from the wave lengths of the light which they observe from certain of these stars, they can calculate back to a time when all of those galaxies of stars which are running away from us, were all in one place at one time. And their calculations by the stars

(10.75) near 2 billion years.

more accurate than the guesses of the geologists. Then the chemist gets into the act. We find that certain chemical elements will break down spontaneously and in this atomic age everybody has heard of uranium 238 and uranium 235 and radium and polonium and one or another of these radio-active elements. We have found that uranium 238 or uranium 235 will gradually break down, and what is left behind when the uranium is all gone is a certain type of lead. And these elements break down at a particular rate. The rate of breakdown is dependent entirely on the individual element. Some elements such as radio-active iodine such as is used in thyroid treatment breaks down so that half of it will disappear in the course of four or five days. Radio-active carbon, which has become important to the archaeologist in dating various archaeological finds, will - half of it will disappear in about 5000 years. Uranium has a decay rate of somewhere in the neighborhood of half of it disappearing in a billion years - very slow rate of breakdown. The chemist by finding, figuring out, or determining how much lead is present in a sample of uranium rock and how much uranium is there, can calculate back when the uranium was put there when there was no lead at all. Making those calculations from the uranium, the chemist comes up with a calculation in the vicinity of 2 billion years. Again these determinations are more accurate than the calculations from the stars which are in turn more accurate than the educated guesses of the geologist. And all three of them put together, giving data of the same order of magnitude at least, give or take maybe a half a billion years, lend credence to the idea that the world is a great deal older than many of us believed

End of Record 4