preparing a stain on the basis of saturated alcoholic solution is not an ideal procedure. At the present time it is perhaps the best method possible, since many different brands of stain are available which vary greatly in their total dye strength without any indication to the purchaser as to what their actual dye content may be. Solutions made up as recommended in the previous article will certainly be more nearly constant than those prepared on the basis of dry weight under such circumstances as these; but the procedure is far from satisfactory.

The ideal to be hoped for is this: That every manufacturer of stains print on his label the actual dye content and the moisture content of the particular batch of stain on which the label is placed; and that every one publishing stain formulae prepare them on the basis of weight of *pure dye*. Such staining formulae will be very different from the ones found in the literature at present, because most of the latter were prepared on the basis of stains that were seldom more than fifty per cent. actual dye strength. Of course, it is too much to expect such a revolution in the preparation of staining formulae immediately; but the first step has already been taken in that one of the stain companies has promised to place on every label the information concerning dye strength and moisture content which is necessary. Any one writing a text book or article in which stain formulae will be given is urged to pay attention to this fact and so far as possible to cooperate with the commission in publishing stain formulae in standardized form. The commission will be very glad to cooperate with any one who wishes to adopt this new form of stain formulae and will furnish any necessary information which is available.

COMMISSION ON THE STANDARDIZATION OF BIOLOGICAL STAINS.

H. J. CONN
Chairman

"THE NEW AIR WORLD"

IN SCIENCE of March 30, Dr. William J. Humphreys, under the caption "Three of a Kind," criticizes my recent book, "The New Air World." His criticisms are so lacking in accuracy that I assume you will allow me space in which to answer some of them. It is a fact that I shall be glad to verify with documentary evidence for your inspeciton that this book has been highly commended by many scientists of high standing and that to my knowledge there is not an unfavorable criticism of it except by Humphreys and Alexander McAdie.

In 1910, through the Appleton Press, I published a college text-book called "Descriptive Meteorology." In the preface of this book it is clearly stated that I "consulted with and received valuable aid from Professor W. J. Humphreys on many technical points in the physics of the book," and it is a fact familiar to many officials of the Weather Bureau that Humphreys read every galley proof and every page proof of that book and that I made changes in my original copy as the result of his suggestions and that this book had his approval, as it was intended for the teaching of the observers and others of the bureau with whom he was expected to be in close association in the future. Now any one in comparing this book with the one that Professor Humphreys now so severely criticizes and which he says "contains scores of errors and numerous loose and inaccurate statements" will see that the second book is simply the first book stated in popular language for the lay reader and for pupils of the grammar schools, with the addition of a few entirely new chapters, and these new chapters he has not specifically attacked. Much of what he approved then he disputes now.

First, he objects to the book because it contains material "merely of the grammar-school grade," when in point of fact the author did not intend it for anything more, saying in his introduction: "an effort (is) made to tell a simple story that will awaken curiosity and lead the reader to wish to know more and more of the mysteries of the atmosphere."

Second: he quotes from page 8 of my book the statement that "The atmosphere is thus by the absorption of radiation warmed largely from the bottom upwards, which accounts for the perpetual freezing temperatures of high mountain peaks, although they are nearer the sun than are the bases from which they rise."

Then he says: "This, as any physicist knows, is a wholly inadequate explanation of the phenomenon in question." But he withholds from

the reader the fact that page 8, from which he extracted only five lines, contains what I believe a competent person would regard as a "wholly adequate explanation." It is as follows:

Oxygen and nitrogen, which form the greater part of the atmospheric gases, absorb comparatively little of the solar rays, while water-vapor, which constitutes a little more than one per cent. of the atmosphere and which remains close to the earth, absorbs large quantities. From the fact that one half of the atmosphere, including nearly all of its water-vapor, lies below an elevation of three and one half miles, it becomes evident that the greater part of the absorption of the sun's rays must take place in the lower strata. On clear days the atmosphere absorbs nearly one half of the sun's rays; the remainder reaches the surface of the earth, warms it and in turn is radiated back into the air—with this difference: that as earth radiation the wave motion of the rays is longer and slower than it was when the rays entered our atmosphere as solar radiation. In this slower form the rays are more readily absorbed. The atmosphere is thus warmed largely from the bottom upwards, which accounts for the perpetual freezing temperatures of high mountain peaks, although they are nearer the sun than are the bases from which they rise.

Now read the explanation that Humphreys gives of this phenomenon in his criticisms published in SCIENCE on March 30 last, and judge as to which is the more lucid and "adequate":

Absorption at the surface in excess, on the average, of radiation; and radiation of each portion of the upper air, up to eleven kilometers, roughly, above sea level, in excess, on the average, of absorption, are the necessary and sufficient causes, through the convection thus maintained, of the practically continuous state of decrease of temperature, in this lower portion of the atmosphere, with increase of height.

Talk about "loose and inaccurate" statements! I submit this as a sample of incoherency well knitted together; and it is about as "inaccurate" as anything well could be, for no one ever before heard of "convection" being "thus maintained." I must further embarrass Professor Humphreys by stating that the explanation given by me in "The New Air World" and which he criticizes may be found substantially in substance on page 82 of "Descriptive Meteorology" hereinbefore mentioned, which he carefully read and approved before it was published and he never has repudiated the credit given him in the preface of that work.

Third: he disputes my statement about the hour of maximum temperature reversing from day to night at the altitude of about one and one half miles and says that if I "had first studied the records" I would have found that "the lowest temperature at level *is* at night, or more exactly at 5 to 6 A. M., substantially as at the surface."

Here again the cold records will embarrass Professor Humphreys, but I will have to leave him to contend with Dr. William R. Blair and Professor Charles F. Marvin, chief of the Weather Bureau, with whom he comes squarely into conflict. As chairman of the sub-committee on the relations of the atmosphere to aeronautics, submitted to the National Advisory Committee during the World War, Professor Marvin approved report No. 13, written by Dr. Blair. On page 46 of this report it is stated: "The afternoon maximum temperature disappears between the 1.5 and 2 kilometers levels in the summer months and between 1 and 1.5 kilometers levels in the winter months," and pages 47 and 48 diagrammatically present the information and show Humphreys in error.

I have answered specifically but three of Professor Humphreys' criticisms, but I think these answers are sufficiently "adequate" to show the nature of all of them.

WILLIS L. MOORE

With your kind permission I shall reply briefly to the above rejoinder.

So far as I know (and I have inquired at the library of the Weather Bureau) none of the eminent scientists who "highly commend" "The New Air World" has published his commendation in a reputable scientific journal.

If any one is sufficiently interested and knows meteorology I can show him more than one hundred errors and loose statements in this book.

As to my responsibility for the statements that appear in "Descriptive Meteorology," allow me to say that Professor Moore is entirely too lenient. I read not only the proof of this book but also the original manuscript in its different stages and removed an amazing number of errors. I also wrote chapter VIII and

portions of some others; nor was I alone in making such requested contributions. Finally, the late Cleveland Abbe put much labor on the proof. In short, everything practicable was done, with the material in hand, to save the bureau's face. Nevertheless, a number of errors still remain in this book, including the insufficient explanation of the cold of mountain peaks.

The longer quotation from "The New Air World" does not help matters and would not even if so rewritten as to be precise. From the fact that the lower atmosphere is a better absorber, in general, of solar and terrestrial radiations than is the upper, one might *jump* to the conclusion that therefore the temperature of the air must rapidly decrease with increase of elevation. But, then, the lower atmosphere is, in general, a much better radiator than is the upper air, and so one might with equal reason *suppose* that the temperature of the air must rapidly increase with increase of elevation. If confronted with the fact that the lower atmosphere is both a better absorber and a better radiator than is the upper he might *guess* that there would be but little change of temperature with change of elevation. In each of these cases the argument is inconclusive. The complete explanation, though it could be elaborated into a chapter, is outlined in the sentence which Professor Moore says he is unable to follow—a summation appropriate to a scientific journal and entirely clear, as I know from actual tests, to those who understand the phenomenon under discussion.

As to the time of day at which the minimum temperature occurs, on the average, at an altitude (author does not state whether above surface or sea-level) of one and a half miles, let me say that Dines, in his paper "The characteristics of the free atmosphere," Meteorological Office, London, 1919, reviews all the contributions, about half a dozen, that up to that time had been published on the daily temperature range in the free air and concludes that this range decreases rapidly with height and that above two kilometers the range is so small that it is uncertain when either the maximum or minimum occurs. Beginning with 1916, however, the Weather Bureau has collected a large amount of information on this subject which shows that at a mile and a half above the surface at the station (Drexel) where this information was obtained the diurnal temperature range is small and that the minimum and maximum temperatures, respectively, occur, on the average (seasonal and annual), at about the same times at this level as at the surface, as perhaps one would expect to be the case, except at the times and places of strong vertical convection.

Professor Moore's excuses for the above two errors do not, as he implies, prove that he was right in saying that at the altitude of 100 miles the temperature is absolute zero; that there could be no atmosphere if the temperature were below —346° F.; that without dust there could be no light; that ozone is highly electrified oxygen, etc., etc.

Finally, let me say that an accurate elementary book merits the highest praise, for it does great good; while a grossly inaccurate one deserves severe condemnation, because of the harm it works through misinformation to children and other unsuspecting victims.

W. J. HUMPHREYS

QUOTATIONS

MR. BRYAN, THE CHURCH AND EVOLUTION

THOUGH Mr. William J. Bryan regards the defeat of his resolution against Darwinism in the Presbyterian General Assembly as a personal humiliation and is said in the press reports to have "sunk into his seat so pale as to appear almost ill" yesterday when the vote against the resolution was declared, it is hard to see how even a conservative believer can be displeased by the resolution on the subject which was adopted by the Assembly. This resolution declares

> that Synods and Presbyteries within whose bounds Presbyterian supported academies, colleges and training schools are located are hereby instructed to exercise careful oversight over the instruction given in such institutions, and that Synods and Presbyteries withhold their official approval from such academies, colleges and training schools where any teaching or instruction is given which seeks to establish a materialistic evolutionary philosophy of life which disregards or attempts to discredit the Christian faith.

The bases of belief would appear to be en-