

# SCIENCE

Vol. LXVII

JANUARY 6, 1923

No. 1723

## STATURE THROUGHOUT THE WORLD<sup>1</sup>

### CONTENTS

<i>The American Association for the Advancement of Science:</i>	
<i>Stature throughout the World:</i> PROFESSOR R. BENNETT BEAN .....	1
<i>The Functions of Section M—Engineering:</i> PROFESSOR CHARLES RUSS RICHARDS .....	5
<i>Eugene Allen Smith:</i> DR. WALTER B. JONES .....	7
<i>Scientific Events:</i>	
<i>The London School of Hygiene and Tropical Medicine; Free Public Lectures on Medical Subjects; Officers of the American Chemical Society; Officers of the American Association for the Advancement of Science</i> .....	10
<i>Scientific Notes and News</i> .....	12
<i>University and Educational Notes</i> .....	14
<i>Discussion and Correspondence:</i>	
<i>The Period of Gestation in the Monkey:</i> DR. CARL G. HARTMAN. <i>The Floods of 1927 in the Mississippi River Basin:</i> A. J. HENRY. <i>Divisions of the Decorah Formation:</i> G. MARSHALL KAY. <i>A Day-light Meteor:</i> DR. ALBERT B. REAGAN. <i>Interference?</i> A. GAEL SIMSON .....	15
<i>Quotations:</i>	
<i>Dr. F. A. Bather</i> .....	17
<i>Amendments to the International Rules of Zoological Nomenclature:</i> DR. C. W. STILES .....	17
<i>Special Articles:</i>	
<i>The Chromosomes of Moina Macrocopa:</i> DR. EZRA ALLEN. <i>Genetic Evidence that the Cladocera Male is Diploid:</i> DR. ARTHUR M. BANTA and THELMA R. WOOD. <i>Pentathionic Acid, the Fungicidal Factor of Sulphur:</i> DR. H. C. YOUNG and ROBERT WILLIAMS .....	18
<i>Science News</i> .....	x

SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKeen Cattell and published every Friday by

### THE SCIENCE PRESS

New York City: Grand Central Terminal.

Lancaster, Pa.

Garrison, N. Y.

Annual Subscription, \$6.00. Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

Entered as second-class matter July 13, 1923, at the Post Office at Lancaster, Pa., under the Act of March 3, 1879.

A GENERAL survey of stature has been started in connection with a study of old Americans in Virginia and this report is a condensed summary of the preliminary work. Only males are considered.

Stature is a complex dependent upon the growth of various parts of the body, chiefly bone and cartilage. This growth is partly regulated by the endocrines of the hypophysis and thyroid, and it is influenced by a great number of factors, such as food, water, habit and habitat. It is impossible to measure each factor that enters into the life history of each individual, therefore mass statistics are used, and only general results and conclusions may be given.

The records have been obtained from various sources, and many of them are of men below the age of 25 years who therefore had not finished their growth. In general there is no distinction as to age; all ages are included, from near adult to the old, although the majority are between the ages of 20 and 30 years. The technique of measuring is not always the same in gathering the records, therefore they may not all be fairly comparable. The method of grouping them by the median of group means or averages should prevent any gross errors as the result of technique or the selection of individuals.

Group medians are used throughout because this affords the fairest average stature. There are 326 groups from Europe and the median of the group averages is 169.4 centimeters. The extremes are one group of "Indigent French" with a stature of 156.0 centimeters, and one group of "Scotch Farmers" with a stature of 181.2 centimeters. There are two distinct modes, one at 166.0 centimeters and the other at 170.0 centimeters. This is clearly indicated by the median for southern Europe at 165.5 centimeters, and that for northern Europe at 170.6 centimeters, with middle Europe at 166.6 centimeters.

The median of 135 groups in Asia is 161.1 centimeters, with extremes of one group of Negritos from southern India at 148.0 centimeters, and one group of Ainos with a stature of 172.0 centimeters. Persians and Turks are not included in Asia but are put

<sup>1</sup> Address of the vice-president and chairman of Section H—Anthropology, American Association for the Advancement of Science, Nashville, December, 1927.

with Europe. There are three groups of these at 165.0, 173.0 and 175.0 centimeters. The Asiatics, except for the Negritos, are more homogeneous than the Europeans, if we leave out the Persians and Turks, although the Ainos should also be excluded because they are modified Europeans. Under such circumstances the extremes for Asia would be one group of Malays with a stature of 154.0 centimeters, and one group of Tibetans with a stature of 162.5 centimeters. The stature increases from Asia to Europe through the Persians with a stature of 166.0 centimeters and the Turks with a stature of 168.0 to 175.0 centimeters.

The median of 245 groups in Africa is 170.0 centimeters, with extremes of one group of Negrillos with a stature of 130.0 centimeters, and one group of Somalis with a stature of 180.3 centimeters. The spread of the curve is greater for Africa than for Europe, and it is skew for tall stature, trailing in the low. This would show that there are more negroid stocks in Africa than true Negroes and Negrillos, who are not so tall as the negroid stocks.

The median of 126 groups of North American Indians is 165.0 centimeters, and extremes of one group of "Partial Albino" Central American Indians with a stature of 145.7 centimeters, and one group of the Winnipeg Indians with a stature of 180.0 centimeters. The curve is irregular with three distinct nodes at 156.3, 163.8 and 173.8 centimeters.

The median of 38 groups of South American Indians is 160.0 centimeters with extremes of one group of Aymaras with a stature of 148.0 centimeters and one group of Patagonians with a stature of 185.0 centimeters.

The median stature of 152 groups from the Pacific Islands is 159.0 centimeters, with extremes of one group of Negritos with a stature of 139.7 centimeters and one group of Australians with a stature of 185.0 centimeters. The curve has a mode at 160.0 centimeters and a submode at 170.0 centimeters.

The tall statures of the Patagonians, Australians and Somalis may have been the result of the selection of extremely tall persons to be measured. This seems to have been the case with the Patagonians, especially, because several groups had statures from 171 to 175 centimeters.

#### EUROPE

Stature in Europe has its summit in Scandinavia of 172.5 centimeters, with Great Britain a close second at 171.0 centimeters, and Denmark, Germany and Turkey following with about 170.0 centimeters. Some may object to putting Turkey and Persia in Europe, but their similarity in many physical char-

acters and their similarity of stock and origin have led me to do this. Low stature has its extreme at 155.0 and 157.5 centimeters among the Lapps and northern Russians, who might well be put with Asia. The Italians and Jews come next with a stature of 164.0 centimeters followed by the Russians and French at about 165.0 centimeters. Central Europe, which includes Belgium, Switzerland, and the Balkans, has a stature of 167.0 centimeters, and Greece has about the same.

It may be said that in general stature in Europe is low in the north as among the Lapps and northern Russians, and low in the south as among the Italians and Jews, and it is higher in between. The Scotch have the highest individual statures, it is high in England, and higher in the United States, especially among the Old Americans of British origin. There is evidence of two areas of high stature in Europe, the one in Scandinavia, North Germany and the British Isles, the other about the interior littoral of the Atlantic and Mediterranean. The former are called the Nordic or Teutonic Peoples, and the latter are called the Littoral, Adriatic and Dinaric Peoples. There is also evidence of two areas of small stature the one toward the Arctic zone and the other toward the Tropics. The restless activity by the cold, moist, cloudy Baltic region, or the steppe and mountain, had some influence in molding the tall stature, whereas the extreme cold of the far north and the heat of the Mediterranean with civilization had some influence in making the stature small. Through these influences selection acted, and heredity carried on the result.

There are pockets of high and low stature in Europe and in the other continents, as demonstrated by Wissler for the American Indian. These "patches" may be the centers of radiation for the culture, or centers of compression by the tribes from without. Ripley presents evidences of the crazy quilt effect of stature distribution in Europe, and discusses at some length the effects of race and environment. He gives the results of "misery spots," "artificial selection," "natural emigrants," "occupation or professions," and the "habits of life or of the nature of employment." These all have their influence in a minor way. Visualizing the whole continent brings out major influences. It is only by getting out of the woods that the forest may be seen.

#### ASIA

The summit of stature is found in China, 162.0 centimeters, India 164.0 centimeters and Tibet, 162.5 centimeters: and the lowest stature is found among the Negritos, 148.0 centimeters, and in the Malay

peninsula, 154.0 centimeters. The Mongolians and Siberians in the north have about the same stature as the Indo-Chinese and southern Indians in the south, 159.0 centimeters. Tall statures are found about the high plateaus of western Asia and this is less in the north and south as well as in Japan, and in the latter the stature is also about 159.0 centimeters. The stature changes from 164.0 in northern India to 157.5 in southern India and 148.0 among the Negritos of southern India and the Malay peninsula. The Malays are closer to the Negritos in stature than any other people and the Indo-Chinese are closer to the Malays. These relations become more distinct when the peoples of the Pacific Islands are studied.

#### PACIFIC ISLANDS

The summit of stature in the Pacific Islands is reached in certain groups of Polynesians where it is 172.0 centimeters, and the extreme of low stature among the Negritos where it is as low as 139.7 centimeters. A few small groups of individuals among the Australians have a stature of 185.0 centimeters. The stature of all the groups of Malays is 159.0 centimeters and that of the Senoi or Sakai is 152.5, whereas the stature of the Negritos nearby is 148.0 centimeters. The Senoi or Sakai are so manifestly crosses between the Malays and Negritos that their stature is easily explicable. There are two distinct types among the Polynesians, the European and the Malay, and there are two distinct groups of stature, the one at 161.0 centimeters and the other at 172.0 centimeters, with no intervening groups between 165.0 and 170.0 centimeters. The stature of the Melanesians is 161.5 centimeters and the stature of the Australians is 167.0 centimeters. The latter shows the European influence through the "Hairy Men." Groups of hairy men are found in a broad zone from Russia to Australia, with remnants in Japan and the Philippines.

There is tall stature in Asia about the great plateaus bordering on Persia and Turkey, and small stature toward the Arctic and Tropic zones, with smaller statures in the Pacific Islands among the Negritos and Malays. The Malays are mixtures of the Asiatic, Negrito and European. There is tall stature among the Polynesians and Australians, with less tall stature among the Melanesians. The Polynesians are mixtures of the Europeans, Malays and Melanesians with more European than other stocks, and the Australians are mixtures of the Melanesians, Malays and Europeans with more of the Negroid than other stocks. In Australia there is apparently a tall negro element different from the Negrito. This, however, may be more apparent than real.

#### AFRICA

The summit of stature in Africa is found among the Bantus of eastern Africa, along the upper Nile region and among the great lakes, as well as in North Africa, where the group average of 185 centimeters is not uncommon and in one group of Somalis the stature is 185.3 centimeters. Low stature has its extreme among the Negrillos and Bushmen, with a low of 130.0 centimeters for the former and of 142.5 centimeters for the latter. The median for 102 groups of North Africa and 48 groups of East Africa is 171.0 centimeters which is the same as that of the Bantus. The median for 21 groups of Negrillos is 147.5 centimeters. Between the extremes of high and low stature are the Bushmen, 156.0, True Negroes 161.0, Berbers 164.0, and Bantus mixed with True Negroes 166.5 centimeters. If one approach the Negrillos from any side there is a gradual transition from a high to a low stature and other changes accompany this, from the True Negro on the west, the Bantu on the east, the Hottentot and Bushman on the south, and the Europeanized Hamitic and Semitic Negroid on the north.

Tall stocks have been coming into Africa from Asia and Europe throughout historic time and probably before, and these stocks have mixed with the Negroes to produce the tall peoples of Africa. The tropic conditions in central Africa have dwarfed the True Negro into the Negrillo, and the True Negro has also become dwarfed.

#### NORTH AMERICA

North America is divided into five parts, Eskimo, Canada, United States, Mexico and Central America. There is a gradual increase in stature from the Eskimos through Canada to the United States, and a sudden decrease through Mexico to Central America. The summit of stature is reached among the Winnipeg Indians of Canada, 180.2 centimeters, and the Dakotas, 178.0 centimeters, and Apaches, 176.2 centimeters, in the United States. Low stature has its extreme among the San Blas Indians of South America. Starr gives the stature of 2,276 Mexican and Central American Indians as 157.5 centimeters. The low stature towards the arctic and tropic zones in North America indicates as elsewhere that those zones do not favor tall stature.

#### SOUTH AMERICA

Stature in South America has its summit in Patagonia, where several groups attain the stature of 185.0 centimeters. Other groups of Patagonians average between 171.0 and 175.0 centimeters. Probably tall members of the tribe were measured in the

groups with statures of 185.0 centimeters. Low stature has its extreme among the Aymaras, Quechuas and Machigangas of the interior tropic zone and among the Fuegians at the southern extremity of South America towards the arctic zone. We have something similar to this condition in Africa in the low stature of the Negrillo in the jungles, high stature in the southeast, and low stature in the south among isolated groups of Bushmen and Hottentots. Steppes, pampas and fertile regions in temperate zones produce high statures. Jungle and infertile cold regions produce low statures. This is but an expression of the fittest for each region, who survive.

#### OLD AMERICAN WHITES OF VIRGINIA

For the past few years I have been making a study of the Old Americans in Virginia, and in this study have measured several thousand men, women and children from Tidewater, Piedmont and Mountain sections of the state. There is a difference in the stature of the Tidewater section on the one hand and the Piedmont and Mountain sections on the other. The stature from all three sections is 173.7 centimeters. The tallest group is that of the leading farmers of Albemarle County in the Piedmont section of the state where the stature is 176.2 centimeters with extremes of 165.1 and 190.4 centimeters, and the smallest group is from Tidewater where the stature is 170.7 centimeters with extremes of 160.6 and 181.6 centimeters.

The tall stature in the Piedmont and Mountain sections of the state may be the result of the stock from which they were derived. The Scotch, or Scotch-Irish as they are called, have been traced through Pennsylvania, Virginia, North Carolina, Tennessee, Kentucky, Missouri and to the Pacific Coast. They were pioneers in the colonial period and acted as a buffer between the Indians and the colonists on the Atlantic seaboard. Later they aided largely in the settlement of the west. They have been the tallest men of the United States. During the Revolution Virginia furnished some of the tallest men of the army in Morgan's Rangers, and such pioneers as Washington, Jefferson and Marshall, who were over six feet tall; during the War between the States the tallest soldiers were from Kentucky, the sons of Virginia, and during the World War the tallest soldiers came from Missouri. California is celebrated for its tall men.

The tall stature of Piedmont and Mountain may be the result of other factors than the stock of people, but this is one factor. The small stature of Tidewater may be partly the result of malaria and dysentery in the earlier colonial period, leaving a sturdier

and stockier kind, and the moving out of the tall active, restless pioneer into the open spaces of the west where they joined the Scotch in maintaining the tall stature. A long experience among the mountaineers showed me their tall stature, and the recent measurements confirmed it. The examination and measurement of several hundred mountain children showed their superior physique. They had no malnutrition and they proved to be the best developed of all Virginia children so far measured.

The University of Virginia Free Dispensary provided the examination of some poor whites from Charlottesville and the surrounding district. The stature is 172.9 centimeters with extremes of 157.6 and 187.1. This is a heterogeneous group, although the extremes are not so great as in the morgue subjects measured at autopsy in the Charity Hospital, New Orleans, where the stature was 171.1 centimeters and the extremes 157.0 and 190.0 centimeters. Is the submerged tenth made up of extremes? The low stature of this group may be the result of disease or malnutrition, but the stature is not so low as that of the business men of Charlottesville, which is 171.0 centimeters, with extremes of 160.6 and 180.0 centimeters. This is a group comparable in social position with the Albemarle farmers, living in the same community, and with equal if not better opportunity for proper nourishment. It has been recognized that clerks are smaller than laborers and merchants than farmers. This is a difference of type and not the result of nourishment. The tall, active, restless pioneer develops the country, then the small, quiet, sedentary citizen builds towns and conducts its business. The pioneer may develop business, but usually lives in the country and the small man is left in the city. This is the selection by the fittest for what is for their best good.

A comparison of soldiers and students shows a difference in stature in favor of the students of about 3 centimeters. The students have a stature of 174.2 centimeters with extremes of 160.2 and 189.7 centimeters, and the soldiers have a stature of 171.0 centimeters with extremes of 152.0 and 191.0 centimeters. The students were University of Virginia men over 20 years of age, and the soldiers were engineers of the Truck Camp near-by also over 20 years of age. The students were more of the hypermorph type which is taller, whereas the soldiers were more of the mesomorph type which is not so tall.

#### SUMMARY

Tropic jungle life has an influence that decreases stature, and so has Arctic cold and waste. In each there is difficulty in procuring proper food, and discomfort in the extreme.

The active life of the temperate zone with its comforts and abundant food supply produces the tallest statures.

The greatest extremes of small stature are found among the Negrillos of Central Africa and the Aymaras of Central South America, in the jungles of excessive heat and poor food supply. Next to these come the Eskimos, Lapps and Siberians, with ice and excessive cold and poor food supply. On the other hand, the littoral and southern Baltic regions in Europe, the western part of Asia, eastern Africa, and the plains and pampas of the Americas with their active life, abundant food supply and temperate climate produce the tallest statures.

Certain stocks may move into areas for which they are not fitted and remain for a time, and such conditions exist throughout the world to-day where recent movements of peoples have taken place, but ultimately there is a survival of the stock best fitted for the environment, and the unfitted stocks disappear by amalgamation, eradication or dispersal.

Sea areas and probably sea food have an influence in reducing stature. The present Mediterranean peoples and the primordial British have small statures and so does Japan, yet they came from taller continental stocks. The Central Americans and Fuegians are smaller than the continental peoples near-by. The Malays and southern Asiatics are smaller than the peoples of the interior of the continent. Other instances might be cited.

There is some evidence that the seaboard statures of the United States are less than those of the interior, but other factors enter here.

Looked at in its broadest sense, environment molds the individual, selection retains the fittest under different environments, and heredity carries on the results.

R. BENNETT BEAN

## THE FUNCTIONS OF SECTION M— ENGINEERING<sup>1</sup>

FROM time to time during the ages of his development man has accidentally discovered or invented various devices and processes that have enabled him to raise himself above the level of the rest of the animal kingdom, to better cope with the forces of nature and to adapt himself to his environment. With slowly accumulated experience he improved and developed these devices and processes until they came into general use among his fellows. Each forward step in

man's ascent has been thus marked by some epoch-making discovery that expanded his power and improved his status. Doubtless from the beginning some men more than their fellows were endowed with powers of observation, deduction and ingenuity, and it is to them that the real progress of the race has been due. To such men various types of construction work were intrusted, and their experience and knowledge were passed on from generation to generation by a kind of apprenticeship and by word of mouth. Master craftsmen were thus developed who possessed some knowledge of materials and the design and construction of structures. It was from such ancestors that the modern engineer sprang.

Naturally with advancing knowledge of science, the work of the engineer—as the master craftsman came to be called—was profoundly affected. The uncertainties of his work were reduced and gradually analytical methods with reliable scientific data replaced the method of trial and error, although, alas! the latter is still employed in an altogether unjustifiable degree by engineers and by many industries. Frequently in the solution of an industrial problem it is necessary to guess because of the indeterminate nature of the problem. If one continues to guess as the problem recurs, it indicates a low order of intelligence and foresight among those who are responsible for the answer.

As a class engineers are now more concerned with the adaptation of existing knowledge to their needs than with the extension of knowledge. Occasionally their needs are such that they are, perforce, led to explore somewhat the boundaries between the known and the unknown, but they are generally content if this process develops empirical relations that satisfy for the moment their peculiar requirements or if some difficulty in design or operation is temporarily met. While for a time empirical methods may be sufficient, sooner or later every engineer and every industry will recognize the necessity for precise knowledge of processes and materials and for exact methods of analysis that can only be supplied through the aid of the fundamental sciences. No industry can feel secure until it is fully aware of the scientific basis of its various activities. Accretions to knowledge result from scientific research and developments in industry follow the adaptation of such knowledge through industrial research. Upon the combined result of scientific and industrial research depends the progress of civilization and the improvement of man's status.

Until recently men responsible for the design and construction of structures and for the control of industry were trained as apprentices and their effectiveness depended upon their natural adaptability for such work and their practical experience. The devel-

<sup>1</sup> Address of the vice-president and chairman of the Section of Engineering, American Association for the Advancement of Science, Nashville, December, 1927.