

We would therefore expect about 30 billion stars to have one or more planets. Now, we can reject certain classes of stars as candidates for habitable planets, because their lifetimes are too short (these are stars of high mass). Others can be rejected because of variability in light output, a characteristic that would make evolutionary development of life much more difficult. In fact if we select only those stars similar to the sun (whose peak of radiation energy coincides with a region of terrestrial atmospheric transparency) we have only a few percent of the total -- about one in 30. Therefore, we would expect about 1000 million suitable solar type stars exist. Of these, it is estimated by various astronomers that 200-600 million have planets at about the right distance and have been around long enough that life forms as developed as our own could exist. Implicit in further discussion are the assumptions that:

1. Planets and/or life evolves to a mutual compatibility;
2. The life force, whether spontaneous or otherwise, is such that whenever the environment is favorable, life will exist;
3. Our own history of past evolution and development is neither slow nor fast, but average and typical for life forms. (Ours is the only example available and no one has yet demonstrated that the "average" galactic life form should be any different.)

Now let us turn momentarily to time scales. The sun and earth are on the order of 5 billion years old. We might define modern man as being about 5000 years old (Stonehenge is 4000 years old) -- just one millionth of the earth's age. The age of science is certainly not more than 500 years, so our scientific and technical development has thus far occupied only one ten-millionth of the earth's life span. We expect the sun will burn another 5 billion years before significant changes in its brightness occur. Now the age of the galaxy is between 5 and 10 billion years; therefore among the 200-600 million stars we would expect to have acceptable planets, some would be older than the sun, some younger (for star formation is still continuing, even though at a lesser rate than in the galaxy's early history) and some the same age. It should be clear from assumption (3) and the example of our own