These colors appear to be characteristic interference effects. Stoney[1] describes almost identical phenomena and states the conditions under which there would be formed crystals of such orientation and thickness that light reflected to the observer from the front and back surfaces of the crystal would produce interference. The explanation based on diffraction which McConnel[2] offers in criticism of Stoney's article does not seem to fit the phenomena observed here. His theory does satisfactorily explain the effects which he observed during a winter spent where similar phenomena were frequent, but there the brightest colors were within a range of from 3° to 7° from the sun and the farthest distance at which he could ever detect any color was 23°. He says that according to Stoney's theory the most brilliant effects might reasonably be expected somewhere about 20°-30° from the sun "for which we should look in vain." There were in this case few if any iridescent colors within the area where he found them most brilliant, and certainly beyond 23° they were very brilliant. It would therefore appear that there are these two different types of phenomenon.

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QUOTATIONS

THE PROPOSED SUPPRESSION OF THE TEACHING OF EVOLUTION[1]

THE mode of origin of species was practically discovered by a little-known German paleontologist by the name of Waagen in 1869, but, like the great discovery of Mendel in heredity, this truth has been long in making its way, even among biologists. Waagen's observations that species do not originate by chance or by accident, as Darwin at one time supposed, but through a continuous and well-ordered process, has since been confirmed by an overwhelming volume of testimony, so that we are now able to asemble and place in order line after line of animals in their true evolutionary succession, extending, in the case of what I have called the édition de luxe of the horses, over millions of years. We speak to the earth from Eocene times onward to the closing age of man, and it always teaches us exactly the same story. These facts are so well known and make up such an army of evidence, that they form the chief foundation of the statement that evolution has long since passed out of the domain of hypothesis and theory, to which Mr. Bryan refers, into the domain of natural law.

Evolution takes its place with the gravitation law of Newton. It should be taught in our schools simply as Nature speaks to us about it, and entirely separated from the opinions, materialistic or theistic, which have clustered about it. This simple, direct teaching of Nature is full of moral and spiritual force, if we keep the element of human opinion out of it. The moral principle inherent in evolution is that nothing can be gained in this world without an effort; the ethical principle inherent in evolution is that the best only has the right to survive; the spiritual principle in evolution is the evidence of beauty, of order, and of design in the daily myriad of miracles to which we owe our existence. This is my answer to Mr. Bryan's very natural solicitude about the influence of evolution in our schools and colleges—a solicitude not inherent in the subject itself, but in the foolishness and conceit of certain of the teachers who are privileged to teach of the processes of life.

It would not be true to say that the evolution of man rests upon evidence as complete as that of the horse, for example, because we have only traced man's ancestors back for a period of 400,000 years, as geologic time was conservatively estimated in 1893 by Secretary Walcott of the Smithsonian Institution, Washington; whereas, we have traced the horse back for a period of 3,000,000 years, according to similar estimates of geologic time.

The very recent discovery of Tertiary man, which I have just described in *Natural History* (November-December, 1921), living long before the Ice Age, certainly capable of walking in an erect position, having a hand and a foot fashioned like our own, also a brain of suffi-

[1] *Phil. Mag.*, s. 5, Vol. 24, p. 87.

[2] *Phil. Mag.*, s. 5, Vol. 24, p. 423.

[1] Extracts from articles in the New York *Times* for March 5, in answer to the article by Mr. Bryan from which extracts were printed in the last issue of SCIENCE.

cient intelligence to fashion many different kinds of implements, to make a fire, to make flint tools which may have been used for the dressing of hides as clothing, constitutes the most convincing answer to Mr. Bryan's call for more evidence. It once more reminds us of the ignorance of man of the processes of Nature, and sets a new boundary beyond which digging in the earth for more of truth must be directed. This Foxhall man, found near Ipswich, England, thus far known only by the flint implements he made and his fire, is the last bit of evidence in the direction of giving man a descent line of his own far back in geologic time. It tends to remove man still further from the great lines which led to the man apes, the chimpanzee, the orang, the gorilla and the gibbon. This is not guess work, this is a fact. It is another truth which we shall have to accept regardless of its effect. No naturalist has ever ventured to place man so far back in geologic time as this actual discovery of the Foxhall man places him. In this instance again truth is stranger than hypothesis or speculation.

Nearer to us is the Piltdown man, found not far from 75 miles to the southwest of Ipswich, England; still nearer in geologic time is the Heidelberg man, found on the Neckar River; still nearer is the Neanderthal man, whom we now know all about—his frame, his head form, his industries, his ceremonial burial of the dead, also evidence of his belief in a future existence; nearer still is the Cro-Magnon man, who lived about 30,000 years ago, our equal if not our superior in intelligence. This chain of human ancestors was totally unknown to Darwin. He could not have even dreamed of such a flood of proof and truth. It is a dramatic circumstance that Darwin had within his reach the head of the Neanderthal man without realizing that it constituted the "missing link" between man and the lower order of creation. All this evidence is to-day within reach of every schoolboy. It is at the service of Mr. Bryan. It will, we are convinced, satisfactorily answer in the negative his question: "Is it not more rational to believe in the creation of man by separate act of God than to believe in evolution without a particle of evidence?"

HENRY FAIRFIELD OSBORN

Is it any more degrading to hold that man was made through a long line of animal ancestry than to believe that he was made directly from the dust? Surely the horse and the dog and the monkey belong to higher orders of existence than do the clod and the stone. Whether we accept the teachings of evolution or the most literal interpretation of the Biblical account we are compelled to recognize the fact that our bodily origin has been a humble one; as Sir Charles Lyell once said, "It is mud or monkey." But this lowly origin does not destroy the dignity of man; his real dignity consists not in his origin but in what he is and in what he may become.

If only the theological opponents of evolution could learn anything from past attempts to confute science by the Bible they would be more cautious. It was once believed universally that the earth was flat and that it was roofed over by a solid "firmament," and when scientific evidence was adduced to show that the earth was a sphere and that the "firmament" was not a solid roof, it was denounced as opposed to the Scriptures. Those who have visited the Columbian Library in the Cathedral of Seville will recall the Bible of Columbus with marginal notes in his own handwriting to prove that the sphericity of the earth was not opposed to the Scriptures, and a treatise written by him while in prison to pacify the Inquisition. To-day only Voliva and his followers at Zion City maintain that the earth is flat, and the heavens a solid dome, because this is apparently taught by the Scriptures.

The central position of the earth in the universe with all heavenly bodies revolving around it was held to be as certain as holy writ. All the world knows the story of "Starry Galileo and His Woes" at the hands of the Inquisition, but the Copernican theory was opposed not only by the Roman Catholic Church, but also by the leaders of the Reformation. Martin Luther denounced it as "the work of a fool"; Melanchthon declared that it was neither honest nor decent to teach this pernicious doctrine, and that it should be repressed by severe measures, and John Wesley declared that it "tended toward infidelity." Even as late as 1724 the Newtonian theory of gravity was

assailed by eminent authorities as "atheistic," since "it drove God out of His universe and put a law in His place."

The conflict between geology and Genesis as to the days of creation and the age of the earth lasted until the middle of the last century, and students of Dana's geology will recall the reconciliation between the two which that great man devoutly undertook. But, by the ultra-orthodox, he and other Christian geologists were denounced as infidels and as impugners of the sacred record. It took three hundred years to end this conflict, if it may be said to be wholly ended now, but certainly no intelligent person now believes that the earth was made just 5,926 years ago and in six literal days.

And now comes Mr. Bryan in this twentieth century of enlightenment preaching a new *auto de fe,* attempting to establish an inquisition for the trial of science at the bar of theology! He proposes to prohibit the teaching of evolution by fine and imprisonment, to repeal a law of nature by a law of Kentucky. He proposes to gather into the fold of his narrow theology all existing public and private schools, colleges and universities and to allow evolutionists and agnostics to found their own schools. In view of the fact that, with the exception of a few sectarian institutions, all our colleges and universities are dedicated to "the increase and diffusion of knowledge among men," that for a generation at least they have turned away from the teaching of dogmatic theology to the cultivation of science, literature and art, that they have during this period received great benefactions for the expressed or implied purpose of carrying on this work in the spirit of freedom to seek, to find and to teach the truth as God gives men to see the truth—in view of these considerations it may well be asked whether it would not be more fitting for Mr. Bryan to establish his own institution for teaching his own views of science and theology, as Dowie, for example, did at Zion City, rather than to attempt to convert existing institutions to that purpose.

Scientific investigators and productive scholars in almost every field have long since accepted evolution in the broadest sense as an established fact. Science now deals with the evolution of the elements, of the stars and solar system, of the earth, of life upon the earth, of various types and species of plants and animals, of the body, mind and society of man, of science, art, government, education and religion. In the light of this great generalization all sciences, and especially those which have to do with living things, have made more progress in the last half century than in all the previous centuries of human history. Even progressive theology has come to regard evolution as an ally rather than as an enemy.

In the face of all these facts, Mr. Bryan and his kind hurl their medieval theology. It would be amusing if it were not so pathetic and disheartening to see these modern defenders of the faith beating their gongs and firing their giant crackers against the ramparts of science.

EDWIN GRANT CONKLIN

NOTES ON WOODS

WEST INDIAN BOXWOOD

THERE has been much confusion regarding the identity of the so-called West Indian boxwoods. One of the first on the market was the "amarillo" of Venezuela, *Aspidosperma Vargasii* DC. (Apocynaceæ), but this has been very largely superseded by the "zapatero," *Casearia præcox* Griseb. (Samydaceæ or Flacourtiaceæ). A third, the "baitoa" of San Domingo, appears on the market in considerable quantity, though it is inferior in quality to the other two. It has just been determined that this wood is produced by ***Phyllostylon brasiliensis*** Capanema (= *P. rhamnoides* Taubert = *Samaroceltis rhamnoides* Poisson) of the family Ulmaceæ. It occurs not only in Hispaniola and eastern Cuba but also in Brazil and Argentina. The important distinguishing features of this wood are as follows: (1) About half of the vessels are filled with calcium carbonate. (2) The wood fibers are supplied with a thick gelatinous layer. (3) The vessel segments, wood parenchyma strands and some of the rays are in horizontal seriation. The "ripple marks" are not always distinct in the wood but are readily visible on the surface of