

of gamma-ray illumination, will change the momentum in an unknown manner. Nevertheless, knowing the momentum of the particle in the past, and hence also its past velocity and energy, it would seem possible to calculate the time when the shutter must have been open from the known time of arrival of the first particle, and to calculate the energy and velocity of the second particle from the known loss in the energy content of the box when the shutter opened. It would then seem possible to predict beforehand both the energy and the time of arrival of the second particle, a paradoxical result since energy and time are quantities which do not commute in quantum mechanics.

"The explanation of the apparent paradox must lie in the circumstance that the past motion of the first particle cannot be accurately determined as was assumed. Indeed, we are forced to con-

clude that there can be no method for measuring the momentum of a particle without changing its value. For example, an analysis of the method of observing the Doppler effect in the reflected infra-red light from an approaching particle shows that, although it permits a determination of the momentum of the particle both before and after collision with the light quantum used, it leaves an uncertainty as to the time at which the collision with the light quantum takes place. Thus in our example, although the velocity of the first particle could be determined both before and after interaction with the infra-red light, it would not be possible to determine the exact position along the path SO at which the change in velocity occurred as would be necessary to obtain the exact time at which the shutter was open."

Science News Letter, March 28, 1931

EVOLUTION

Says Tennessee Will Repeal Anti-Evolution Law

Emotional Misunderstandings Aroused by Scopes Trial Declared to Have Passed; Legislature Originated Bill

By **JUDGE JOHN R. NEAL**
Chief Defense Counsel, Scopes Trial

THE bill to repeal the Tennessee anti-evolution law is a wholly spontaneous movement, originating in the legislature itself. It therefore gives great promise of success.

Courage on the part of the State University and high school authorities in supporting this repeal would secure its passage.

While the Scopes case put an end to the movement for passage of bills similar to the Tennessee anti-evolution law in other states, its effect in Tennessee was not such as had been hoped for by the group of Tennesseans responsible for originating the famous case. The Supreme Court of Tennessee, while indulging in some dicta upholding the law, based these dicta only on technicalities not relating to the constitutionality of the act, and thus not only prevented an authoritative State decision, but prevented an appeal to the Supreme Court of the United States.

Emotional misunderstandings aroused

in Tennessee by the Scopes case have largely passed away, and the people of the state now see the anti-evolution legislation in its true light. They perceive that the sole question it presents is as to whether we are to have freedom of thought and freedom of teaching in Tennessee.

With their minds unconfused as to the real issue, the Tennessee Legislature will undoubtedly bring Tennessee back into the ranks of civilized communities that desire for their youth the privilege of making their decisions for themselves.

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EVOLUTION

Principals in Dayton Case Remote From Repeal

WITH Judge John R. Neal, outstanding figure in Tennessee law and liberal politics, expressing his confidence that the Tennessee state legislature will repeal the law that five and a half years ago made the state a storm center of controversy and ridicule, the rest of the principal figures in the dra-

matic Dayton trial are remote from the new scene of action. They are not indifferent to the outcome of the effort to obtain a repeal of the anti-evolution law, but they apparently feel that the legislators will do away with the law without the intervention of persons from outside the state.

Possible Opponent Dead

The one man who might return to defend the bill against repeal, William Jennings Bryan, is dead. He was the first to pass of all those involved in the Dayton trial, and he died before the dust of battle was fairly settled, in the town where he had joined issues for a literal interpretation of the Bible against the upholders of science, whom he took to be its enemies.

Bryan's most dramatic opponent, Clarence Darrow, has retired from the practice of law and tries no more cases. He is heard from principally when he splinters a lance in debate over a philosophical or theological question. His associates, Arthur Garfield Hays and Dudley Field Malone, are still in practice in New York, and still make an exciting avocation of championing the cause of the economic and social under-dog. George Rappleyea, the engineer of Dayton whose suggestion over a glass of soda in a drug store started the whole affair, is now in business in New Orleans.

Scopes Now Geologist

John Scopes, the blond-haired, quiet young teacher who consented to be indicted and tried to make a test case of the statute, and to his amazement found himself the center of worldwide disturbance, continues his quiet way along the path of science. The trial crystallized a half-formed resolve he had to become a geologist. The autumn after it was over he entered the graduate school of the University of Chicago, and carried on his studies there for two years. Then he accepted a position as field geologist for an oil company, and spent three years in Venezuela. Not long ago he came back to America, bringing a wife with him—an American girl whom he had met in the tropics—and now he is back at the University of Chicago, finishing his work toward the Ph.D. degree.

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Peruvian Indians used cinchona bark as a remedy for malaria, but the advance step of separating the active constituent quinine from the bark was taken in 1820 by two French chemists.