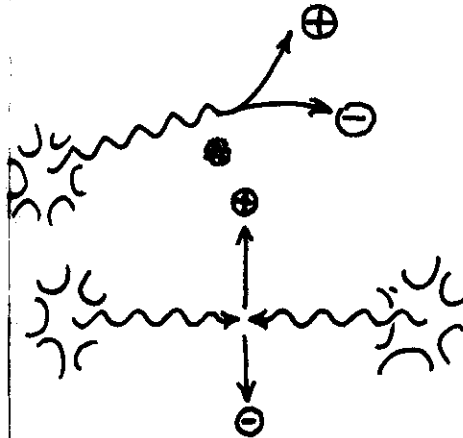


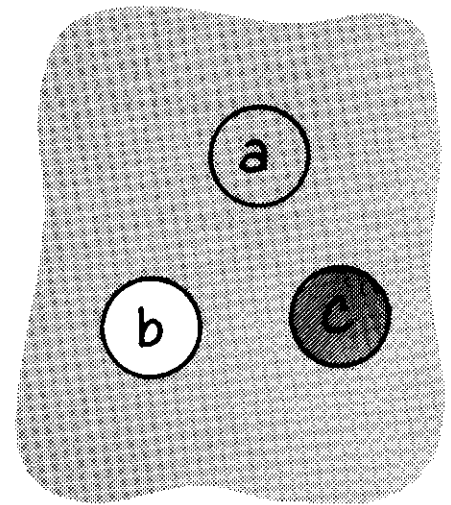
ANSWER: DIVIDING THE VOID



The answer is: a. If a sufficiently energetic x-ray passes *near* a piece of matter or if a pair of x-rays collide, the energy of the x-rays creates a positive and a negative electron *right in empty space*. The process has been photographed, and is a routine occurrence when high energies are involved. The positive electron is known as a *positron* or anti-electron.

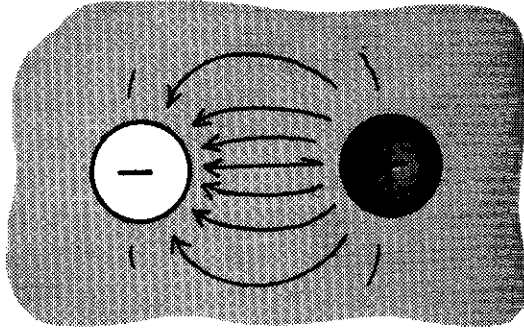
How does this come about? Granted you can see where the energy comes from—the x-rays. But where do the charges come from? Now a *net* charge can never be created. That is, if there was zero charge to start with there must always be zero charge. Charge can be created only in the limited sense that equal amounts of plus + and minus - are created together, so the total effect is zero creation since the + exactly cancels the -. More accurately, we might state that charge is separated out of the void. We can picture it like this:

Suppose the vacuum of empty space is a gray void. Out of one area called **a** in the gray void we remove a bit of grayness, leaving a white area **b** and compressing the removed gray part into another gray area **c**. In this way we make **c** even grayer, or perhaps black. So in effect we have not created black or white, but have only separated black and white out of gray. So it is that + and - electric charges can be separated from the vacuum of space—in essence, dividing the void. Of course, it takes energy to do the division.



And another thing: If we take a piece of empty gray space and force the grayness to a different location leaving

white behind, we produce a *strain* or *displacement* that is left in the space between the black and white areas. That strain is the *electric field* which is sometimes called a *displacement field*. If the plus and minus are not held apart, the strain will cause them to snap back together.



If the plus and minus are allowed to snap together you might expect the strain would be relieved and everything would return to the prior state—a plain gray void. But when the strain in the earth is relieved by the snap of an earthquake fault, does everything go back quietly to the way it was? Everything goes back, but not quietly. The strain energy escapes, thereby making the surrounding earth shiver. So also does the sudden relief of the strain between the plus and minus which makes the surrounding gray shiver. The shiver is the pulse of radiation always emitted by electron-positron annihilation.

Incidentally, this notion of creating things (two opposite things) out of nothing is not only found in physics. In the world of business a new corporation is created selling stock (or bonds). On the one hand the corporation then has money to operate with, but on the other hand it has its debt obligations to the people who supplied the money. The stock and bonds represent the debt obligation of the corporation and the debt obligation exactly balances the money gathered by the new corporation when it starts up. The gathered money is called the capital, so: capital + debt = 0.