

death (PCD) or apoptosis, *ced-3* and *ced-4*, in *C. elegans*, and the role of *ced-9* that protects cells from PCD have been described. Also the homology between *ced-9* and *bcl-2* (human B cell lymphoma) has been brought out. Mention of PCD in insect and frog would have made it more interesting. However, the author should have mentioned that PCD is necessary for formation of a mature organ during the developmental stage. Death of cells occurring after adulthood is reached is a random process.

The role of chromosome-1 in aging, and the relationship between telomere and aging have been covered in a limited manner. Mutation/deletion in mitochondria in relation to diseases has been covered, but a lot of interesting findings of Japanese workers are missing. Also, several diseases such as cystic fibrosis, triplet nucleotide-related diseases, cancer, etc. are described, but they have little relevance to aging or longevity *per se* as they do not occur in all individuals of a species. The author describes the role of telomere briefly while advancing the point that telomere shortening could be a consequence of aging, not the cause of aging.

Of the extrinsic mechanisms that influence aging and longevity, free radicals have been discussed in some detail. In the reaction (p.144) showing generation of superoxide and hydroxyl radicals,  $H_2O_2$  has been wrongly mentioned as oxygen peroxide. In the text, however, it is mentioned correctly as hydrogen peroxide.

Part II of the book deals with prolongation of life. This section is even more sketchy and superficial, largely because too many topics with less serious scientific data have been covered. Food restriction no doubt has a positive effect on longevity of rats and humans, but even though this study was conducted by Mckay *et al.* over 60 years ago, we still do not know the components of the food that act at cellular, subcellular, molecular and gene levels to prolong longevity.

The author has tried to include every topic possible, whether it has any scientific basis or not, such as vitamins, fats, minerals, aspirin, hormones on the one hand and social work, sexuality, alcohol consumption, plastic surgery, replacement of body parts, etc. on the other. The scientific merit of the book has been severely eroded due to the inclusion of several topics in part II. For a single author to cover topics from telomere to social network in 232 pages is unrealistic.

So the book has remained superficial and sketchy throughout. The author should have restricted herself to biological or medical aspects to make the book useful. The book would be useful for geriatricians, in parts, and to general readers, but not for graduate students and those interested in research on biology and biochemistry of aging because the work of several authors dealing with biochemical and molecular aspects of aging is not discussed and certain books that cover these aspects in depth are not listed. There are some mistakes in editing: In the preface, the last but one sentence reads '... even eliminate, various of the handicaps...'. It should read '... even eliminate the handicaps...'. In the legend of Figure 9 (p. 52) is mentioned '...The evolution of four physiological functions with age'. It should be 'evaluation...'. On p. 86 is mentioned 'the gradual deterioration in the synthesis of control mechanisms or damage...'. It is not clear what is meant by *synthesis* of control mechanisms. On p. 89, phosphodiesterase is spelt wrongly. In the reaction showing production of free radicals, on p. 114, stoichiometry of the reactants should have been maintained.

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### Software review

**Macysma.** Symbolic/numeric/graphical mathematics software. (Release 2.2 for Windows 3.1/Windows 95/Windows NT.)  
**PDEase2D.** Software for obtaining numerical solutions of partial differential equations. (Release 3.0 for Windows 95/Windows NT).

To begin with a very brief summary: these two packages from Macysma Inc. form one of the best (if not the best) software products for scientific computations that I have so far come across. In terms of the range of things it can do, the ease of operations, and the speed at which the results are obtained, it can more than meet the requirements of almost everyone. If you want to do any kind of scientific computation, and have a pentium class computer, you would be well advised to go in for Macysma instead of one (or even

many) more computer/s. Macysma (with PDEase2D and Numkit, the advanced numerical analysis package that can further enhance the speed and power of these two) is capable of doing not only everything that you always wanted to do, but of inspiring you to undertake more ambitious computations as well. A few weeks with it, and you would wonder how you ever managed without it. (Of course, most good software packages do have their 'true believers'; I can easily imagine others using exactly the same expressions about, say Matlab or Mathematica.)

Macysma is supplied on a CD, accompanied by extensive documentation. The printed matter consists of a small booklet (*Introduction to Macysma*), two comprehensive books (a system reference manual and a tutorial cum user guide) and three spiral bound volumes (for PD2Ease, scientific notebook interface and scientific graphics reference manual). There is also the excellent glossy reference card, and the usual pamphlet of release notes, which also give a step-by-step procedure for installation.

The installation itself is extremely simple, straightforward and fast. I tried it out on a 486/66 MHz/16 mb for Windows 3.1, on a pentium 75 MHz/16 mb for Windows 3.11 and pentium 133 MHz/32 mb for Windows 95 as well as WindowsNT 4.0, and it took much less than 10 minutes even on the slowest of the machines. However, when one begins to use the software, there is a noticeable delay during loading. The windows 3.1 and 3.11 versions of Macysma took more time to load than what the machine took for booting!

One of the best features of the design of Macysma is the ease of use. You can start using it (even its advanced features) literally within minutes of installing it, even if you have had no previous experience with it (or its equivalents). Firstly, there is a very readable introduction in the documentation. Secondly, there is extensive on-line help. In fact, the menu-driven, natural-language query is a powerful and innovative interface; you can pose a question in ordinary English, and in response, you are taken to the appropriate section of the on-line manual. Thirdly, Macysma (and PD2Ease) comes with dozens of demonstration scripts/examples; just looking at a few of them would be enough for you to be able to begin using these packages directly for solving the problems at hand.

What are the things that Macysma can

do for you? On the symbolic manipulation front, it can evaluate algebraic expressions, of surprising degree of complexity. You can, for example, give it a complicated product of expression of polynomials in  $x$ , trigonometric expressions in  $y$  and exponentials in  $z$ , with coefficients  $a, b, c$ , etc. and it will faultlessly expand the expressions. Moreover, it can convert it into FORTRAN or C code, if you so desire. It can symbolically evaluate derivatives and integrals, and even solve differential equations.

The numerical analysis capabilities are equally formidable, with matrix operations, solution of nonlinear equations, and provision for arbitrary precision arithmetic being some of the highlights. The PD2Ease is particularly awesome in this regard. One has just to see any of the dozens of demonstration problems, covering a diversity of topics ranging from reaction-diffusion equations to quantum mechanics to flow past aerofoils to financial analysis to believe it. The task of the engineer or scientist, who wishes to model a particular scenario, would now be restricted to correctly formulating the set of partial differential equations, and supplying the parameters and the boundary conditions; PD2Ease does the rest.

The most spectacular aspect of the package, however, is the graphics. In fact, it has the potential to revolutionize the teaching of applied mathematics. The single-line commands of Macsyma are powerful enough to generate highly

complex curves and surfaces. The parametric plotting facility is particularly useful in this regard. Even more attractive is the ability to generate animation. Here, too, even with a single-line expression one can very easily demonstrate for example, the vibrations of a surface. With a little imagination, it would be easy (and worthwhile) to build fairly advanced courses (say on population dynamics, or vibrational spectroscopy) using Macsyma.

A product of this level of complexity is not expected to be totally free of idiosyncrasies. There are a few glitches in the demonstrations supplied with the package. The example of a surface fails to show the surface in one instance, and the torus and sphere described in the text are invisible in another. The screen size and the control of successive steps differs to some extent in the Windows 3.1, 3.11, 95 and NT installations. The windows 3.1 fails to export a picture to a .bmp file (but 3.11 does not!), and the colours of a picture saved using the clipboard get mysteriously transformed when viewed again with another software. The manual does give a very sound advice when it encourages the users to check their results using inverse operations (e.g. differentiation to be followed by integration)!

Macsyma has (well, these days who doesn't?) a presence on the World Wide Web (<http://www.macsyma.com>). The company's home page contains a lot of useful information. The price of these packages, as quoted there were \$349 for

Macsyma and \$999 for PD2Ease; with site licences and volume discounts, it is likely that they would be less expensive. The site also announces free demonstration copies. Once you see the facilities of Macsyma, there is a very good chance that you would be justifiably tempted to buy it.

Not having used comparable versions of the other competing products such as Mathematica, Derive, Maple or Matlab, it is not possible for me to give any authoritative opinion on which one of them would be the best (and most cost-effective) package to use. Moreover, with the increasing availability of the powerful and free/inexpensive software (GNU, Linux and the like), it is probably possible to do many of the things which Macsyma does at a very small fraction of the cost. However, to have all these facilities in a single, powerful, well-documented, easy-to-use, continuously improving, and internet-supported package is something which is strongly in favour of Macsyma. There is no doubt whatsoever that a practising scientist/engineer, who needs to carry out scientific computations, would find that use of Macsyma leads to a substantial enhancement in productivity in research, development and teaching.

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