 miles of atmosphere before they reach the eye ... much of their original intensity. Heat is however unlike light which when retained by the atmosphere ... will be reflected from the particles of air - does not impart any of its properties to the media which it passes. The air however contains water vapour which absorbs both light and heat and consequently raises the temperature.

The fact of the existence of a high degree of internal heat is now undoubted as regards the earth, but this it appears though recently in the town of... has no appreciable effect on the external surface. This is due to the... conducting nature of the external parts of the earth's crust. Its influence is however shown locally in the presence of volcanoes and hot springs which locally affect the local temperature very little.
The other ordinary sources of heat as Friction, Percussion, Chemical Action and Accumulated Electricity have not much direct influence upon Temperature in general, but there is one other mode of the production of heat which must exercise some influence on the Climate of those regions where the Conditions for its manifestation obtain. When upon Substances are moistened, the temperature is observed to rise considerably, the elevation differing according to the Substance employed. Thus pulvérized Mineral Substances when moistened raise the Temperature two degrees F., while of Thread Bobbin and paper it some raise. This is more marked as high as 117. Now a Caustic like this operating upon a large area will give rise to remarkable Changes in various ways. And it may be that to this among other agents is to be attributed the Transformation—wondrous in its rapidity—that is noticed in some
of the regions of the new World and elsewhere - the almost instantaneous appearance after rain has fallen, of vegetable forms in profuse abundance on the arid prairie and desert.

The terms heat and cold as used popularly mean that heat is present in greater or less degree but also that the heat is manifested either as a gain or a loss. The atmosphere is however often really much colder, and at other times much hotter than, judging by sensation alone we would conclude; for heat and cold are less felt when the air is still than when it is in motion, - when there is much moisture in it than when none is present. So that our varying sensations under the same temperature, and also those of different individuals under the same conditions show us that the sensibility of the human body to the influence of heat and cold
Cold is not a good criterion of temperature — still it is more according to these sensations and the resulting changes that we judge of the character of climate and season. Currents of air and water exercise a potent influence on the distribution of the heat of the different zones and states of the air and also have much to do with the variation in these, and consequent changes which produce marked effect upon the climates of various countries.

Currents of air may for convenience be classified as tropical, temperate and polar — though some of them extend over all three regions. It results from the greater heat before referred to as occurring at the equator, that the air in that portion of the earth, becoming heated expanses, becomes lighter and ascends. This gives rise...
Gentlemen and ladies in the assembly of
promises or a nation the year they
are called upon to make the laws they
have consented to form (c. xiv. 59-60 N.C.)

In the presence of Congress, in open meeting.
Iroquois, from Congress, in open meeting.

The committee, being firm in principle, can
the Constitution and every provision that
have been made by the law of the land and
the Congress, and the Congress, and the
By your humble petitioner.

I am your humble servant,

The President of the Congress.

—If this be true, I pray you put
furnace the laws as you will, but
we are

They can do the same, so let them
accord. Peace in our time. I pray you,

put to an inspired customer, whose

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of variable winds and calms. The air before referred to as spreading in the upper regions, and falling over towards the poles is not of course felt as a wind on the surface in these regions, but upon the summits of the Alps and some of the Sandwich islands. This wind is felt at a height of about 12,000 to 18,000 feet as a strong contrary current. While the clouds below are at the same time seen to be hurried along by the North-east trade.

These statements as to tropical winds hold true for the Atlantic and Pacific oceans, but in the Indian and elsewhere deviations occur. In the Indian and Indo-Chinese waters, the region of calms is wanting, as are the regular tradewinds. The prevailing winds are termed monsoons, which appear to be the result of the more regular currents modified by the peculiar distribution of the land. The monsoons are periodical trades.
winds blowing in different directions at different times of the year and varying in direction in different places.

Within the area of their prevalence we find the dangerous Typhoon of the Chinese seas which occurs in summer and autumn.}

destructive hurricanes also have their favourite haunts in this vicinity, their nest appearing to be in the East Indian Archipelago to the N.W. of Australia where the S. E. trade winds and the N.E. Monsoons meet. They occur from January till April.

Almost the only other exceptional worth mentioning, are the Hurricanes of the Northern Hemisphere. These pierce in the American Waters on the East side of the New World—They usually come from the E. or South E. course along the Northern shores of South America and traversing the East Indies go off to the North or N. E.

In tropical regions there are temporary local winds—e.g. the Land and Sea Breezes
breezes which exercise considerable power in affecting the temperature of places near the coast, at different times of the night and day.

In the temperate zones these winds are not so constant as between the tropics. The high wind from the equator gradually loses heat and approaches the surface of the Earth, where it is met with at about lat 50°. In this country we often experience it warm and as it carries much moisture it is the cause of decided fall in the barometer. It is a west or south-west wind with us - this motion given to it at the equator along with its northward tendency combining to produce this result. In the Southern Hemisphere the prevailing southerly wind comes from the W.W. The current of cold air from the poles also appears in the temperate zones of both hemispheres as a north-east or east wind.
In the Polar regions the direction of the prevailing winds is towards the equator.

Such is a brief and general sketch of the principal air currents, most important agents in modifying temperature.

Of the streams of ocean less is known, but the principal courses are pretty well made out. One of the most important currents is the Gulf Stream with which all are more or less acquainted. Crossing the Atlantic in Equatorial regions is the parent stream of this wonderful salt water stream. It splits upon Cape St. Roque in S. America whence its waters are directed by the lie of the shores and ground, north and south to warm the colder seas of higher latitudes.

The Gulf Stream after coursing round the Caribbean Sea and
Gulf of Mexico (whence it derives its name) Coasts the Peninsula of Florida and finally divides off the N. American Coast into various currents—recrossing the Atlantic in different directions—one branch rejoins the Equatorial Current from which the Sargasso, another passing southward in the region of the Canary Islands forms a current off the W. Coast of Africa; a third visits our own shores and raises the average temperature of Western Europe while a fourth does the same good office for Iceland and the Northern ocean. A current of cold water from Baffin's bay and the coast of Greenland meets and mingles vantage curves with the waters brought northward by the Gulf Stream, off the coast of Newfound land Constant winds like the Trade winds and Monsoons occasion Surface currents or drifts as we are termed.
Next to temperature, moisture is the agent which gives the greatest variety to climate. The winds previously noticed carry more or less moisture, for this is one of the most constant components of the atmosphere. Those air currents from the equator known among countries in our own latitude as W. and W. winds, convey much aqueous vapour which their exalted temperature enables them to bear high in the atmosphere.

In this region, various causes upset the equilibrium, and some of the moisture is parted with and falls as snow or hail rain. These winds thus convey to our country and other similar situated the heat of tropical zones and moreover in the case of Europe they transmit, besides, the heat derived from the Gulf Stream as well as their own to those countries whose coastline is towards the W.
of the current from the poles to the Equator, meet with among us at East and North-East winds, carry a much less amount of moisture, and even that comparatively small quantity, near the ground because of its low temperature. So that although the barometer is seldom high during an east wind, the moisture is apparent as East Air, sometimes accompanied by rain orleet or snow.

Besides this coming from regions possessing different temperatures, there is another reason for the peculiar character of each of these winds - this that while the former passes over much ocean surface and the originally opening from tropical seas the latter have runned and plains of Russia Central Europe. Hence but little moisture can be derived.

The moisture of a country is regulated very much by the nature of the prevailing winds, its proximity to the tropics and its distance from the sea.
In countries near the tropics there is generally speaking more rain than in other parts of the world, the rainfall gradually diminishing towards the poles. Within the tropics as much as 300 inches and even more may fall annually while in high latitudes as e.g. in Siberia the rainfall is reduced to 12 inches as the mean annual amount. In some regions no rain falls. This is the case in a large district of the old world comprising the Sahara desert & parts of Egypt, Arabia, Persia and Central Asia. Along the coast of Peru and in some parts of Mexico this entire absence of rain is likewise observed. The cause of this exceptional peculiarity is partly the intercepting power which the lofty mountains in the vicinity of some of these districts exert in stopping the further progress of clouds and of condensing the moisture of the prevailing winds. The absence of rain from the
Sahara and Parts of Egypt & Arabia maybe due in some degree to the
distance of those regions from the ocean
The absence of winds from the sea - but
perhaps is more to be attributed to the
nature of the Country and the intense
heat there developed.

Besides the power which hills possess of
absorbing moisture from winds and thus
rendering the countries over which these
pass, this dries even to the extent of
reducing them of rain altogether,

they possess other influences upon winds,
so that they may give direction, thus
rendering certain localities more subject
at one time than another to particu-
lar winds, or by their peculiar disposi-

tion around they may protect from noxious
scales while allowing of more favourable
and healthy breezes. But the vicinity
of mountains is generally apt to be
visited by injurious and sudden

gusts, and when the hills are snow
covered their winds are severely felt.
More especially are they observed to be fruitful when, as is sometimes the case, they make their sudden descent into valleys and districts whose climate is at other times genial and warm. Good illustrations of this species of climate are to be found along the Mediterranean shores of Europe. In Italy especially is it observed for here the Remontane from the snowy ranges and summits of the Alps rises alternates with the still hot and parching air.

The may be, however, too much shelter from winds - many of these are pleasant and conducive to health - indeed a certain amount of motion in the air is essential to the health of a district. If there is no breeze to carry them off, vapours and malaria arise and infiltrate the atmosphere and render life if not hazardous at least uncomfortable - this is the case in some of the Swiss Valleys which, deep, long, and tortuous, seem to defy even Alpine gales.
gales to penetrate their mesoatomic stagnation. In these localities it is that eutrophin and granite have their abode, and these diseases have been attributed in some measure to the close and unhealthy air. Referring again to the fall of rain we would observe that although more rain occurs near the Equator - it does not follow that the rainy days are more numerous than those in other regions of rain in the Equatorial belt. The rain falls in the Indian Ocean and the Countries. And islands adjoining the rain falls during the S.W. Monsoon (from April till October) while during the N.E. Monsoon (Oct to April) the weather is dry - but the humid atmosphere. The regular rains are as little seen as regular winds - and the frequently wind and rain bear each other company. The former is seldom without the latter.
In Europe the countries where much rain falls lie to the West and South—Where they appropriate the moisture of the cloud-bearing Atlantic gales. In these the period of greatest rain-fall is Autumn. For the Central Countries of the Continent in Russia and Siberia also the time of greatest rainfall is Autumn. The Eastern parts of Summer rains are also the rule in North America—Constant rain occurring throughout, and the rainfall in Winter in the interior. As to the Southern parts of the globe Patagonia has a Summer rain fall on the East Coast & Autumn one on the West, while at Cape Hope Constant rains show persist. Winter Rains are the rule in South Australia and New Zealand and Autumn Fall at the Cape of Good Hope. In regard to Tropical regions the time of rain falling is pretty certain, but in the Temperate Zones rain may fall any day of the year. Again, though rain generally falls 3 days in the tropics—that rule does not hold in polar or Temperate Regions.
The character of winds that have crossed over a large extent of water differs we have seen from that of a land wind — and sea winds and land winds differ as much among them selves as they do from each other. Various writers have notice of the effects of particular winds upon the system. It is stated that in Andalusia when the Zolano — an east wind — blows, quarrels become more frequent and in the trials which result this fact is in part admitted as excuse. If the order of these events were reversed the sequence would be more apparent to British minds we think. At Gibraltar the Levant is during its occurrence a source of unendurable discomfort. At Toulon the Autun a dry and irritating wind seems to have the effect of causing nervous Remorse. At Naples the Vespro is said to cause apersion of mind and during its stay operations are thought dangerous.
At Madrid the air is peculiarly clear and penetrating and this is in part due to the natural character of the surrounding district which renders the wind passing over it dry and cutting, the high elevation of the country giving a lower temperature and rare atmosphere. These effects of peculiar winds on the mind and body are stated to be independent of temperature. They seem generally to be produced by winds which have passed over a large surface of land, dry and of considerable elevation.

These are the chief causes in producing the different climates of countries, whether they be near the poles or the equator, and varieties of climate to be found within these countries themselves are also principally caused by the operation of the agencies which we have been considering. Other agents there are which have some influence in changing temperature...
or affecting in some degree the causes already noticed but they are of comparatively small account.

As instances of these we might lay down:
- The occurrence of rivers;
- Electrical phenomena;
- Drainage, natural or artificial;
- Vegetation naturally or artificially disposed;
- Geological formation and the nature of the soil — as well as its color.

The last mentioned is the most important but its influence is not constant nor of perfect importance.

Having considered the causes of climate — a word as to their effect

Upon visiting Madeira and Fernha, Humboldt thus remarks:

"No country seemed more fitted to dissipate melancholy and restore peace to an agitated mind than Fernha, Madeira. Where the natural beauty of the situation and the salubrity of the air conspire to quiet the anxiety of the spirit and to invigorate the body."