An animal—particularly the human animal—is a beautiful example of a carefully contrived and subtly engineered design. The word 'design' comes naturally even in evolutionist books. The Designer must know infintely more science than we shall ever know. He started off with a few simple examples and, learning from them, introduced new and improved species. He gradually incorporated new properties, imagination and free will being the latest ones. He is probably learning that these are not enough, since they seem to cultivate a propensity to selfdestruction.

I find these ideas comforting, for if we do destroy ourselves, a superior model will be created, whereas according to the theory of evolution we are doomed.

I should be happy to know what my fellow physicists think of these admittedly extraordinary ideas. In putting them forward I can claim to be in good company. According to Darwin, when Newton put forward his theory of gravitation, Leibnitz accused him of introducing 'occult qualities and miracles into philosophy.' What was this gravitation? How could two inanimate bodies attract each other? Newton replied laconically 'Hypotheses non fingo'. When I am asked to describe my ideas of the Creator I also say 'Hypotheses non fingo'!

Darwin was fond of the quotation 'Natura non facit saltum' (Nature does not make jumps). I wonder what he would have thought of the quantum theory!

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A PRE-MAIN-SEQUENCE STELLAR MODEL APPLIED TO CLOSE BINARY STAR SYSTEMS

JON K. WEST*

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The study of the stars would be very difficult if there were no binary systems. We can be glad that the Lord provided over half of the stars in our part of the universe as binary or multiple star systems. By studying the motion of binary stars, much can be learned about the stars considered individually.

The Study of Binary Star Systems

If Kepler's law is applied to the motion of eclipsing binaries, it yields an absolute determination of the total mass, and the stars' separation. If the spectrum of an individual star can be discerned, then the velocities of each component star can be determined from the Doppler frequency shift of specific spectral lines. The individual stellar velocities being known, the individual masses can be determined from the total mass. Finally, by studying the variations in the light emitted by the binary system, the actual radius of each star can be found.

Now, the problem becomes that of relating the light output of the star to its distance. For only a very few stars near the earth can direct measurement of their distance be made by triangulation (i.e., parallax). Distances to the rest of the objects in the universe must be found by indirect means. Two of the most reliable of the indirect methods come from studying binary stars.

The first of these indirect methods applies the inverse-square law of light. The color of an eclipsing binary can be determined by studying the stellar spectrum. This yields an effective surface temperature. If the individual stellar radius has been found from the light-curve analysis, then the light-emitting surface area is known. This gives an absolute luminosity (or magnitude) from classical thermodynamics. If we compare the observed luminosity with the calculated luminosity, then the distance can be estimated fairly well.

The second method is called dynamical parallax. The calculated binary separation can be compared with the observed angular separation. The base line of this triangle is the distance to the system.

There is, of course, much more to the study of binary stars than could be covered in this brief discussion. As a matter of fact, most of the data available on stellar temperatures, masses, radii, luminosities, and distances, come from a handful of eclipsing binaries. See Reference 6 for more information.

The Hertzsprung-Russell Diagram

See Reference 1 for a good discussion of the distribution, characteristics, and spectral classification of stars. Work by E. Hertzsprung and H. N. Russell led to the general relationship between the spectral type (color or surface temperature) and the absolute luminosity (or stellar magnitude). The dashed line in Figure 1 shows this general relationship, as determined empirically. The stellar luminosity is shown on a logarithmic scale,

*Jon K. West is Manager of Advanced Chemical Processes, General Electric Co. His address is 3222 NW 44th Place, Gainesville, Florida 32605

in terms of its ratio to that of the Sun. The (effective) surface temperature is also shown by plotting its logarithm. The stars conforming to the dashed line are known as the main sequence. In general, the hotter a star, the more luminous it is, as one might expect. However, the relationship would have been difficult to work out in detail without the data gained from the study of binary stars.

The Evolution of Stars

I shall state here the conventional account, without arguing either for or against it.

The main sequence is considered to consist of stars, called "normal", deriving their energy by the fusion of hydrogen. Stars not on the main-sequence are usually thought to have exhausted their fuel, or to be in some stage of so doing. This stage is called "post-main-sequence"; the star is believed to expand, and the result is large, cool, highly luminous stars, known as red giants. These are above the main sequence.

In time, even the capability of remaining red giants would be exhausted. Then the stars are supposed rapidly to cross the main sequence (too rapidly to be observed?) and to come to a region below the main sequence. Stars of this sort are small, very hot, and of low luminosity. They are called white dwarfs.

There is supposed also to be, or to have been, a rapid stage of evolution, known as pre-main-sequence. Stars in this stage are supposed to derive their energy from gravitational contraction. Most evolutionists consider this stage to be too transient to be worth much study.

The Evolution of Binary Stars

If binary stars are considered to have evolved in a way similar to that just discussed, one would expect to find some consistent relation between the stages of the two stars. This is where the story breaks down. There is a class of binaries known as semi-detached systems, in which the stars almost touch each other. These systems have a large secondary, of lower mass, and a small primary star, of higher mass. According to the scenario mentioned above, the larger secondary would appear to be at a later stage of evolution than the primary. This presents a problem, for typical models, as solved e.g. with the help of a computer, predict that the more massive star should evolve more quickly than the less massive. So, to re-state the problem, why is the star of lower mass larger than the other?

Commonly, attempts to answer this question propose complex transfers of mass between the two stars. May there not, however, be another and much simpler explanation? Maybe both stars are very young, and are powered by gravitational contraction. Then nuclear fusion need not be involved, and the post-main-sequence models would not apply.

Pre-Main-Sequence Binary Stars

Conventional models of close binary systems (usually computer models, nowadays) commonly start with at least one of the component stars on the main sequence. Thus they assume that the system under study is cosmologically old. According to the conventional evolutionary theory, one or both of the binary components will move above the main sequence as the star becomes exhausted of its hydrogen fuel. Then, as the more massive star expands, it transfers matter to the less massive companion. After a period of such transfer, the system will appear to have an older, less massive, secondary.

Models of pre-main-sequence binaries have been computed to study the transfer of mass;[9] but no computations were published until 1980.[8] These models undertake to follow the evolutionary tracks of a binary system as it contracts onto the main sequence. No other

Table 1. The ages (E+6) at various points for the test model, compared with Iben's figures (Reference 5.)

	Primary 3 Solar Masses		Secondary 1.5 Solar Masses	
Age Point	Iben	Test	Iben	Test
1	0.034	—	0.23	0.205
2	0.208	0.06	2.36	1.391
3	0.763	0.747	5.80	3.483
4	1.135	1.202	7.58	4.949
5	1.250	1.351	8.62	5.949
6	1.465	1.432	10.43	—
7	1.741	—	13.39	—
8	2.514	—	18.21	—

CAPTIONS FOR THE ILLUSTRATIONS

On the following pages are shown the plots, according to the model, of some of the systems studied, according to the pre-main-sequence binary model. In every case, the filled circles indicate the track of the primary, the open, the secondary. When the model is compared with an actual system, the latter is indicated by the triangles, with the same convention as to filled or open.

The various parts concern the following systems:

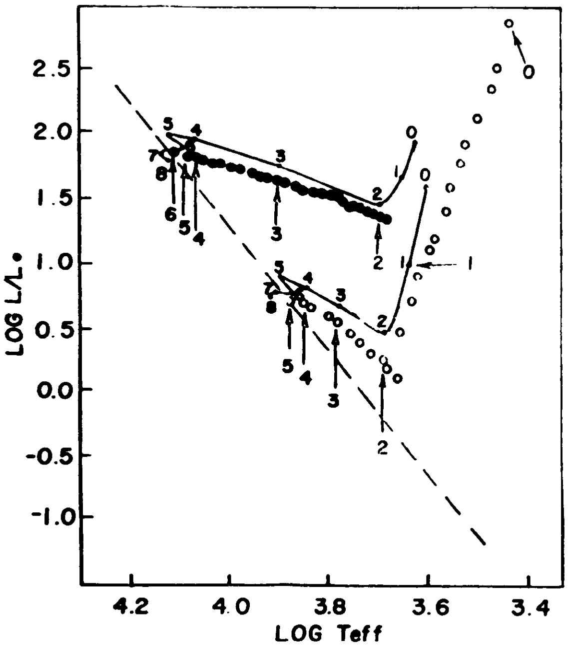
1. The model for a test binary, primary $3M_0$, secondary $1.5\ M_0$.
2. TV Cassiopeia, Primary 3.1 M_0, secondary 1.39 M_0.
3. IM Aurigae, primary 2.97 M_0, secondary 0.89 M_0.
4. U Cephei, primary 3.19 M_0, secondary 1.53 M_0.
5. AI Draconis, primary 2.18 M_0, secondary 1.03 M_0.
6. U Sagittae, primary 4.27 M_0, secondary 1.60 M_0.
7. Delta Librae, primary 2.96 M_0, secondary 1.31 M_0.
8. Beta Persei, primary 3.15 M_0, secondary 0.74 M_0.
9. V505 Sagittarii, primary 2.22 M_0, secondary 1.18 M_0.
10. X Trianguli, primary 1.72 M_0, secondary 1.00 M_0.
11. TX Ursae Majoris, primary 3.13 M_0, secondary 0.90 M_0.
12. W Ursae Minoris, primary 2.68 M_0, secondary 1.19 M_0.

work seems to have been done, despite reports that some observed binary systems appears to be pre-main-sequence.[2]

The present investigation has set up pre-main-sequence models of eleven individual close binary systems.[7] The observed positions on the Hertzsprung-Russell diagram are compared with the evolutionary tracks arising from the model. If both components appear to have the same age and fall near the tracks of the model, then the system may indeed be pre-main-sequence. Eleven semi-detached binaries were considered, each with a total mass between 2.5 and 6 solar masses. The periods ranged between 0.9 and 3.4 days.

Model and Results

The stellar structure is represented by a polytrope of ındex n = 3 for the radiative solution. A polytrope of in-



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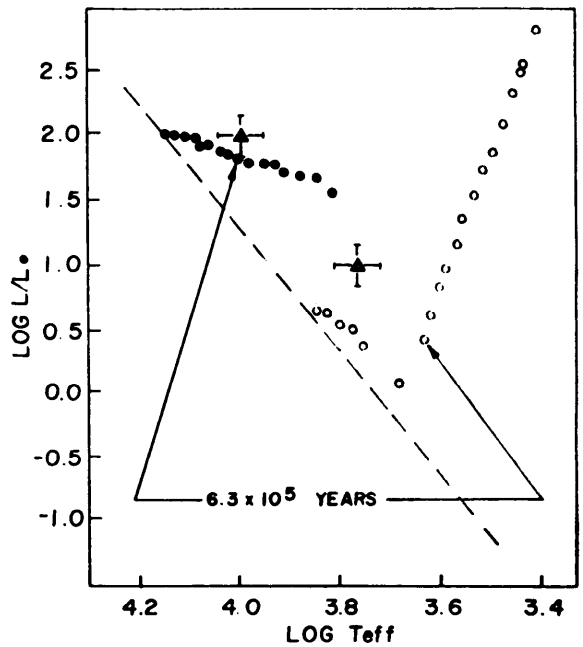

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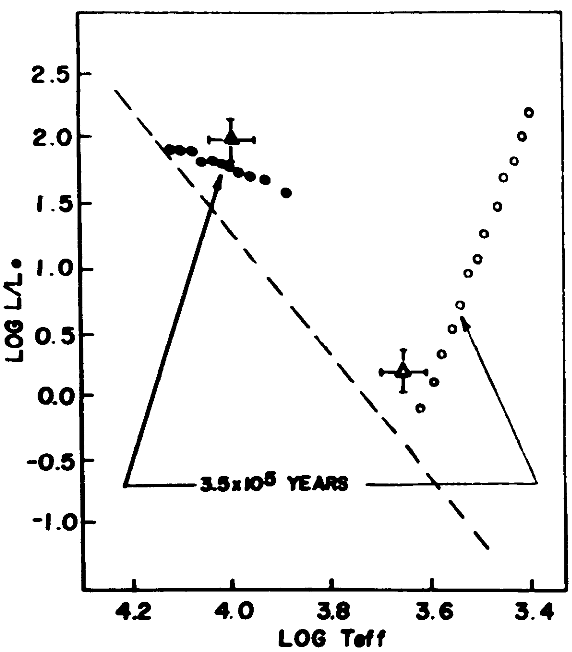

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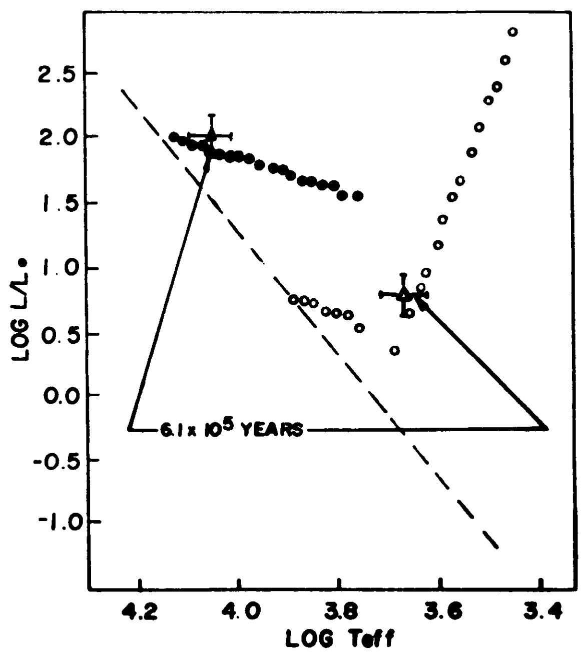

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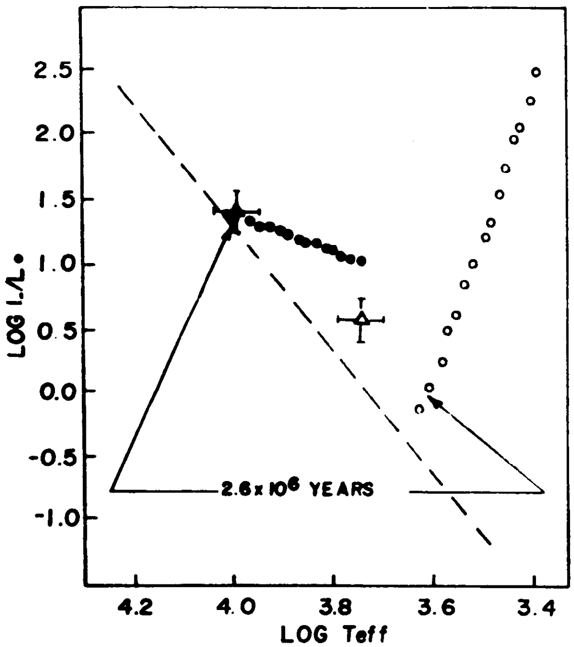
dex n = 1.5 is used for the Hayashi solution.[4] The initial configuration is constrained by the Roche lobe of each star. This limits the radius of each component of the system. The basic assumptions are as follows:

1. Mass and energy are conserved; both for the individual components and for the binary system as a whole.
2. The binary system obeys conservation of angular momentum, with circular orbits.
3. The stars are spherically symmetrical.
4. The stars are in quasi-hydrostatic equilibrium.
5. The chemical composition of population I type stars is chosen to be the same for each star: x = 0.750, y = 0.224, and z = 0.025.

The masses of each star and their periods being free parameters, a computer program calculated the sequence of contraction models. Since both sequences were calculated together, the ages and structures of



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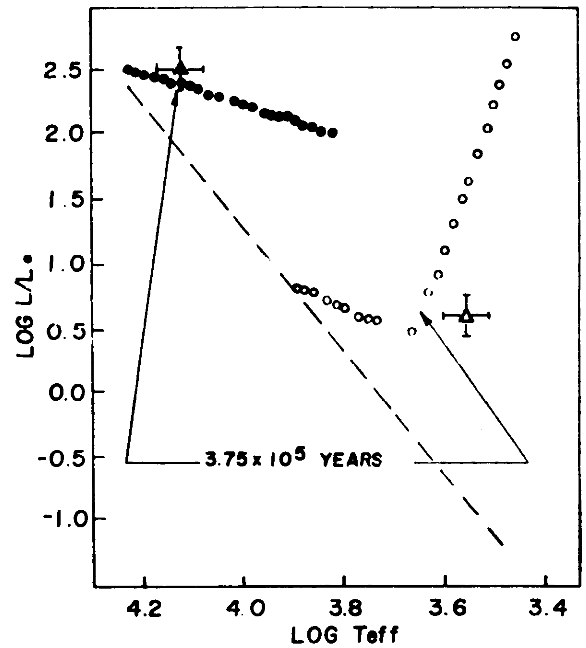

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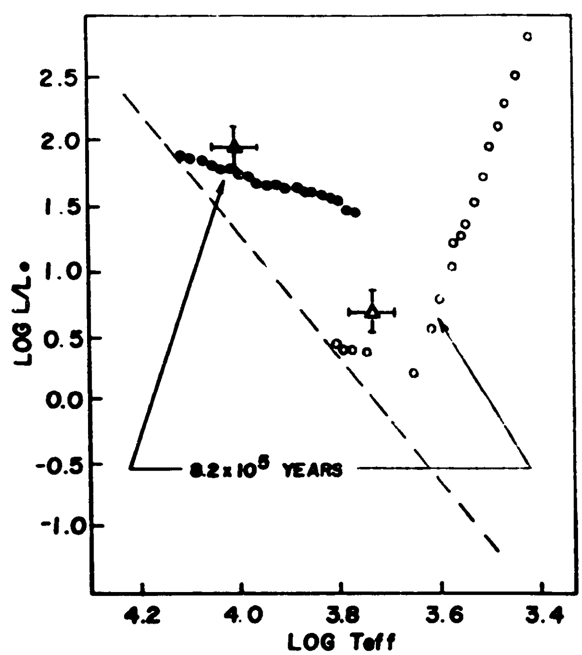

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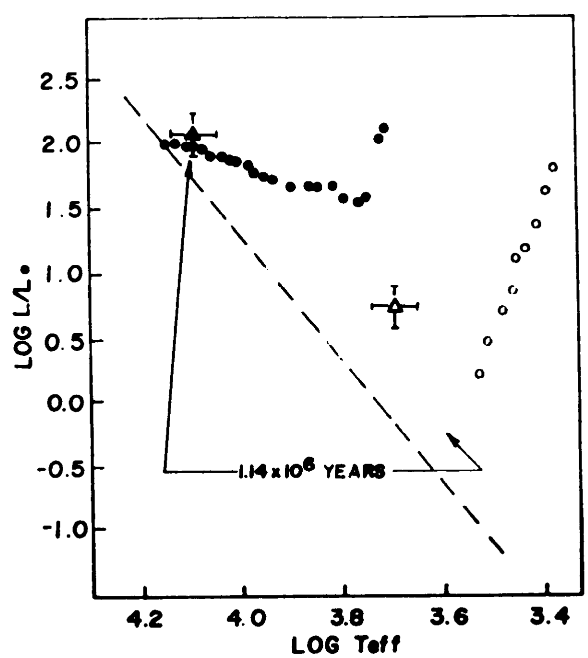

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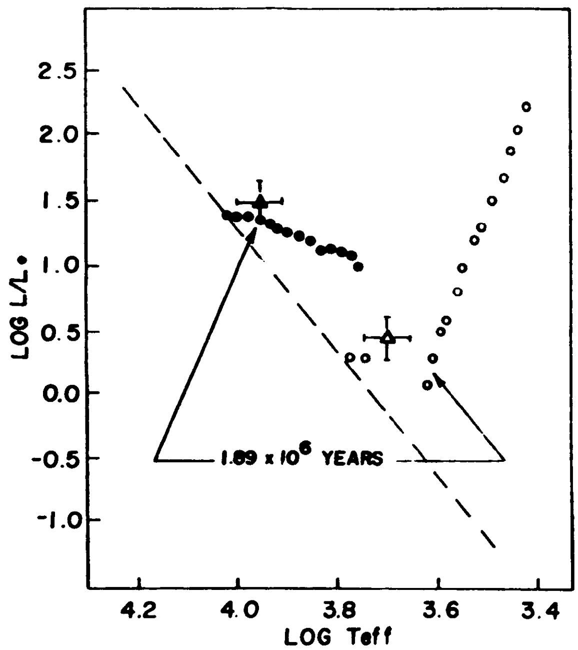
each component could be compared. A test model was compared with the evolutionary tracks published by Iben.[5] The primary for the test model was 3 solar masses, the secondary 1.5, and the period 3 days. Initially both test stars were on the Hayashi track.

Figure 1 shows the plots of the test model and Iben's pre-main-sequence tracks for single stars on the Hertzsprung-Russell diagram. The initial point for Iben's model is labelled "0". The points 1 through 5 can be used for age comparison with the test model. The same numbering was used for the test model. Table 1 shows the ages (E + 6) at these points for each star.

The absolute dimensions of the eleven systems were published by Giannone and Giannuzze.[3] Figures 4, 10, and 12 show the three systems found to fit the pre-main-sequence model best. They are: U Cephei at 6.1 E + 5



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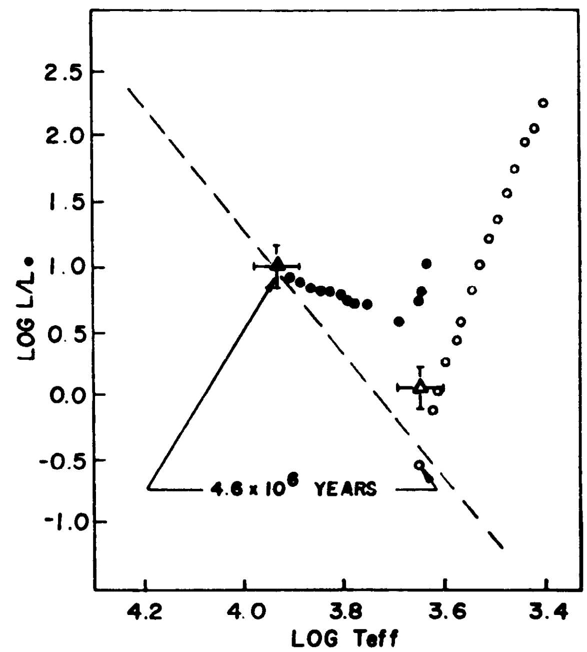

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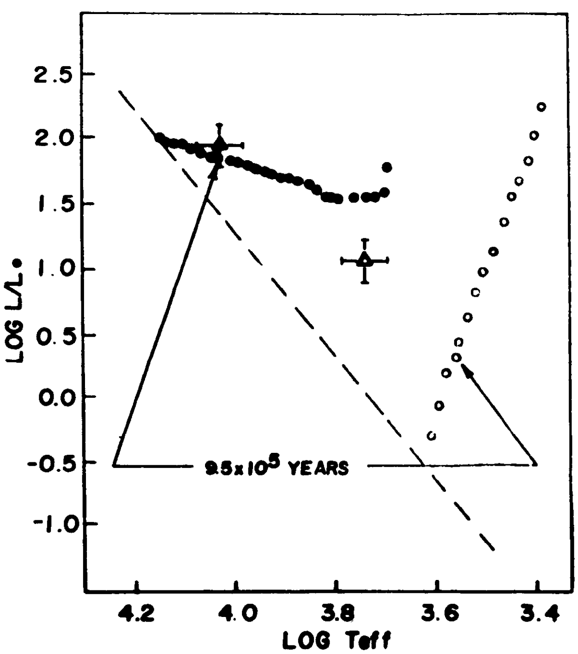

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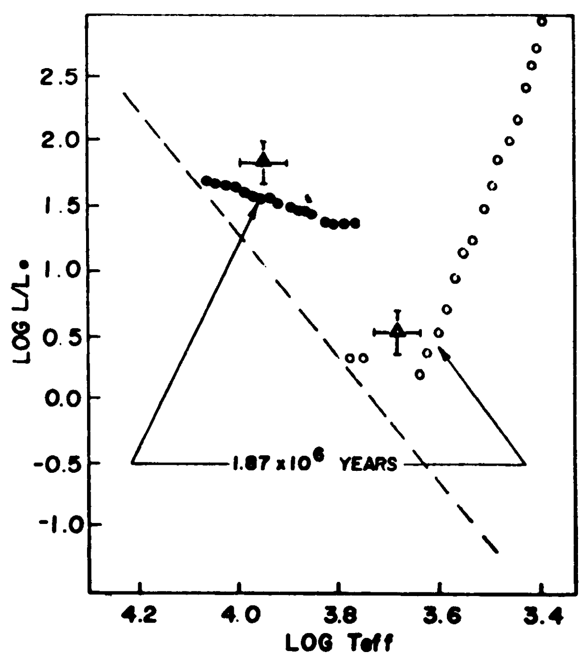

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years, X Trianguli at 4.5 E+6 years, and W Ursae Minoris at 1.87 E+6 years.

Four systems found not to fit the model are: TV Cassiopeia, AI Draconis, Beta Persei, and TX Ursae Majoris.

Finally, four systems could fit the pre-main-sequence model with modifications. These are: IM Aurigae, Delta Librae, U Sagittae and V505 Sagittarii. The modifications would require differing chemical compositions for each component of these binaries.

Conclusion

This investigation has shown that it is possible to represent some semi-detached close binaries by a pre-main-sequence model. More detailed study of individual systems is needed in order to adapt any model to the observed data and inferences therefrom.

Secondly, this survey of only eleven binary systems has yielded a significantly large number of systems fitting a pre-main-sequence model. Such a model sets an upper limit to the ages of those systems. Even though this limit is large compared with the Biblical age of Creation, it is three orders of magnitude smaller than the accepted evolutionary age attributed to typical semi-detached close binary systems.

Offer of a Program

The program used in these investigations is available to anyone wishing to do more work on the subject, on cassette tape or minidisc for the TRS80. It requires at least 16K level 2. I am willing to make a copy for anyone who will send me the disc or cassette.

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ALLEGED EVOLUTION OF THE ORDER PRIMATES, INCLUDING MONKEYS AND APES

W. MEHLERT*

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In previous studies, I have demonstrated that the evidence for the alleged evolution of *Homo* (Man) and of the ape-like creature *Australopithecus* (extinct since one million years B.P.) crumbles into dust when closely examined.[1] (I do not necessarily subscribe to such great ages as that just mentioned; but I shall not argue about them here.) The purpose of the present study is to show how weak and misleading is the evidence for the new world monkeys, the old world monkeys, and the great anthropoid apes such as orang utans, chimpanzees, and gorillas.

Not a single acceptable evolutionary ancestor has ever been found for the group *Australopithecus*, which lived, supposedly, from about 4 to 1 m. (short for million) years B.P.

Apes and monkeys belong, according to evolutionary theory, to the order Primates, which supposedly evolved from obscure or unknown ancestors some 60-70 m. years ago. It is alleged that some form of primitive early lemur or tarsier gave rise to all the modern members of the order Primates in the Tertiary Period. Just precisely what this claim is based on will be discussed first.

According to Professor E. C. Olson, Chicago University, fossils of ancient primates (lemurs and tarsiers only) are fairly abundant; but, as he admits, these creatures, although far separated from their modern counterparts in time, are fairly close to the modern, living forms in physical structure.[2] In his book he made no attempt to show precisely in which way any evolutionary development occurred. The great U.S. vertebrate paleontologist, Elwyn Simons, wrote: "In spite of recent finds, the time and place of origin of order primates remains shrouded in mystery".[3] He cannot tell us where or how the lemurs or tarsiers arose.

Kelso admitted: "The transition to primates is not documented by fossils".[4] Thus at the very beginning evolutionists cannot tell us how, or from what, the order primates arose. Romer[5] and Kelso both concede that the evolutionary background of the New World (American) monkeys is unknown. Neither can anyone find ancestors for the Old World monkeys! "The record simply does not exist". The evolutionists are indeed off to a very bad start; Simons wrote in another place: "Not a single fossil primate . . . appears to be an acceptable ancestor for the great infraorder of the catarrhines, which include all of the living Old World primates".[6] (Monkeys, apes, and Man.)

*Mr. W. Mehlert's address is 21 Greenway Street, Lawnton, Queensland, Australia.