To return to color, the color-chemist to-day is a super-magician. If women could be scientific, they would insist upon being stamped all over, not with a king's cartouche, such as we have seen was used on Tut-ankh-Amen's tomb; no, with the hexagon symbol of benzene, as the emblem of the colors in which they are now arrayed far more gloriously than were ever the lilies which Solomon, we are told, could not rival. To-day, we can paint the lily with its own color. We make the colors of the lily, indeed those of most flowers, in the laboratory, actually from benzene. Faraday, in Sandemanian moments, would almost have regarded this as sacrilege.

To-day is no common occasion and we desire to deal with it in no common way. This commemoration is held at the instance of a remarkable and unusual conjunction: by the Royal Institution, acting together with the Chemical Society, the Society of Chemical Industry and the Association of British Chemical Manufacturers—a trinity completely representative of English chemical interests. Chemists desire to show that for once they can think together. We together acclaim the memory of Faraday—of Faraday the complete philosophic chemist. Moreover, our committee has decided to take in hand the preparation of a medal, to be awarded at intervals, perhaps sexennially, without regard to nationality, for an outstanding achievement in some clear relation with Faraday's discovery of benzene. We desire not only to keep his influence alive but also to extend it. We propose to follow a well-known practice of the clergy and make the first award, in anticipation, to-day. We ask Mr. James Morton, of Carlisle and Grangemouth, to accept promise of the first Faraday Benzene Centenary Medal, in special recognition of the signal service he has rendered to chemical science and industry in Great Britain, during the past ten years, by developing and extending the manufacture of the anthracene vat-dyestuffs and, more recently, by extending their application to silk and wool.

HENRY E. ARMSTRONG

EVOLUTION AND EDUCATION IN THE TENNESSEE TRIAL

PROFESSOR OSBORN has taken a very active part in the scientific side of the Tennessee trial, following conferences between himself and Dr. George W. Rappleyea and Mr. John T. Scopes, in which he was assured of the thoroughly sincere motives that prompted these young Tennesseans to bring on this great trial. It is interesting to note that Mr. Scopes studied evolution under Arthur M. Miller, professor of geology in the University of Kentucky, who took his degree of doctor of philosophy under Professor Osborn.

Great interest in this trial has been manifested in the British press, and Major Leonard Darwin, son of Charles Darwin, cabled to Professor Osborn asking if he could be of any help, prepaying a cabled reply. In response to Professor Osborn's advice, Major Darwin sent to Mr. Scopes the following letter:

I have been requested by my council to express their great sympathy for you in your courageous efforts to maintain the right to teach well established scientific theories. To state that which is true can not be irreligious, and it is only those who have studied the question insufficiently who deny the broad fact of organic evolution; though how it came about is still a matter of dispute and is likely to remain so for some time. In this country ministers of almost all denominations are allowed openly to proclaim their belief that man has been evolved from some lowly organisms by an unbroken series of modifications; a series somewhat similar to that by which each individual has certainly been developed from a baby and ultimately from a minute living germ. Those who declare that the one process—that of racial evolution—is more contrary to spiritual ideals than is the other process—that of development from an infant, are placing unnecessary stumbling blocks in the paths of all those of their hearers who are not wholly irreligious.

In conclusion, may the son of Charles Darwin send you in his own name one word of warm encouragement.

Yours very faithfully,
(Signed) Leonard Darwin, President,
Eugenics Education Society.

Mr. Bainbridge Colby requested a series of statements from the scientific advisers in the case, Messrs. Osborn, Conklin, Pupin, Metcalf, Rice, Miller and Lane, as to the relation which evolution bears as part of educational discipline, not only in zoology and anthropology, but in every branch of science. The scientific advisers complied with written statements in the form of sworn affidavits which Mr. Colby might use if he desires as testimony in the trial. The statements of Professors Metcalf and Rice were not in duplicate and can not be reproduced here, but those before us are as follows:

By Arthur M. Miller, professor of geology, University of Kentucky.

The affiant, Arthur M. Miller, states that for thirty-three (33) years last past he has been and now is the head of the Department of Geology at the University of Kentucky, and for a portion of said time he was also the head of the Department of Zoology of the said University; and that from his experience as a student and teacher of geology and biology, he affirms that it would be impossible to properly present these subjects to students without implicitly or explicitly accepting the doctrine of evolution as true—as much as the Copernican

theory in astronomy or the doctrine of the conservation of energy in physics; and that should a teacher attempt to exclude evolution as true from a presentation of geology or biology, he would find himself without authoritative text books on the subjects to put into the hands of his students.

In witness whereof, the said affiant hath hereunto set his hand at Lexington, Kentucky, this 1st day of July, 1925.

(Signed) Arthur M. Miller

Subscribed and sworn to this 1st day of July, 1925.

By Henry Fairfield Osborn, research professor of zoology, Columbia University.

The teaching that creation has been gradual and not sudden—a matter of millions of years and not of a few hours—that all processes of the formation of the earth have taken enormously long periods of time, that all living things, plants as well as animals, attained their present form and perfection by gradual instead of by sudden means, that man himself is the result of a very gradual process of creation rather than a suddenly formed and finished product—this teaching is what we call *evolution*, for want of a better word. The attempt is made by men who do not understand it and who know nothing about it, who have never studied it, who have never closely observed a plant or an animal nor the structure of man, to show that this teaching is revolutionary and contrary to human knowledge and human welfare. This attempt is absolutely false, untruthful and ignorant, it is contrary to the intelligent teaching of the entire civilized world to-day; it is contrary to what is being taught in the Christian countries of the world and in all the Christian states, except only in certain of our own states where the gradual processes of creation have been grossly misrepresented and even ridiculed. The idea of gradual creation known as evolution is essential in education and every branch of human welfare—in medicine, anatomy, surgery, plant and animal industry, the application of geology as well as zoology, psychology, human origins, cultural and anatomical. It is only through our knowledge of the relationships of man with the lower animals that great discoveries and beneficent discoveries have been made in combatting disease, beginning with vaccination against smallpox and coming down to the cure of diseases like diphtheria and the treatment of all the germ diseases, where it has been found that the animals most closely related to man yield most readily to the treatment that helps man.

No act of any legislature in the world can take evolutionary teaching out of education, because it has become an essential and integral part of education. Nor can we take it out of the teachings about man. While possessed of a superior spirit which we call the soul, man in his anatomy is absolutely one with the rest of the mammals, bone by bone, muscle by muscle, blood vessel by blood vessel, gland by gland, tooth by tooth. Man is no exception to the rest of the animal world nor to the rest of the universe, and no act of legislation can change him. No teacher can possibly teach zoology or any other branch of science truthfully and intelligently if evolution is left out; the cutting out of evolution from education is exactly like taking the heart from the body, for evolution is at the very heart or center of all education and will always be so. In astronomy the evolution of the stars has recently been demonstrated; in chemistry and physics the evolution of the chemical elements has recently been demonstrated. Thus the entire universe is shown to be the product of gradual evolution rather than of special and instantaneous creation.

Henry Fairfield Osborn,
Research Professor of Zoology, Columbia University
President, American Museum of Natural History

Subscribed and sworn to this 3rd day of July, 1925.

By Henry Higgins Lane, professor and head, department of zoology, University of Kansas.

Henry Higgins Lane, being first duly sworn, says:

First, That he has been a student of biological science for thirty-three years; a teacher for twenty-six years; and an investigator in biology for twenty-three years.

Second, That he has been connected with colleges and universities for twenty-six of the past thirty years, twenty of which have been spent in the capacity of head of zoology or biology departments. At present he is professor and head of the department of zoology at Kansas State University.

Third, That he is the author of a book entitled "Evolution and Christian Faith," in which are set forth his conclusions as to the evidence for the doctrine of evolution as well as the relations of that doctrine to the Christian religion.

Fourth, That he has uniformly found in his experience both as a student and as a teacher, that the doctrine of evolution is a necessary foundation for the correct understanding and teaching of such subjects as general biology, zoology, human and comparative anatomy, psychology and anthropology. That the whole field of successful scientific plant and animal breeding is based upon the application of the laws of evolution and genetics to the problem of the development and improvement of domesticated forms of life.

Fifth, That as a result of fourteen years teaching in a medical school, he is convinced of the absolute necessity of a knowledge of evolutionary principles for the proper understanding on the part of the medical student of many of the abnormalities and variations in structure and function of organs with which the physician and surgeon is called upon to deal in the practice of his profession.

Sixth, That as a student and teacher of vertebrate paleontology he has found the whole geological record to be a hopeless muddle, without sense or plan, unless explained on an evolutionary basis.

Seventh, That every line of evidence, whether from the classificatory system, comparative anatomy, comparative embryology, comparative physiology, the environmental relations of organisms, geographical distribution, paleon-

tology, genetics or biochemistry, consistently supports the evolutionary doctrine, and that otherwise the whole edifice of biological science is without meaning and valueless.

Eighth, That in his opinion man's bodily structure, physiological processes, mental faculties, embryological development, and division into numerous races and subraces, all point unmistakably to a human origin out of lower forms of animal life.

Ninth, That the whole trend of the doctrine of evolution when fairly stated is to establish the ideas:

(1) That *God* is everywhere present, and at work in his creation now, as well as in the past.

(2) That He is working according to a well-defined *plan* discernible in the phenomena of nature.

(3) That in this plan, *man* is the crowning product of creation.

(4) That the evolutionary doctrine as applied to man and human affairs, is ennobling, uplifting and productive of optimism as to man's future.

(5) That there is nothing in the evolutionary doctrine when fairly considered that in any way conflicts with true religion or a fair interpretation of the Bible.

(6) That the account of creation, in the first chapter of Genesis, leaves untouched the *method* of creation, and allows for an evolutionary process as clearly as such a brief account could do when its real purpose is kept in mind.

(7) That the scientific doctrine of evolution is in *no sense* atheistic or materialistic, but strongly supports the theistic and idealistic philosophy of the universe.

(8) That the doctrine of evolution leaves the truths of Christianity exactly where they have aways been, *i.e.,* free to stand or fall on the basis of their own intrinsic evidence and the experience of Christiandom.

(Signed) Henry Higgins Lane

Subscribed and sworn to this 1st day of July, A.D., 1925.

Professor Osborn also hurried through the press of Scribner's for wide distribution in the state of Tennessee especially his small volume, "The Earth Speaks to Bryan," a collection of religious and scientific essays written especially to meet the point of view of the Fundamentalists. Mr. Bryan has made continued and effective use of W. A. Bateson's Toronto address of December, 1921, from the time of its appearance in print to his recent article in the July *Forum.* In two issues of *Nature* (June 13 and 20) appears in full a paper by Professor Osborn presented to the National Academy of Sciences at the April meeting, entitled "The origin of species as revealed by vertebrate paleontology." The facts established by the years of research culminating in this paper are partly restated in popular language in "The Earth Speaks to Bryan."

HENRY FAIRFIELD OSBORN
COLUMBIA UNIVERSITY

ASA GRAY[1]

THE career of Asa Gray has great beauty, indeed it has the dramatic quality which comes of humble origin, far-seeing ambition, persistent effort, large accomplishment and wide recognition.

Born in 1810 at Sauquoit, Oneida County, New York, he was of English and Scotch-Irish ancestry. His parents, humble in situation, were of staunch qualities and great industry. His father, who had had but six weeks of schooling, was a tanner and like most early settlers also a farmer. In boyhood Asa was employed in the homely occupations of the farm and among other duties had the monotonous task of driving an old horse around a circular course to propel the crude mill which crushed the bark used in his father's tannery.

His parents had the Scotch piety and reverence for learning. How soon his education was begun may be inferred from a pretty story gleaned from one of the most authentic accounts of his childhood. His father promised him a spelling book of his own when he could spell all the words up to *baker,* which being of two syllables marked a notable advance. In a few weeks he had accomplished the task and was duly rewarded. Next day as he entered his school, not being permitted to speak to the teacher to proclaim his triumph, he marched past her desk waving his new spelling book before her. This was a little before he was three years old.

With intellectual ideals so early inculcated and so eagerly accepted it is not surprising that he did well in his schooling and that even a college education was contemplated for him. This, for financial reasons, did not prove feasible. Instead, at the age of sixteen, he entered a country medical school. Here he chanced to read an encyclopedia article on botany. He was so interested that he bought Amos Eaton's Manual of Botany and by the aid of this quaint little volume began the study which his own talents were destined so greatly to develop and enrich.

From this simple beginning his progress was rapid. At 17 he was assisting a country doctor; at 20 he had graduated from his medical course and was teaching several of the natural sciences in a boys' school at Utica. When 25 he wrote his "Elements of Botany," a work of unusual clarity and for its period of unsurpassed excellence in America. He had already conducted a course in botany at Hamilton College and was the following year chosen curator of the collections of the New York Lyceum.

By Dr. Torrey he was invited to collaborate on his

[1] Address at the unveiling of the Gray bust in the Hall of Fame, May 21, 1925.