LEGISLATION TO SUPPRESS TRUTH

TO THE EDITOR OF SCIENCE: When Professor Morgan stated in his "Critique of Evolution" that the old conflict between science and theology over the question of evolution vs. special creation was ended and that it was unlikely it would ever again be revived, he was evidently not informed of a condition prevalent throughout most of our southern and western states. The newspapers report a bill before the Kentucky legislature making the teaching of evolution an offence punishable by a fine of $500 to $1,000. This action is more than a possibility elsewhere, since the Oklahoma State Baptist Association recently passed a resolution condemning evolution, and appointed a committee to eradicate this "heresy" from their schools in this state. The Texas Southern Baptists in a convention at Dallas recently took the same action. A similar movement was inaugurated in December by a "Congress" of the Disciples of Christ, where in discussion bitter hostility was shown and a committee was appointed to investigate all the colleges under the auspices of that body with a view to withholding funds from any which may be found to "teach evolution." In both of these denominations, the religious periodicals are carrying pages of fulminations against evolution ("Darwinism"), often of the most antequated and puerile matter, but calculated to arouse the frenzy of the uninformed who imagine their religious beliefs to be imperilled by this "damnable doctrine"! The secular press in this same region of the country has in several cases carried editorials commending the action in Kentucky and urging like action elsewhere.

This is not a time when the scientific world should regard the situation as a joke, nor merely as a local manifestation. With a "silver-tongued" apostle, the recrudescence of the old conflict bids fair to take on the proportions of a general action. The Moody Biblical Institute of Chicago, it is reported, is sending thousands of Mr. Bryan's addresses through the mails in furtherance of this propaganda. When it is realized that 50 per cent. of our citizenship are known to have the intelligence of mere children the harm that these misguided reformers may do is beyond calculation. X.

ECOLOGICAL INVESTIGATION ALONG THE RED RIVER

TO THE EDITOR OF SCIENCE: On page 127 of the February 3, 1922 number of SCIENCE you published a news item which included extracts from a letter of the Attorney General of the United States justly commendatory of Professor Cowles "for his ecological investigations along the Red River for use in connection with a suit between the states of Oklahoma and Texas in the Supreme Court of the United States."

The reader might gather from this that the suit referred to was strictly a two-sided one between these two states and that the government of the United States (including the attorney general) were a disinterested, unpartisan referee in the matter. Such an impression the attorney general certainly did not mean to convey, for the United States is an intervener in the suit. When the evidence is made available to the scientific public it will have to be read with this in mind.

CARL HARTMAN
AUSTIN, TEXAS

ATOMIC NUCLEI

In my address printed in SCIENCE on March 3 last, the following corrections should be made:

1. In the last line of page 225, 3×10^{-13} cm. should read 3×10^{-12} cm.

2. In the fifth line, column 1, of page 226, 3×10^{-13} cm. should read 3×10^{-12} cm.

3. In the twenty-seventh line, column 1, page 226, 3×10^{-12} cm. should read 3×10^{-13} cm.

These errors were made in the copy and inadvertently overlooked by me in the proof.

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MARCH 7, 1922

NOTES ON METEOROLOGY AND CLIMATOLOGY

NEW DISCUSSION OF TEMPERATURES IN THE UNITED STATES

ORDINARILY, the dullest portion of a scientific paper is that in which tables and charts

are described. But a significant exception to this rule is to be found in Professor Robert DeC. Ward's recent discussion of the new temperature charts of the United States.[1] In this paper, Professor Ward has woven about certain fine charts, which are to appear eventually in the section on "Climate" in the *Atlas of American Agriculture* (U. S. Department of Agriculture), a moving story of isotherms so fascinating that one reads to the very end without the least fatigue;—this is noteworthy because it is exceedingly difficult for most authors to avoid the prosaic when dealing with such a subject. But the dynamic qualities of the paper are not more impressive than the skill displayed in drawing from the isothermal complex, the broad and significant climatic features of these extraordinary charts.

From a large number of charts furnished the author through the courtesy of Dr. O. E. Baker, Professor C. F. Marvin, and Mr. J. B. Kincer, twenty have been selected for discussion and are reproduced as lithographs in the *Monthly Weather Review*. The charts include monthly means for each of the twelve months, average winter temperatures, mean annual ranges, lowest mean monthly temperatures recorded in January and July, absolute maxima and minima, and average annual minima. These represent a distinct advance over earlier charts in that topography has been carefully considered. The mountainous west, therefore, on most of the charts, presents a very complex appearance, for there the influence of altitude is most clearly shown. The river valleys, such as those of the Rio Grande and the Colorado, could be readily detected by the trend of the isotherms were the base map lacking; the Appalachian region introduces warping and many local irregularities. The crowding of the isotherms in the Rocky Mountains, however, prevents such broad generalizations as are possible in the East.

[1] Some characteristics of United States temperatures. *Monthly Weather Review*, November, 1921, pp. 595-606. A limited number of reprints of this article will be available shortly, and may be obtained upon application to the Chief of the Weather Bureau, Washington, D. C.

Beginning with a broad, world-view of the trend of isotherms across the continents, the author shows how the great ocean currents crowd the isotherms in latitude on the east coasts and spread them apart on the west coasts. This accounts for the mild climate of the west coast of Europe as compared with the east coast of the United States. In middle and lower latitudes, the east and west coasts of the United States do not differ materially in mean annual temperature, but in northerly latitudes, the mildness of the Pacific Coast asserts itself. In latitude 45° N., for instance, the mean annual temperatures are about 10° F. higher on the west than on the east coast; while San Diego, Calif. and Charleston, S. C., in the same latitude, have approximately the same mean annual temperature.

A striking feature of the mid-winter chart is a southward curving of the isotherms over the northern interior districts, "which emphasizes, among other things, the fact that the western border of the Great Plains and the eastern foothills of the Rocky Mountains are warmer in spite of their greater elevation than the lower-lying country farther east." Prevailing off-shore winds along the Atlantic and Gulf coasts prevent the full effect of the moderating influence of these warm waters to be realized. But, in spite of this, the isotherms bend in general accord with the coast lines. The moderating effects of water are also observed to leeward of the Great Lakes. Along the Pacific coast, on-shore winds cause the isotherms to parallel the coast, thus affording an interesting comparison of the effect of prevailing winds and latitude controls, the Atlantic coast being conspicuously subject to the latter.

The January mean temperature is much higher on the west coast than on the east, increasing, as was the case with the mean annual temperature, in effectiveness with increase of latitude. The coast of Oregon is 20° F. warmer than the corresponding latitude on the Maine coast. The direction of the pilgrimages of seekers for balmy climates, the shifting of transportation from the Great Lakes to railroads upon the close of navigation, the

seasonal control of certain industries, are only suggestions of the many economic considerations dependent in a large way upon the geographical distribution of monthly mean temperature.

In mid-summer, however, the south to north gradients of temperature in the east are not so marked as in winter. "So far as the mean temperatures alone are concerned, therefore, a long journey from south to north in search of decidedly cooler summers gives far less change than the corresponding trip from north to south in winter in search of much warmer and balmier climates." Three features of Pacific coast temperatures are interesting: (1) the slight north-south gradient of only 1° F. per 100 miles along the coast; (2) the extremely steep gradient from the cool coast of southern California to the heated interior; and (3) the contrast between heated valleys and cool slopes.

But it is in his discussion of the annual march of the isotherms that Professor Ward waxes especially cinematographic, for one can see the northward and southward march of the isotherms as vividly as if they were projected upon the silver sheet. As the winter advances these isothermal lines appear in northerly latitudes and glide smoothly and continuously equatorward, and later begin their poleward migration, sometimes leaving the earth's surface entirely in higher latitudes, and rising into the free-air. This is the author's conception of the interpretation of such charts, and concerning it, he remarks:

> When this conception is thoroughly in mind, isothermal maps have a new meaning. They are no longer dead and rigid, but are full of movement, suggesting an infinite number of relations between the everchanging temperature and all of human life and activity.

The temperature gradient in January from southern Florida to Laborador is the steepest in the world, when the great distance is considered. This steep gradient, especially unique because there are no transverse mountain ranges to produce it, has great economic significance, as was first pointed out by Woeikof. Labrador is arctic in climate, while Florida in many respects is tropical. This favored the prosperity of the early colonists and remains of the greatest economic significance.

The final portions of the paper deal with many questions of considerable popular interest. Upon what does our judgment of an abnormally cold or warm month depend? Certainly, our senses are not capable of averaging a month's temperatures so that they can conclude that this month or that was abnormally warm or cool. Such opinions, it seems, are based upon extreme "spells" of weather, their severity, and their distribution.

What is the physical cause underlying the sequence of unusually mild or cold seasons? Such abnormalities have been noted since the earliest times and have been studied by Schott, Stockman, and Henry, and more recently by Dr. C. F. Brooks. The first three showed that no permanent change of temperature is taking place. Dr. Brooks has shown that no other than a chance relationship has existed during four fifths of the years from 1812 to the present; the remaining fifth is represented by two series of alternating cold and warm winters attended by similar preliminary seasons. These series begin with 1872-73 and 1917-18, and are of especial interest in connection with their bearing upon generalized long-range forecasting.

What are the highest and lowest temperatures ever observed at various stations in the United States? "Zero has not been recorded on the Atlantic Coast south of Chesapeake Bay, on the immediate Gulf Coast, or in the Valley of California." In the northern Plains −60° F. has been recorded. At Greenland Ranch, in the Death Valley, a temperature of 134° F. was measured. Key West, Fla., is the only regular Weather Bureau station that has never recorded a freezing temperature.

Finally, there is the question of the validity of certain beliefs that there are irregularities in the annual march of temperature which tend to persist. The "January thaw," the "May freeze" and "Indian summer" seem to have no counterpart in the annual march of temperature, according to Professor C. F. Mar-

vin and the New England "Ice Saints" (May 10) seems to be a similar fiction, according to the late Waldo E. Forbes. Where such irregularities appear in the mean of a number of years, they appear to be the result of one or more extreme occurrences.

The well-merited praise that Professor Ward bestows upon the new temperature charts of the *Atlas of American Agriculture* could equally well be turned by others upon his own splendid discussion of them.

C. LEROY MEISINGER
WASHINGTON, D. C.

SPECIAL ARTICLES

THE PRODUCTION OF NON-DISJUNCTION BY X-RAYS

IN a previous issue of this journal[1] the writer described certain experiments which showed that the X-chromosome could be "eliminated" from the egg of Drosophila by X-rays. In these experiments red-eyed, homozygous, virgin females were X-rayed and crossed with white-eyed males. A total of twenty-four exceptional sons (white-eyed) were produced by the X-rayed females; fourteen out of the nineteen fertile X-rayed females producing exceptions. All excepting one of the twenty-four exceptional sons obtained from the X-rayed females were from eggs laid within six days of the time of X-raying and they could be divided into two groups corresponding to eggs laid during the earlier and later part of this period. Plough[2] has shown that maturation of the eggs in Drosophila melanogaster occupies approximately six days. It therefore seems probable that the X-rays act on the eggs while in one of the maturation divisions.

In the experiments referred to above only exceptional sons were recorded. In primary non-disjunction as investigated by Bridges[3] both exceptional sons and exceptional daughters occur. When, however, the female parent is homozygous for the dominant allelomorph as in the case of the X-ray experiments, the exceptional daughters are indistinguishable externally from their regular sisters.

The experiments to be described were planned to determine whether exceptional daughters were produced as a result of X-rays. Accordingly homozygous white-eyed females were crossed to eosin-eyed miniature-winged males. The regular offspring of such a cross are eosin-eyed, normal-winged daughters and white-eyed normal-winged sons. The exceptions are white-eyed, normal-winged daughters and eosin-eyed, miniature-winged sons. In the experiments, white-eyed, virgin females from stock obtained from Dr. T. H. Morgan and used in the previous X-ray experiments, were mated to eosin-eyed, miniature-winged males from stock obtained from H. H. Plough. The females used both for the controls and for X-raying, were all sisters, being from the first generation of a single pair of white-eyed flies. The virginity of these was secured by isolating pupæ in test tubes. The X-raying[4] was done soon after the flies emerged from the pupa cases and they were immediately mated. The males used in the matings were, in the greater number of the experiments, the offspring of a single pair of eosin-eyed, miniature-winged flies. (This was probably an unnecessary precaution). Seventeen of the control pairs were fertile and one pair or 6 per cent. produced one exceptional son (eosin-eyed and miniature-winged). The total number of offspring produced by the control pairs in the first generation was 1,743 females and 1,726 males and the exceptional fly formed .06 per cent. of the males. Thirteen of the X-rayed females were fertile. Nine of them or 69 per cent. produced exceptions, two daughters (white-eyed and normal-winged like their mothers) and twelve sons (eosin-eyed and miniature-winged[5] like their fathers). The

[1] SCIENCE, N. S., Vol. LIV, September 23, 1921.

[2] *Jour. Exp. Zool.*, Vol. 24, No. 2, 1917.

[3] *Genetics*, Vol. 1, p. 1-52, 107-163, 1916.

[4] The X-ray dosage and the technique of these experiments cannot be adequately described in a short note such as the present. They will be described in detail in a more extended paper to appear shortly.

[5] In the case of three of the exceptional sons the wing character was not determined. Two of them were obtained by dissecting late pupal stages and one died before its wings had expanded.