

More important than these conjectures, which are at best only possibilities, is the incongruity of the find with all we know of man's cultural history.

First with respect to the metates; among living peoples these are in use only by those who are cereal-raisers or who are in contact with them. For example, in North America grinding slabs are used only by the corn-raising Southwestern Indians and their seed-gathering neighbors of the Basin-Plateau region. Indeed the use of the metate may not be of remote date even in this area, and all Americanists are agreed that cereal-raising is not one of the original constituents of Indian culture. In the Old World also cultivation is a Neolithic art, that is, of geologically Recent provenience.

The blades are likewise of European Neolithic type, or at best of Solutrean technique (from the middle or close to the fourth glaciation).

Yet Dr. Hay has it that this deposit is of early Pleistocene age. The fossil animals include "a primitive elephant, a mastodon, two species of camels, two species of ground-sloths, a glyptodon and three or four species of horses, one very large, one pony-like. . . . As to the animals, I hold that they are characteristic of the first interglacial stage (the Aftonian) of the Pleistocene."

If Dr. Hay is right, and I have no reason to doubt his identification, we are confronted by an unusual situation. Artifacts which would be identified by an archeologist as Recent (or terminal Pleistocene) are held to be of the same age as an early Pleistocene fauna. This incongruity seems not to have occurred to Dr. Hay.

Is there any warrant to support this from what we know of the course of human events elsewhere? I think not. The earliest definitely human remains from the Old World (*H. heidelbergensis*) date from the second interglacial or the first. The Frederick deposit may antedate this. The earliest human artifacts (Chellean or Pre-Chellean) date from the middle or close of the third interglacial. These are quite roughly made in contrast to the well chipped Frederick blades. The zoological evidence conforms. Most authorities are agreed on man's anthropoid ancestry. The anthropoids are Old World forms; there are no known anthropoid prototypes of man in America.²

It seems to me that the onus of proof rests with those who hold that Neolithic implements are congruous with an Aftonian age. I am doubtful that

the mass of cultural and zoological evidence to the contrary now available will be set at naught.

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"EXIT THE TENTAMEN, BUT . . ." WHAT?

UNDER the above caption, minus the last word, my esteemed friend, Mr. Wm. T. M. Forbes, in the issue of *SCIENCE* for October 28, 1927, undertook to reply to an article from my pen published in the same journal, July 1, 1927, entitled "Exit Hübner's Tentamen." Mr. Forbes addresses numerous questions to me. At one point he says: "What would Dr. Holland do about it?" To all of his numerous queries I shall give appropriate answers elsewhere in a journal more strictly devoted to the technical nomenclature of entomology, and shall in that article show how greatly Mr. Forbes, and others, who hold with him, have misunderstood the writings of Hübner, and his tentative system of classification. There is only one point upon which I wish to touch in this brief paper.

Mr. Forbes at the end of his paper says: "In bringing in the *Verzeichniss*, Dr. Holland does not mention that ten years had intervened and that in the meantime Hübner had used all the Tentamen names of butterflies as generic (as the first names of binomials) also many of the moths. This fact completely invalidates his argument."

Passing by the implication that I was making an "argument" in a matter which in my judgment is not open to argument, and was simply stating obvious truths, this allegation of Mr. Forbes awoke my utter astonishment. I am familiar with every page and line which Hübner gave to the world. Mr. Forbes's statement seemed to me most amazing. Accordingly I wrote to him inquiring upon what he based his sweeping statement that from 1806 to 1816 Hübner had used "binomials" in his nomenclature of the butterflies. Mr. Forbes has kindly replied to my inquiry and informs me that he based his assertion upon the legends of the plates in Vol. I of the *Sammlung exotischer Schmetterlinge*. Mr. Forbes's answer still more amazes me. Any one, who takes the trouble to look at these plates from a corner of one eye, can instantly see that the legends are all *trinomial*, and not *binomial*, as Mr. Forbes says. Mr. Forbes is under an illusion. *Three* is not equal to *two*, as *twice four* is not equal to *five*. Hübner in the legends of these plates was consistently true to the "System" he had adopted. On these plates he gives 1, the name of the *Stirps*; 2, the name of the *familia*; 3, the name of the *Gattung* (species). Not once does he employ a generic name, either in his sense, or ours. Mr. Forbes is wholly in error.

As Mr. Forbes's premise is false, and contrary to facts, his conclusion is equally false. His "argument" involves the logical error of *petitio principii*. It is

² The case of *Hesperopithecus*, a single tooth of Tertiary age from Nebraska, seems disposed of by W. K. Gregory's recent determination of it as pertaining to an extinct peccary (*SCIENCE*, n.s., 66, 579-581).

not true that Hübner used "binomials" during the period mentioned by Mr. Forbes, and it can only be by sophistry, which flies in the face of Hübner's own usage and explicit and oft-repeated statements, that it can be made to even seem that he used "binomials" in the period indicated. He came to use binomials at a later date, and finally toward the end of his life adopted the "binomial system of nomenclature," as we know it to-day. The legends of the plates in Vol. I of the *Sammlung exotischer Schmetterlinge* are not binomial, they are *absolutely* trinomial. I squarely take issue with Mr. Forbes on this point.

My motive for writing the foregoing lines is to simply let any reader of SCIENCE, who may have read my article of July 1 and Mr. Forbes's reply, understand that I am in thorough disagreement with him. I do not wish silence on my part in these columns to be construed as assent.

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VISIBLE RADIATION FROM EXCITED NERVE FIBER AGAIN

THE phenomenon of the "Reddish Blue Arcs and the Reddish Blue Glow of the Retina" is a very remarkable one—especially when it is exhibited (as I exhibit it) in a dark room before a whole audience at once. All are agreed that one is seeing entoptically certain optic nerve fibers on the surface of the retina—but why are they visible? I have given reasons for believing that they are emitting physical light—and this has required no "violent efforts of the imagination," as Dr. Davis¹ supposes that it has done—one has only to remember that nerve, when excited, gives out heat, and that heat is, objectively, the same thing as light. It happens that a physicist has just stated this explicitly: "The experimental evidence for thinking that light is a form of energy and that radiant heat is of exactly the same nature as light is overwhelming."² (Italics mine.) But may the cause be (Gertz) a secondary stimulation of some organ-fibers, ganglia, bipolar cells, or rods and cones—by means of action currents? There is a residual image, so nothing but rods or cones can be concerned—they alone contain the highly specific light-sensitive substance which furnishes a residual image. An electric current sent in from the outside gives visual sensations but with no residual image; "this does not prove, however," says Dr. Davis, "that an electrical disturbance *localized in the retina* (italics his) might not stimulate the photosensory mechanism directly." Now a current from the outside might conceivably have attacked the optic nerve

only after it has left the eyeball, but that it actually runs along the fibers on the surface of the retina is proved by the fact that structural details of the retina are marked out by it—for instance, at certain intensities the blind spot will be seen to be of a different color from the rest of the field. Since this is the case, it is inconceivable that an action current generated *within* the nerve fiber should play any different rôle from one that comes into it from a battery on the outside. It follows that nothing but physical light attacks the photosensory mechanism.

My theory has now been beautifully confirmed by Deane B. Judd, of the Bureau of Standards (*American Journal of Psychology*, October, 1927).

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QUOTATIONS

GENESIS AND EVOLUTION

THERE will be no more monkeying in the public schools with the Mosaic account of creation as recorded in the book of Genesis, if Representative Hobbs's bill to prohibit it finds favor with his fellow members of the General Assembly and is approved by the Governor. Mr. Hobbs, who is the accredited representative of the sovereign legislative district composed of Wolf and Powell Counties, has introduced a bill to prohibit the teaching in the public schools of the state any theory of evolution that conflicts with his understanding of the sacred texts of Holy Writ.

Statesman Hobbs has eight children, whose simple faith in the Hebraic account of creation he would protect with the strong arm of the law. Many earnest, honest sticklers for the letter of the law will approve and applaud this zealous guarding by the Wolf-Powell statesman of the faith once delivered to the saints. Why should the great Commonwealth of Kentucky trail behind progressive states like Tennessee and Texas in this matter of protecting its youth against this threatening heresy? Was not the Grecian Socrates put to death for corrupting the faith of the youth in his time, respecting the virtues of the gods? Was not Galileo severely punished by the Hobbs law of his age for contradicting the Biblical teaching about the solar system?

Representative Hobbs serves well his state in seeking to call a halt on these venturesome modern school teachers. They have already poisoned the minds of a mighty multitude with the false doctrines that the earth is round, that the planets revolve around the sun, that this earth instead of being the sum and center of the universe is but a sand grain on the limitless shores of creation and, instead of being only six thousand years old, has been revolving through space for

¹ SCIENCE, 1928, LXVII, 69.

² Crew, Henry, 1927, "General Physics," 319-320.