
 THE AGE OF FIRST MENSTRUATION AT POLE AND EQUATOR.

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“Milieu” alone, the “tout-ensemble” of all conceivable causes, seems to explain these as yet unaccounted for variations in the age of First Menstruation.

I.—PRECOCIOUS PUBERTY IN THE TROPICS AND RETARDED DEVELOPMENT IN THE ARCTIC REGIONS ERRONEOUSLY ASSUMED.

Precocious menstruation at 9 or 10 in the Tropics and retarded development, with puberty at 18 or 20 in the far North is a myth which has so long prevailed, has been taught from generation to generation, copied from text-book to text-book, and is, moreover, so much at variance with the actual facts that these erroneous views should be promptly corrected, and this can be done only by presenting the subject for the consideration of a great international gathering such as this.

A study of the age of first menstruation at Pole and Equator has developed facts of great ethnological and physiological importance and, moreover, facts diametrically opposed to all hitherto accepted teachings: pubertal development is *not* as a rule *early in the Tropics* and *late in the Arctic regions*: the negro woman of Somaliland develops at 16, as late as the Laplander in Norway; and the Samoides on the Obi River in Siberia become mothers at 11 or 12, as early as the Hindoo girls of India and even earlier: The Eskimo women of Greenland develop much as do the Moorish women of Morocco; in fact the age of pubertal development at the Pole may be almost as early as it is usually supposed to be at the Equator and at the Equator as late as it is usually supposed to be at the Pole, and yet it is true that climate *does* affect sexual activity and sexual development—to some extent. It is true that pubertal development most generally takes place in the warm months, that conception generally occurs in the spring. It is true that the determination of sex in the ova of certain insects, male, female or neuter, is determined by temperature, as it is in the flower of certain plants,—it is true that

in the temperate zone pubertal development is earlier in the South, later in the North, earlier in Italy and France (at 14 and 15) than it is in Germany and Denmark (at 16),—earlier still if we go yet farther South, to India and to Egypt, where it occurs at 12.5 and *is said* to come at 9 and 10: later still than in Germany and Denmark it comes in Russia and in Norway (at 17). This is true as far as civilization extends, within the limits of the temperate zone; if we go beyond this into the extremes of temperature North and South, we are brought face to face with conditions utterly at variance with all preconceived ideas,—as we go *further north*, toward the Pole, pubertal development is *not later* but on the contrary, *earlier*, almost as early as in extreme southern latitudes, varying greatly with race, from 12 to 16. As we go *further south* toward the Equator development is *later* never as precocious as it is in the southern regions of the temperate zone, always later (from 12 to 16).

If I do not in this brief sketch, substantiate every statement I make it is merely for lack of time, and I beg that it be thoroughly understood that every assertion here made is based upon well authenticated statistical data, and in order that the value of such statistics be patent to every one, I have given in the tables the number of observations upon which they are based and the name of the observer.

With regard to the Temperate Zone, my deductions are drawn from over 100,000 observations, of which 20,000 have been made either under my own eye, or at my instigation: from the Arctic Zone I have 624 observations and from the Tropics 2733, or, if we exclude the older records from the sub-tropical climate of India and consider only the equatorial regions strictly, 1,593.

To the statements of travellers I have given due consideration, as many of these have come from scientific observers, but they are of secondary import only to me and yet our previous knowledge has been based entirely upon such more or less vague and always doubtful assertions. I can but repeat that these are of but secondary import; my deductions are based upon statistical data, culled by *medical* observers familiar with the people and long resident in the country. In addition I rely also upon my own personal observation among negroes, Eskimos and Indians, and upon the personal knowledge of officials resident in both the extremes of North and South for a sufficient time to admit of the observation of individuals throughout the entire period of development from birth to puberty, marriage and child-birth, so that no possible doubt can exist as to the subject of age which is so often questionable among primitive peoples who know not their own years.

II.—FACTS IN THE CASE—AGE OF FIRST MENSTRUATION IN ARCTIC, TEMPERATE AND TROPIC ZONES.

The age of first menstruation of such races and peoples as have been observed in the different zones is clearly shown in the accompanying tables and diagrams, and I will here briefly present the facts, clearly distinguishing between *statistical data* and the *reports of travellers* which I merely refer to as of interest because hitherto they have been our main source of information.

1.—*Arctic Zone.*

a.—Statistical data are of necessity scant as the population is limited and medical observers of long residence are few and far between. All reports coincide in the early puberty of Eskimo women, and if we consider them as many ethnologists do, as hyperborean Mongols sprung from a southern race, this may not be surprising. A comparatively late puberty is however ascribed to one of the Eskimo tribes by Von Haven, whose 100 observations show 16 to be the age of development. The Quenas who are still farther North develop at an earlier period (at 15) and the valuable study of Mathews shows that the sub-Arctic Indians of the Hudson Bay Territory develop at 12.6 years; this authority, whose long residence among the people demands credence for him, tells us that the Eskimo living still farther North develop even earlier, and this is a frequent statement from northern observers that puberty is earlier among residents of a still more northerly region.

b.—Travellers' Statements.—Six hundred and twenty-four cases is perhaps a small number for statistical study, but travellers almost without exception corroborate my statistical results and unite in the assertion of this precocious puberty among the Eskimo of both hemispheres, in the entire circle about the Pole. Puberty is late upon the northern outposts of civilization among the Russians, the Esthonians, the Norwegians; it begins to be somewhat earlier farther North, among the Finns and the Lapps, and is most precocious at the farthest extreme among the Eskimo. I have the personal assurance of several observers of the occurrence of child-birth at 13 and 14 among the Polar race: a physician long resident among them has knowledge of motherhood at 11.5, at 12.5 and frequently at 13 years. Von Humboldt says that the Koriaks of Siberia are often mothers at 10, and the authority of such a traveller we must credit: Tooke, whose long residence in and knowledge of Siberia gives authority to his statements, says much the same

and speaks of the astonishingly early maturity of the natives of North-west Siberia. Among the Slavonians he notes a less early development, between 12 and 13.

2.—*Temperate Zone.*

A knowledge of the variations in the age of First Menstruation among the different races and peoples of the Temperate Zone is essential in this investigation, because the conditions existing in the extremes, at Pole and Equator, are so contradictory and confusing; the positive data we have are so limited in number, that a knowledge of the facts as far as pubertal development is concerned in this carefully studied region, will assist in some measure at least to solve this curious question. The period of pubertal development is one of such importance that in all civilized countries, and these lie within the limits of the Temperate Zone, the subject has been fully investigated by scientific men, and prominent among them are members of this Congress past or present; for instance the valuable researches made in England by Tait, in Spain by Gutierrez, in Finland by Heinricus, in Greece by Corumelas, in Austria by my esteemed friend Chrobak at my own instigation. From Italy we have the admirable study of Raseri, made in the interest of the Government: thus we have over 100,000 observations giving us results which admit of no discussion. A fact which stands out prominently is the great discrepancy in the age of pubertal development in the *Old* and the *New World*, in Europe and in America, though within the same latitude, the same general climatic conditions and among people of the same race and the same nationality. Hence in a consideration of the subject we must distinguish clearly between the *Old* and the *New World*, between European and American countries.

a.—The Temperate Zone of Europe.—I have grouped nearly 60,000 observations, 58,737 from the centre of European civilization, from Italy and Spain to Germany and Denmark, and it will cause surprise to know that the mean age of pubertal development in these temperate regions is nearly 16 years, 15 or somewhat over 15.5; 14.2 in Spain, 14.8 in Italy, 14.6 in France, 15 in England, 16 in Germany, over 16 in many parts of Germany and in Denmark and Norway. It will be noted, and it is so important that I repeat it, that in a general way as we go *farther North* puberty is *retarded*: among the peasants of Russia and Esthonia it comes as late as the 17th year, not quite so late in Finland and in Norway, but even in Southern Germany, in Bavaria, it is as late as 16: in Italy 14.8 and if we go farther south, to Egypt and Arabia, *I am told*

and it is recorded by travellers that development is precocious, at 10 or 11, but *no statistics* exist and I have my doubts as to these vague statements of this very precocious puberty, especially when I know from Greece and Turkey that among the mountain people of these countries and of Asia Minor, development is as late as the 16th year, though earlier among the same people when transplanted to the lascivious civilization of the large cities and above all when brought in youth to the harem. I simply point to these general facts to indicate the comparatively late puberty of European women, and also the apparent indication of climatic influence in a later development in northern regions and an earlier in the South.

b.—Temperate Zone of America.—On the American Continent both in Canada and in the United States, conditions are entirely different: We have the same races, the same people transplanted to a new world but the period of pubertal development *does not remain the same*; 14, more strictly 13.9, is the mean age of First Menstruation from the Gulf of Mexico to the icy regions of Canada and from the Atlantic to the Pacific. This change takes place promptly, in the first generation, among the descendants of English, German, French and Italians, to whom all puberty comes at a much later date in their native countries. This is probably true also of immigrants of other nationalities in the United States, but these I have not personally observed. It is worthy of note that in the United States and Canada there is but very little variation among all classes of the population as well as all nationalities in the age of first menstruation,—13.6 among the better educated of the higher classes, 14.3 among the laboring class, whilst in European countries this difference is two years and over. This contrast in the functional characteristics of the women of the Old and New World appears still more striking when we consider districts upon the same isothermal lines: in St. Petersburg 15.5 to 16 is the mean age of puberty, in Montreal with the same mean annual temperature it is 14.3 among the English, 13.7 among the French. New York and Boston in the same latitude and with the same temperature as Paris, London and Berlin show the same age (14) which is universal throughout the United States and Canada, whilst in the European States it varies from 14.5 to 16 and even 17. The striking feature which my study of some 20,000 cases in the United States and Canada has developed (10,000 of these have come under my own personal observation) is that among all nationalities and under all the varying climatic conditions of the *New World* the age of pubertal development does *not vary*. It remains practically the same and offers a marked contrast to the great variations upon the European

Continent, from 14.5 in Italy and Spain to 17 in Russia and parts of Germany.

3.—*The Tropics.*

We have always associated the burning sun, the brilliant colors and luxuriant vegetation of the Tropics with the early bloom of women, and the stories of travellers concur in this tale of early puberty, we are always told that girls menstruate at 9, 10 or 11; this is what travellers tell us who pass through the country, speak not the language or if so have not the confidence of the people and know them not; they are vague reports which have however sufficed to establish the universal belief in this precocious puberty of the Tropics. *Not one statistical investigation can be found to corroborate this*; on the contrary, all statistical studies and the reports of scientific investigators who have studied tropical countries, invariably tell us of a relatively *late* development, in fact the age of puberty, whilst varying varies only as it does in the temperate zone, as it does among European peoples.

a.—Statistical Data.—Statistical data are meagre, altogether 2,733 cases, and if we except 1,140 from India, collected by Robertson between the 18th and 22nd degrees of northern latitude, from Calcutta and Bangalore, where we have a mean annual temperature of 25° C. (78° Fahr.), we find that the age of pubertal development varies from 14 to 16: I look upon this region of India as still *sub-tropical* and not to be included in a study of Equatorial peoples. As we near the Equator, statistical investigation points to later puberty: in Siam, which is 13° N. of the Equator, 14.5 is the age of development: in Batavia 8° below the Equator, it is the same (14.6), that is, among the descendants of Europeans; in Cochin China (11° to 17°), it is 16.6, and with slight variation the same conditions prevail among the three different races found in that country, the Annamites, the Chinese and the half-breeds. These are facts based upon a study of 1,244 cases by Mondiere, whose long residence and intimate knowledge of the natives gives assurance of the correctness of any statements he may make. The negroes of Barbados and Jamaica also develop at a relatively late period (15.6) and the same is true of those of Demerara as proven by statistical study; to these facts I call a special attention because these negro slaves are brought from the equatorial regions on the western coast of Africa, and this is likewise the period at which puberty comes to them in their native land, as reported by German ethnologists who have there investigated the negro tribes.

b.—Travellers' statements.—All statistical facts indicate a relatively late development in equatorial regions and this is corroborated by the statements of scientific investigators who have studied these regions: German ethnologists specially have given attention to the subject, 15 and 16 is more frequently mentioned as the age of puberty than 12 or 13. The negroes of Somaliland, extending from the Equator 10° N. attain puberty at 16 and so do those of Bogosland, extending 10° S., who first menstruate at the same age. In Loango from 14 to 15 is given as the age. On Biaffra Bay among the Benim and Biaffra only do I find so early a period as the 11th and 12th year mentioned, but this, I should add, is only a general observation. From Abyssinia, from Arabia and from Egypt more remote from the Equator come rather vague statements of an early puberty in the 11th and even the 10th year, but from these regions *stricte sic dicti* as I have before stated, we have *no absolutely reliable observations* and above all *no statistics*. The reports from the equatorial regions appear more worthy of consideration because they come from scientific observers and because the age of first menstruation is a period of such importance, I may say *the most* important epoch in female life, that it is recognized among most of the African tribes by very elaborate religious ceremonies lasting often many days, hence the event is one readily noted, it is generally known, made evident to the observer and hence can be recorded with certainty.

Though unwilling to base my deductions upon any but scientific statistical observation, I call attention to such observations as these as corroborative and it may be observed that even the statements of travellers mention an *early puberty* of 10 and 11 *only in sub-tropical* regions and not in the equatorial; so far I have not been able to discover a single statistical study which reveals a very precocious development, say at 10 or 11, among any people, and I am inclined to believe that exceptional cases are cited where such early development has actually been known; it is the *exceptional case* to which attention is usually called, and as no others are noted this is accepted as typical. This idea of a precocious puberty in the south will be dispelled with the advance of scientific research precisely as have the formerly accepted racial characteristics of the skull taught by the once highly regarded science of Craniology which attributed a certain peculiar skull formation to every race and tribe: this has disappeared as it was based upon very few and usually peculiar skulls which the traveller happened to secure, or secured, *because they were unusual*. As soon as larger numbers were studied these isolated observations proved to be fallacious and we found that these supposedly typical peculiarities were only *individual*

abnormities as I take the precocious menstruation at 9 or 10 to be in tropical countries, but when such a case is really observed, it is noted and accepted as characteristic of an entire people.

III.—CAUSES INFLUENCING THIS VARIATION IN THE AGE OF PUBERTAL DEVELOPMENT.

In seeking an explanation for the phenomena here presented which are so much at variance with our pre-conceived ideas, I shall briefly recall the various conditions which may influence the age of pubertal development and the appearance of first menstruation: prominent among these have always been mentioned *climate* and *race*, I may add *nutrition*, *heredity*, *social status*, *occupation*, *sexual precocity* and what I look upon as most important of all, *mentality* or the *nerve influence* and the "milieu" or the surroundings which is actually the sum-total to all these conditions. Size and complexion have been referred to and have been cited gravely by others, but with so negative a result that I may say they do not merit our attention.

I.—*Climate.*

Some of our hitherto accepted authorities have presented facts which would appear to point to climate as the all-determining cause; others equally competent, with an equally good material have demonstrated with equal clearness that climatic influence was null and had no bearing whatsoever on pubertal development; conclusive facts can be found in proof of either assertion, as is readily demonstrated, and for this purpose I will present both groups. *Each is correct, as far as his investigation extends*, but each is based on a limited field of observation.

a.—Sexual development is influenced by climate.—The influence of climate, or rather of temperature upon all living organisms is evident and its effect on sex and sexual development is recognised in both animal and vegetable life.

1°.—Animals, insects and plants.—In the lower animals, in insects, sex development is frequently dependent upon temperature, as is most perfectly demonstrated in the ovule of insects developed by parthenogenesis: the ovule of the frog develops male or female according to the degree of heat, invariably a higher temperature is essential for the development of the male. In the admirable experiments of Maupar, on *Hydatina Senta*, he has clearly shown this: by keeping the ovule be-

tween 26° and 28° C., 97 per cent. of the 104 ovules developed as male; of a second hundred which were kept at a lower temperature (between 14° and 15° C.), 96 per cent. developed as female. Melons, cucumbers and other plants show the same influence of temperature. In a higher temperature, in the sun, the same plant develops male flowers which in a more shady locality, under a lower temperature develops female blossoms.

2°.—The human female.—That temperature has a certain influence upon the sexual organization of the human being is evident: the time of pubertal development of the girl is mostly in the summer months: Conception takes place most commonly in Spring, in April, May and June, as has been shown by several observers, especially by Lastri and Ferrari, who have studied the records of the Baptistry of Florence for 400 years, with this result,—they found too that if winters are over-cold, the period of conception is later; on the contrary, if winters are mild and summers hot it comes earlier, and in the Antipodes, where the seasons are reversed, the prevailing period of conception is correspondingly changed. Then again we have seen that on the Continent of Europe the age of the first menstruation is earlier in the more southerly, later in the more northerly countries; this is a fact but whether it can be ascribed to climatic influence I am not prepared to say, as the proof is not sufficiently positive, the various nationalities differ so much in all their characteristics, in mental and physical organization, but it would appear as if a certain influence did exist and as if the age of first menstruation, at least *in the temperate zone of Europe*, was to some extent affected by climate.

c.—Age of first menstruation independent of climate and even contrary to the usually supposed climatic influence.—I have shown that the Eskimo in the far North attains puberty as early as it is possible for any tropical people to do and on the contrary that late puberty is a common occurrence in equatorial regions. The French who come from the warm regions of southern France to the cold climate of Canada with a mean annual temperature like that of St. Petersburg, mature earlier in the low temperature of their new home than they did under the warm sun of the Mediterranean. The same negro races to whom puberty comes at 15.6 in Demerara or Barbados develop at 14 in the United States in the southern and middle regions, and in the *northern* parts of the country still *earlier* when under more favorable social conditions. All these are striking instances of the fact that pubertal development is independent of temperature or that if it does in some way

influence the age of first menstruation there are other causes far more potent which determine the coming of the period.

2.—Race.

Like climate, race has been asserted to be a potent factor in determining pubertal development, but I will show that the same is true of race as it is of climate, that striking facts may be cited *pro* and *con*, and that the arguments in favor of each are correct as far as they go, but all who have discussed these questions have covered too small a territory and have considered only some few of the many facts in the case.

a.—The age of the First Menstruation is determined by race and varies with race.—This is readily demonstrated, we would say, by a glance at the charts which show a great difference in the age of pubertal development among different races under the same climatic conditions. I need but recall the differences in the age of first menstruation among the different races at Pole and Equator, the difference between the German and the French living under practically the same climatic conditions, so also the marked difference in the age of puberty among the various races inhabiting one and the same country as in Transylvania and the many races found in Turkey. The Germans inhabiting Transylvania, a colony brought there in 1125, show the same characteristics in regard to the time of pubertal development as those of the present inhabitants of the Rhine regions from which these people originally come. The Jews found in many different countries develop at about the same period wherever they be, *if under the same social conditions*. All this would seem as if race were a factor to be considered in the question of pubertal development but a study of other facts, especially of the conditions existing in the New World demonstrates the invalidity of any such factor.

b.—Race without influence whatsoever on pubertal development.—In the United States and in Canada I have studied the German, the French, the English and the Negro, and as again and again stated, the age of pubertal development is the same for all (at 14): this is true of the Germans who in their native land develop at 16, as it is true of the French and of the English to whom in the old home puberty came at 14.5 or 15: the negro with puberty at 15.5 or 16 in Africa and in the West Indian Islands, likewise develops at 14 in the United States: the French are somewhat earlier, as the English and German are later, each by two- or three-tenths of a year, but the same statement

holds good that they lose the racial characteristics observed in their native land.

It is unnecessary to cite further examples, these facts suffice to show that *the same is true of race as it is of climate* that it exercises a certain influence, that the age of puberty differs among different races and that race is a factor which may to some extent influence pubertal development *provided that all other conditions remain the same* but that it exercises no marked influence as is readily proven by the conditions existing in the United States, where development takes place at the *same age* among the *different peoples* and *different races* who differ so much from each other in their native country, racial characteristics disappearing entirely in the new home.

3.—Nutrition.

This is an influence marked upon all living organisms, animal and vegetable and marked as well in sexual development and in the determination of sex.

a.—In animals and plants this influence is readily traced.—Sexual development of the animal in captivity, where it is cared for and well fed, is earlier than it is in its natural condition where food is often scant: animals like their human masters are less fruitful in years of famine, and likewise over-fed animals pro-create less freely than those with only nutrition sufficient, a fact recorded already by Pliny and well-known to every observing farmer. We know that not only quantity but the oft varying qualities of fruits depend upon their nutrition. That sex in animals is influenced by food is known to every cattle raiser in the American West who when he wishes a bull-calf starves the male before copulation: and it may be recalled that the theory of our Vienna *confrère* Schenck was based upon the same principle, hoping to determine the sex of the child *in utero* by the character of the food given the mother. Most strikingly however is the influence of nutrition on sexual development seen in the lower animals and insects: the sex of the bee is entirely determined by the size of the cell in which the ovule is placed and the amount of food given it: the queen-bee comes from a germ placed in a larger cell with abundance of food, the neuters are the sexually imperfect females formed when it is placed in a narrow cell with scant nutrition. Most strikingly has the Italian zoologist Grassi shown the influence of nutrition on sex development in the Termite tribe of ants, where we have not only the male and the female but also the neuter or the sexless worker, and these sexless

insects are divided into workers and soldiers, in the one organs of defence being more fully developed, in the others the parts used in labor. The nature of the domicile, temperature and nutrition determine sex and he claims that these insects develop at will more of one or the other sex, as the necessities of their civic organization seem to demand. These interesting experiments clearly demonstrate that sex development, like the time at which the human female matures, is *not due to a congenital adaptation*, but to an *innate plasticity* which renders possible adaptive modifications such as are suited to the surroundings and are determined by them, by conditions extraneous to the organism. I must here call attention to another most important point, *i.e.*, that in such insects there is only a *given period* in the development of the ovule at which nutrition or temperature can influence the development of one sex or the other; precisely the same is true of the time of pubertal development for the human female, the causes which influence such development can be effective only at a certain period and that is during the years preceding puberty (from the 10th to the 14th year). At this time residence in country or city, kind of occupation or food, nervous excitement or mental influence will determine an earlier or later development but the same factors in younger years would remain inert.

4.—Mentality.

Mentality, as I have termed the nervous and mental status of the girl, exercises perhaps the most powerful influence of all upon the time of development. The degree of education, or nervous sensibility, mental and nervous activity are among the most potent factors in determining the time of sexual maturity, as has been shown by an examination of thousands of cases in which it was evident that the period of development varied precisely with the perfection of the nervous organization and the degree of mental development; among people of a lower organization such as those at Pole and Equator, where mental development is at a minimum, the nervous organization alone can be considered, and this I believe even there to be a factor not to be overlooked.

5.—Other Causes.

Among the various other causes which influence pubertal development among civilized races, such as *heredity*, *social status* and *occupation*, there is but one which we need consider with reference to the age of puberty in these climatic extremes, and that is *sexual precocity*,

which I believe, especially among the Eskimos, may be looked upon as a determining influence. Where people are crowded closely in narrow huts, packed, often naked side by side under a heap of furs, it may be readily assumed that sexual desires are aroused at an early period, and it would appear, too, that passions are unusually fierce with the coming of the sun and the thawing out of all Nature which has remained torpid during long winter months. Reasonable as it may appear that precocious sexual excitement should lead to an early development of genital activity, observations in other lands apparently indicate the contrary.*

Among the Hindoos, where mothers seek by every means in their power to lead to an early sexual development of the female child, where marriage takes place in infancy and the child-wife is forced into the arms of the husband while very young, an exceptionally early menstruation does not seem to occur, yet it is earlier than where these conditions do not exist. Valuable data just received indicate that puberty, though not exceptionally early, is invariably *earlier* where marriage is precocious; thus, at 12.5 or 13 in Calcutta, and among the Brahmins in the Madras Presidency where child marriage is prevalent menstruation appears after the 13th year, while among the mass of the Hindoos in the same district it does not appear before 14; in South Burma, where 20 is the age of marriage, puberty appears at 14, and in North Burma where conditions are the same as in India, the age of first menstruation is likewise about

*March 13, 1903. Further investigation, especially a careful study of the conditions existing in India, where the question of pubertal age has been so much discussed and has assumed national importance by reason of its close connection with the subject of child marriage, has revealed facts sufficient to determine positively the influence of sexual precocity on pubertal development. The more important data bearing upon the subject will be found in Table II, part C, showing that the age of first menstruation in India as in Burma is at 14 if not over (at the earliest, between 13 and 14), yet where child marriage persists with its sexual precocity and a lascivious, premature conjugal life, puberty is earlier and menstruation more precocious, so that I no longer hesitate to express myself positively as to the dependence of one upon the other.

Another important point is positively established by the records received from the many castes and tribes of India: that the pubertal age in that sub-equatorial climate is not as early as it has been supposed to be—*not even as early as my limited data would make it appear*. My records show that 12.9 or 13 is about the earliest, but from the Madras Presidency we hear that none mature under 14 and from South Burma that 14 is the age of development. This convinces me more and more strongly that all the reports of puberty at 9 or 10 are pure suppositions, without foundation in fact.

the same period, 12-13. Certainly the Circassian or Albanian girl placed in the harem menstruates earlier than she does in her mountain home, and the Albanians, who are an unusually pure and virtuous people, though natives of a southern country, do not in their homes mature until their sixteenth or seventeenth year. All this would make it appear that lasciviousness and early or precocious sexual excitement would lead to early puberty, its obverse to retarded development; as one exception to this rule the negroes of Africa, who as a rule are a most lascivious people and sexually passionate, develop late. I have long been in doubt as to the influence of sexual precocity on pubertal development and when reading this paper I stated that a positive conclusion was not warranted with the facts then at hand. Continued study of the subject and more extensive observations have since convinced me that the promiscuous blending of the sexes, an early intermingling, lascivious habits, unquestionably tend to early sexual maturity and the appearance of the menstrual function at an earlier period than is to be expected among the same race or in the same individual under other conditions. I can now state with assurance that lasciviousness and sexual precocity, when prevalent among a people, tend toward an earlier puberty, not necessarily an earlier maturity.

As for other causes such as heredity, social status and occupation, which may be accorded a certain influence among civilized people, these cannot be considered in connection with the question of early or late puberty at Pole and Equator.

IV.—CONCLUSION.

Facts sufficient have been cited to prove the error of previous teachings of precocious puberty at the Equator and retarded development at the Pole. I have shown that puberty may come to the Eskimo as it does to the Hindoo at an early age, and late to the Somali at the Equator as it does to the Laplander in the North. In fact, early puberty is the rule in the Arctic regions rather than it is at the Equator. At both extremes we find races with early and races with late development, and if we draw an average of all the various statistical observations among the different races at Pole and Equator which I have here collected we find that puberty comes at 14.6 in the Arctic regions, nearer 15 in the Tropics, later still in the Temperate Zone of Europe (at 15.5). In the Temperate Zone of the New World, in the United States and Canada, development takes place at an earlier age and with more uniformity than in any other great belt, at 14 throughout.

An explanation I cannot as yet give, suffice it for the present that I present the facts, but these are in themselves of sufficient importance as they overthrow our preconceived ideas and the teachings of our text-books; no light is apparently thrown upon the question either by a study of pubertal development among the nations of civilization in the Temperate Zone, where the subject has been so carefully analyzed by many able authorities, nor is it by a study of climate and race; mentality and nervous stimulus, which is the all-powerful determining factor among civilized people seems in these extremes of temperature of Pole and Equator to be null and void. The mental and nervous condition of these people would appear as an element to be obviated, because it is practically the same among all and of the lowest order, which among civilized people is equivalent with retarded development. Nutrition and habitation and a lascivious life with early and constant mingling of sexes might appear to explain the early puberty of the Eskimo, who are carnivorous exclusively, the amount of meat and fat consumed, the close huts in which the greater part of their life is passed sweltering often at 90°, with a heat greater than that suffered by the natives of the Tropics, besides their racial connection with the Mongols of the South may be taken into account, and all would appear as tending to precocity; but an explanation for the retarded development of the natives of the Tropics is difficult to find, unless it be in their torpid nervous system. The "milieu," the surroundings, the "tout-ensemble" of all extraneous causes, so potent a factor in the races of our civilization, appears here to offer no explanation.

For the present it must suffice that we establish the facts in the case, causes which produce these apparently contradictory conditions must be determined by farther ethnological and physiological study of the various peoples habitating these inaccessible regions in the extremes of temperature at Pole and Equator.

EXPLANATION OF TABLES AND CHART.

Table I. demonstrates clearly the fallacy of the prevalent idea of retarded puberty in the far North and an exceptionally precocious development in Equatorial regions. It shows a comparatively early puberty in the icy regions of the North and retarded development in the Tropics.

I have indicated the mean age of pubertal development for the three great zones, but though it is evident that the figures upon which these means are based are not sufficiently large and do not cover all the different peoples of these regions they are suggestive and interesting

as indicative of conditions contrary to those hitherto supposed to exist. The only question is whether they are prevalent, but we must accept them as being so until other facts are proven. This table would show that at the Pole puberty is earliest at 14.6 years, latest near the Equator at 15.8, and in the Temperate Zone of Europe at 15.5, whilst in the New World development is throughout the Temperate Zone more precocious than in any other great belt, at 14.

The Individual Facts are correct, but the averages for the Pole are only suggestive though substantiated by numerous observations and records which place the age of first menstruation for the far North Eskimo at between 12 and 16, or 13 and 15, even between 12 and 14. I have presented the Arctic Indian, who is rather sub-Arctic, as an example because of these alone can I secure statistical record of larger numbers, and the same observer states that the Arctic Eskimo farther North are more precocious even.

TABLE II.—In this table I have arranged the most important of the statistical observations upon which this study is based in accordance with the mean annual temperature of the locality, not the latitude, though I note this more especially to indicate how much the isothermal lines vary from those of latitude.

I have classed as Arctic all regions with a mean annual temperature below 0° C. or 32° F. and as Tropic those with an annual mean above 25° C. or 78° F. which narrows both the Arctic and Equatorial belt somewhat, though very little.

The Temperate Zone is introduced for purpose of comparison and in order to indicate more clearly the peculiar conditions which exist. Part A of the table, the Arctic Zone, shows early puberty; as we reach Part B, the Temperate Zone and a milder climate with a mean annual temperature above 0° C. or 32° F., development is not earlier but very much later, varying apparently without rule or reason throughout the various climates of the Temperate Zone of the Old World until it reaches its Southern confines, nearing a mean annual temperature of 25° C. or 78° F. on the border of the Tropics, where we find the most precocious development, 12.5, the earliest statistically demonstrated, though 10 and even 9 is mentioned by travelers.

Following the table still farther we come to Part C. The Tropics proper with a mean annual temperature above 25° C. or 78° F., and it is apparent that puberty is not earlier, but much later than it was in the sub-Tropical regions, in the warmest part of the Temperate Zone. Development is much later in the Equatorial regions proper than it is in the southern portions of the Temperate Zone, as it is earlier in the

TABLE I.
AGE OF FIRST MENSTRUATION IN THE GREAT ZONES.

Arctic Zone, 14.6.
624 Cases.

OBSERVER.	CASES.	LOCALITY.	AGE.	
Mathews	500	Arctic Indians Eskimo	12.6 13.0 to 15.0	Extreme North Eskimo: 14.0. Mathews says 12.0 to 12.5.
Von Haven	100	Eskimo	16.0	Childbed: 11.6 to 12.6, several at 13.0 and many at 14.0.
Vogt	24	Quenas-Norway	15.2	

Temperate Zone.
Old World (Europe). 15.5.
58,737 Cases.

CASES.	LOCALITY.	AGE.	CASES.	LOCALITY.	AGE.
8,943	Denmark-Norway	16.5	7,887	France	14.6
21,258	Germany	16.0	6,337	Italy	14.8
12,287	England	15.0	2,025	Spain	14.2

New World (North America). 14.0.
10,531 Cases.
American, English, German, French, Negro: 13.6 to 14.3.

Tropics, 14.8.

2,733 Cases, including Sub-Tropic Region.

Sub-Tropics (India, 15°-25° N.), 1,140 Cases, Age 12.9 : Tropics Proper, 1,593 Cases, Age 15.8.

OBSERVER.	CASES.	LOCALITY.	AGE.	LATITUDE.
Campbell	104	Siam	14.3	13° N.
Mondière	1,244	Cochin China	16.6	11° to 17° N.
Robertson	77	Barbadoes-Demerara	15.6	6° to 13° N.
v. d. Burg	168	Batavia (Dutch descent).	14.6	8° S.
Heggemacher		Somali Land	16.0	0° to 10° N.
Munzinger		Bogos Land	16.0	0° to 10° S.

TABLE II.
AGE OF FIRST MENSTRUATION AMONG ALL RACES AND NATIONALITIES FROM POLE TO EQUATOR.

A. Arctic Zone.

Mean Annual Temperature below 0° C, or 32° F.

NATIONALITY.	CASES.	LOCALITY.	AGE.	MEAN ANNUAL TEMP. CENT.	FAHR.	LATITUDE.	OBSERVER.
Eskimo	10	Alaska	13.0 to 14.0	-12.8°	9°	70°	Heustis.
Eskimo	100	Greenland	15.0 to 17.0	-8.0°	17°	60°	v. Haven.
Eskimo	16	Labrador	15.9	-6.0°	22°	55°	Lundberg.
Eskimo	10	Boothia Felix	All over 14	are married.			Sir J. Ross.
Indians	500	Hudson Bay	12.6	-4.0°	25°	50°	Mathews.
Eskimo		Farther North	12.0 to 12.5				Mathews.
Kamtschadales		Kamtschatka	Very early				de Lesseps.
Koriaks			Often Mothers	at 10.			v. Humboldt.
Sclavonians			12.0 to 13.0	-5.0°	23°	60°	Tooke.
Quenas	24	Norway	15.0	-1.0°	30°	65°	Vogt.
So. Amer. Indians		Fireland	14.0 to 15.0				Hyades & Deniker.

The Age of First Menstruation.

B. Temperate Zone.

Mean Annual Temperature, 0°-25° C. 32°-78° F.

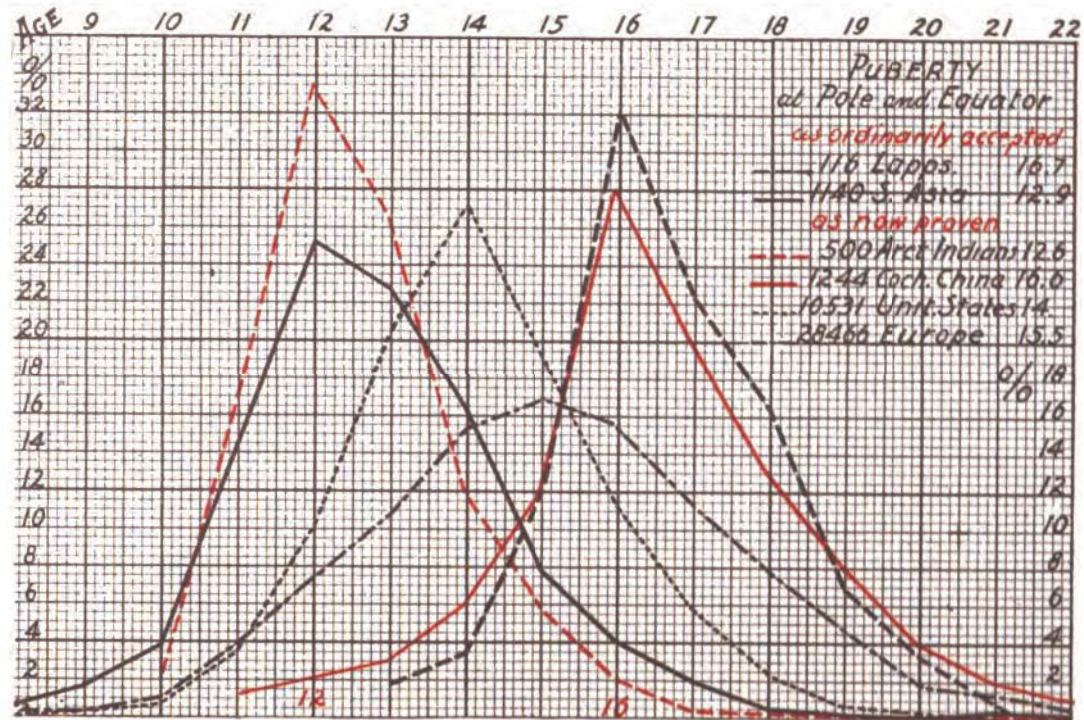
NATIONALITY.	CASES.	LOCALITY.	AGE.	MEAN ANNUAL TEMP.		LATITUDE.	OBSERVER.
				CENT.	FAHR.		
Lapps	116	Norway	16.7	0.0°	32°	60° to 65°	Vogt.
Finns	3,500	Finland	15.8	1.8°	35°	60° to 65°	Heinricus.
Finns	3,500	Finland	15.1	1.8°	35°	60° to 65°	Engström.
Esthonians		Russia	17.0	4.0°	-39°	58° to 60°	Holst.
Russians	2,371	St. Petersburg	14.6	4.0°	39°	60°	Weber.
Russians	17,439	St. Petersburg	16.5	4.0°	39°	60°	{ Tarnowski. Radzewitz.
High Class { Low Class }		St. Petersburg	{ 15.5 } { 17.5 }	4.0°	39°	60°	Horwitz.
Russians	700	Kaluga	17.0	4.8°	40.6°	55°	de Ott.
Norwegian	4,731	Norway	16.3	0.0° to 7.0°	32° to 44°	58° to 70°	Faye-Vogt.
French	876	Canada	{ 13.6 } { 14.2 }	5.0°	41°	45°	{ Prévost. Laph. Smith.
English	1,020						
German, North	3,000	Konigsberg	16.0	6.4°	43°	54°	Lullies.
German, South	15,708	Munich	16.2	7.0°	45°	48°	Hecker-Schlichting.
Dutch	862	Holland	16.6	8.7°	47.7°	53°	Evers.
American { College Work }	{ 2,752 } { 2,503 }	Boston	{ 13.6 } { 14.3 }	9.0°	48°	52°	Engelmann.
German	7,830	Berlin	15.5 to 16.3	9.1°	48.3°	52°	{ Mayer. Krieger & Marcuse.
Austrian	{ 10,000 } { 1,610 }	Vienna Austria	{ 15.5 } { 16.3 }	9.3°	48.8°	48°	{ Chrobak. Szukits.
English	12,287	{ London } { Manchester }	15.0	9.5°	49°	51° to 53°	{ Guy, Tilt, Lee, Whitehead & Robertson.

French	3,322	Paris	15.0	10.4°	51°	48.5°	{ Dubois de Solre de Boismont.
American	2,330	New York	14.2	10.8°	51.4°	39.4°	Emmet.
Armenian		{ Armenia Constantinople }	{ 17.0 to 18.0 14.0 to 15.0 }	11.6°	53°	39° to 41°	Zambaco.
North Italian	992	North Italy	14.6	13.0°	55°	44° to 46°	Raseri.
American	2,315	St. Louis	14.2	13.0°	55°	38.4°	Engelmann.
Japanese	684	Tokio	15.6	13.5°	56.3°	38.4°	Moryasu.
Spaniard	{ 2,025 403 }	{ Madrid and Spain }	{ 14.2 15.0 }	13.6°	56.5°	41°	{ Gutierrez. Seco Baldor.
Negro	2,339	{ St. Louis Baltimore New Orleans }	14.0	13.0° to 20.0°	55° to 68°	29° to 39°	Engelmann.
Italian	3,011	Rome	14.9	15.4°	59.7°	42°	Raseri.
Greek { High Class Low Class }		Athens	{ 15.0 to 17.0 13.0 to 15.0 }	17.3°	63°	38°	Coromilas.
South Italian	1,111	South Italy	14.8	19.0°	66°	37° to 41°	Raseri.
Portuguese	228	Madeira	15.4	20.3°	68.5°	32°	Dyster.
Negro	884	New Orleans	14.0	20.4°	68.8°	29°	Clark-Miller.
Negro		Egypt	10.0 to 13.0 (?)				Pruner.
Arab		Egypt	10.0 to 12.0 (?)				Niebuler.
Arab		Algiers	9.0 to 10.0 (?)				Berthereaud.
Egyptian		Àchim	10.0 (?)	20.5°	69°		Zambaco.
Egyptian		Egypt	9.0 to 10.0 (?)				Riegler.
Egyptian		Bagdad	10.0 to 11.0 (?)	23.0°	73°	33°	Zambaco.
Hindu	71	Bangalore	13.2	22.7°	72.3°	33.2°	Crisp.

C. Tropics. Equatorial Belt.
Mean Annual Temperature above 25° C, or 78° F.

NATIONALITY.	CASES.	LOCALITY.	AGE.	MEAN ANNUAL TEMP. CENT.	FAHR.	LATITUDE.	OBSERVER.
Hindu	239	Calcutta	12.5	85.7°	78°	22°	Bossa & Goodale.
*Hindu { Luxurious Classes		Calcutta	Nearer 12.0				Kallan Bhow
Peasants & Laborers		Central & West India	Not before 13.0				
*Hindu *Brahmin (marry early)		5,000	Madras Presidency				
*Brahmin	65	Calcutta	13.5				Chunder Sen.
*Hindu	27	Calcutta (Orph. Asyl.)	13.9				Fayer.
*Hindu		Calcutta	12.0 to 13.0				Rammy Roy.
*So. Burmese (marry late)		South Burma	14.0			20° to 22°	Devendre Roy.
*N. Burmese (marry early)		North Burma	12.0 to 13.0			22° to 24°	Devendre Roy.
Dutch	168	Batavia	14.6	26.0°	78.7°	8° S	v. d. Burg.
Siamese	104	Bangkok	14.5	26.7°	80°	13.6°	Campbell.
Negro	77	Jamaica & Barbadoes	15.6	27.0°	80.7°	13° to 18°	Robertson.
Hindu	129	Bombay	13.6	26.7°	80°	18.5°	Leith
Annamite } Cambodgian }	1,244	Cochin China	16.6	27.2°	81°	11° to 17°	Mondlière.
Negro, African		Somali Land	16.0	30.0°	86°	0° to 10°	Heggemacher.
Negro, African		Bogos Land	16.0	30.0°	86°	0° to 10° S	Munzinger.
Negro, African		Loango	14.0 to 15.0				Falkenstein.
Negro, African		Borabra	15.0 to 19.0				Hartman.

* These are the data recently received to which I refer in foregoing foot-note and addenda.



Polar regions than it is in the northern part of the Temperate Zone. Were we to consider only Part B, the Temperate Zone, it would appear that development is earliest in warm, later in cold climates, in a general way, yet conditions in the extremes, in the Arctic and Equatorial belt completely overthrow any such theory and would, in fact, appear to make the contrary seem true.

CHART I.—The red lines indicate the age of pubertal development in Polar and Equatorial regions as my investigations reveal it. The broken red line is that of the Arctic region with an early puberty; the solid red line represents the late development in the Equatorial belt.

Directly contradictory are the conditions in sub-Arctic and sub-Tropic regions, the solid black line representing the age of development in India which is almost sub-Tropical and an exception to Equatorial conditions with early puberty; the broken black line is that of the Lapps, sub-Arctic, both showing conditions which were formerly supposed to be those prevalent in Tropic and in Arctic belts. Again, for purposes of comparison, I have introduced the Temperate Zone of the Old and the New World, the broken and dotted the Old, the simply dotted line the New World, both between the extremes of both Arctic and sub-Arctic and Tropic and sub-Tropic.