of Georgetown College, Georgetown, Kentucky, recently, swept the biological laboratories that were located on the second and third floors. Equipment to the value of ten thousand dollars was lost. Enough microscopes were saved to enable the department to begin work immediately in the college gymnasium and no laboratory periods were missed. The department will be housed temporarily in a new building that is being erected on the campus until plans for rebuilding can be completed. The departmental library suffered the loss of files of SCIENCE dating back nearly twenty-five years, many books, herbaria, collections of material and files of several scientific publications. In sending this information Professor Robt. T. Hinton writes: "Any gifts of duplicate copies of SCIENCE, *The Scientific Monthly* and various biological publications would be greatly appreciated if institutions or individuals have them to spare."

THE new building of the School of Pharmacy of the University of Maryland was dedicated on May 10 during the meeting in Baltimore of the American Pharmaceutical Association. The ceremony was held at Old Westminster Church and most of the attending pharmacists visited the tomb of Edgar Allan Poe in the historical churchyard. Dr. Edward Kremers, director of pharmacy at the University of Wisconsin, delivered an address. State and city officials also spoke.

PROFESSOR GEORGE GRANT MACCURDY, of Yale University, director of the American School of Prehistoric Research, has received word from Dr. Hackett, who with Mr. Theodore D. McCown is representing the school in the latter's joint excavations with the British School of Archeology at Jerusalem, that during the first ten days of April no less than 5,000 tools dating from the Aurignacian Epoch of the Old Stone Age were dug from a single cave of the group south of Haifa. Miss D. A. E. Garrod, of the British school, is in charge. The season's excavations will terminate in time for Dr. Hackett and Mr. McCown to take part in the work of the tenth annual summer term of the American School of Prehistoric Research, which will open in Paris on July 1, under the direction of Professor MacCurdy. Assisting him in the field there will be three of his former students: J. T. Russell, Jr., U. S. National Museum; V. J. Fewkes, University of Pennsylvania, and Robert Ehrich, Harvard University.

AN American Committee for International Wild Life Protection has been formed for the purpose of cooperating in every way with existing foreign governments and institutions working for wild life conservation. This committee is made up of representatives of prominent American institutions and organizations interested in these matters, and particularly cooperating in this work with the British Society for the Preservation of the Fauna of the Empire and the Office for International Nature Protection at Brussels. The following institutions have already been elected to the American Committee: Museum of Comparative Zoology—Dr. Thomas Barbour; Field Museum of Natural History—Mr. Stanley Field; Camp Fire Club —Mr. William B. Greeley; California—Major F. R. Burnham. Executive Committee: Dr. John C. Phillips, *chairman,* for the Boone and Crockett Club; Mr. George D. Pratt, for the American Museum of Natural History; Mr. Kermit Roosevelt, for the New York Zoological Society, and Mr. Harold J. Coolidge, Jr., *secretary,* Museum of Comparative Zoology, Cambridge, Massachusetts.

DISCUSSION

THE TAU EFFECT—AN EXAMPLE OF PSYCHOLOGICAL RELATIVITY

IF three spots on the back of the hand or arm are touched lightly with the point of a pencil in quick succession, two spatial intervals will be defined by the three stimulations. If one is asked to judge whether the second spatial interval is equal to, greater than or less than the first interval, it will be found that the observer's report depends more upon the time interval between stimulations than upon the actual distances between places touched. The same has been found to hold true in vision, hearing and the estimation of the extent to which the hand or arm has been moved through space. Thus, if we stimulate three spots on the skin so that the first distance is 20 mm and the second 10 mm, but the time interval between the second and third stimulations is twice as great as that between the first and second, then the distance between the second and third spots will be judged as nearly twice as great as the first. The conditions may be reversed to give the opposite effect; *i.e.,* by making the second distance twice as long as the first, but the time interval much shorter, the judgment will be that the second distance is very much smaller than the first. While this phenomenon has been reported before in the psychological literature, it has not been labeled in such a way as to give it the independent status it deserves. I therefore propose that it be called the *Tau* effect because it obeys definite laws, can be measured and is not due to "imagination," "attention," "suggestion" or any other peculiarly mental-

istic mechanism. It illustrates beautifully the dependence of space on time in our estimations of visual, tactile, kinesthetic and auditory space. In order to produce the *Tau* effect we may say, in general, vary the time interval in the opposite direction to the space interval and the latter will be distorted accordingly. So easy is it to demonstrate the *Tau* effect that it can be used as a parlor trick or game.

It may be thought that we are here dealing with a lightly dispelled illusion or error in judgment in which the subject unwittingly is judging the time intervals instead of the spatial distance between the spots touched. Nothing could be farther from the truth, for even when the subject knows what the effect consists in and is due to, if we vary our conditions by reversing the spatio-temporal relations, the subject will be wholly lost as to whether or not the spatial intervals are really equal or different and in what sense they differ. We have here, I believe, a *bona fide* example of the interdependence of time and space. They are so intimately related psychologically, as well as physically, that by varying them in opposite sense it is possible to demonstrate directly to an observer the distortions in space which relativists have told us about. It is interesting to note that whereas it is doubtful if the physicist can ever hope to do more than make relativity an intelligible abstraction to the layman, the psychologist by this simple experiment can directly demonstrate what the interdependence of time and space means in direct experience.

Several factors influencing the *Tau* effect which should be noted if one is to get it at its best are the following: (1) care should be taken to touch all the spots equally so that no one stands out more than another; (2) the greater (or less) the spatial distance between the second and third stimuli as compared with the first and second, the less (or greater) must the time interval be between the latter as compared with the former, if the effect is to appear; (3) the optimal effect is limited by the actual spatio-temporal intervals used: we have found that distances as great as 80 mm on the back of the arm and times as long as 1 second may be used. There is practically no lower time limit, although the second temporal interval should not bear a greater ratio to the first than 3 or 4 to 1.

A fuller, quantitative account will appear in one of the psychological journals.

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ON THE AGE OF THE NEW ALBANY SHALE

IN an interesting article on "Petrified Wood in the New Albany Shale," published in SCIENCE for December 13, 1929, Chester A. Arnold described an occurrence of fossil wood in the upper part of the New Albany shale in Scott County, Indiana, which he referred to the genus Callixylon. The concluding paragraph of his contribution is as follows:

> Although the wood is widely scattered, it appears to occur mostly near the top of the New Albany formation. While formerly considered as belonging to the upper Devonian and of the same age as the Genesee shale of New York, the New Albany shale is now viewed by some competent authorities as being, at least in part, of lower Mississippian age. This would place the Indiana wood in the Mississippian, and thus extend the range of Callixylon from the Devonian up into the Carboniferous. However, there is no record of its occurrence any higher than this basal member.

It seems to the present writer that Mr. Arnold is not justified in his conclusion quoted above. The New Albany shale as it occurs in the type locality in the vicinity of New Albany, Indiana, is a definite formation. Other black shales present in eastern Ohio, Kentucky and Tennessee, east of the Cincinnati anticline, were until a few years ago thought to be the equivalent of the New Albany shale at New Albany, Indiana. In recent years a part of the black shale in eastern Ohio, Kentucky and Tennessee has been shown to be of early Mississippian age. However, this does not prove that any part of the New Albany shale at New Albany, Indiana, is younger than the Upper Devonian, but rather that such part of the black shale of eastern Ohio and Kentucky as is now known to be of early Mississippian age is younger than any part of the typical New Albany shale at New Albany, Indiana. So far as known to the present writer, no one has ever shown that any part of the New Albany shale, as it is developed in the type locality near New Albany or farther north in Indiana or south in Kentucky, west of the Cincinnati anticline, is younger than upper Devonian age. Therefore, it seems that the more logical conclusion to be drawn from the occurrence of Callixylon in the upper part of the New Albany shale in Scott County, Indiana, would be that this shale is of upper Devonian age, because the genus of fossil wood that occurs in it has never been found in strata younger than the Devonian.

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FIREFLIES FLASHING IN UNISON

SEVERAL times in recent years correspondents of SCIENCE have directed attention to the synchronous flashing of a swarm of fireflies or other insects, as at page 132 in the issue for January 31, 1930.