

The reformist arguments, on this issue of global concern, are not simply based on the redressing of injustices and the empowerment of the marginalized. They rest in part also on what for many urban dwellers is still just an idea rather than a position to which they have given any deep assent: the defensibility and indeed the high value of aboriginal thought and social practice. Most have yet to be convinced of these.

If the power of the pen ever needed to be demonstrated, however, the cases presented in this book would provide useful evidence. Papers by L. R. Hiatt and Kenneth Maddock show very clearly the highly functional relationship between the strength of the cultural evidence brought to light through the work of anthropologists, even that of scholars whose work essentially lay outside the judicial arena, and legal land gains by Australian Aborigines. At the end of the book Maddock asks his fellow anthropologists, "Should we be more coolly objective, or should we take up advocacy instead?"

At the very start of the book an implicit answer to this is given in the paper by Myers entitled "Burning the truck and holding the country." As anthropology it is impeccably and coolly couched within a wide comparative framework, and thus is about as "objective" as it could be. But at the same time its very content provides one of the most eloquent and most convincing arguments for Australian Aboriginal land rights one could find.

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Dying Stars

White Dwarfs. G. WEGNER, Ed. Springer-Verlag, New York, 1989. xiv, 524 pp., illus. \$58.30. Lecture Notes in Physics, vol. 328. From a colloquium, Hanover, NH, Aug. 1988.

White dwarfs mark the final stage in the lives of relatively low-mass stars, including, eventually, our own sun and most or all other stars with masses less than about six times that of the sun. These dying stars have used up their nuclear and gravitational energy sources and contracted to densities a million times those of familiar substances. They radiate the residual heat of their constituent atomic nuclei in a miserly fashion that keeps them dimly shining for 5 to 10 billion years. A few dozen astronomers, world-wide, devote most of their research to white dwarfs, and another couple of hundred are interested enough to come to an occasional meeting like the International Astronomical Union Colloquium whose

proceedings are contained in the present volume.

Half a dozen or so questions would occur to a white dwarf lover who had been deprived for a couple of years of journals, conferences, and preprints. Good, clear, up-to-date answers (epoch August 1988) to essentially all of those questions are to be found somewhere in this book. Unfortunately, they are not easy to find. The volume has no index; the papers are printed, apparently, in the order they were presented and are not fully grouped by topic; and the abstracts of the longer review papers have been omitted to save space.

To save your having to hunt, here are a few of the critical questions and the answers presented at IAU Colloquium 114. The oldest white dwarfs set a limit to the age of the Milky Way galaxy, an important parameter in calculations of galactic and cosmological evolution. The oldest will also be the faintest, and thus difficult to look for. Despite the difficulty, it can now be said with some confidence that the number of white dwarfs per unit brightness interval drops sharply below 10^{-4} solar luminosities (papers by C. C. Dahn *et al.*, M. T. Ruiz *et al.*, and F. D'Antona). This may indeed mean that the galactic disk is not much more than 7 billion years old (the sun is 4.5 Gyr). But it may alternatively reflect physics missing from the cooling calculations whose effect is to prolong stellar life near $10^{-4} L_{\odot}$ and then hasten the subsequent fading.

Another topic of recent acrimonious debate is the number of pairs of close binary white dwarfs with total mass exceeding a critical limit near 1.4 solar masses and periods short enough for the stars to merge in a few billion years. Such pairs are the current "best buy" for progenitors of the kind of supernova that occurs among old stars. Unfortunately, the short-period systems all seem to have low masses, and the massive systems all seem to have excessively long periods for the purpose. A new round of careful searches for white dwarfs with variable radial velocity has uncovered a handful of new candidates. D. Foss reported three, A. Bragaglia *et al.* two, and R. A. Saffer and J. Liebert one more (which unfortunately is already known to have too small a mass for the stars to explode when they merge). On the theoretical front, new models of merging white dwarfs were presented by three groups. M. Kato *et al.* are rather pessimistic about the requisite sort of explosions occurring, even if the white dwarfs are massive enough; W. Benz *et al.* are quite optimistic; and R. Mochkovitch and M. Livio decline to state.

Binary white dwarfs are also investigated for their own sake. Current questions con-

cern whether the binary ones differ systematically from the single ones in either mass or magnetic field properties. The observed binary white dwarf masses are, indeed, higher than average for single stars, but M. Politano *et al.* conclude that this is an effect of observational selection and that the real distributions are the same. The fields, on the other hand, are genuinely different. Only 2 to 3% of single white dwarfs have measurable magnetic fields (ranging from 2 to 500 megagauss). Among the binaries, according to G. D. Schmidt and J. P. Lasota *et al.*, strong fields are much commoner (found for more than 20% of the stars) and confined to a narrower range of 10 to 50 MG. Curiously, no white dwarf fields between 10^5 and 10^6 gauss are known, though they would be conspicuous in detailed spectral analyses.

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Plant Biochemistry

Second Messengers in Plant Growth and Development. WENDY F. BOSS and D. JAMES MORRÉ, Eds. Liss, New York, 1989. xii, 348 pp., illus. \$96. Plant Biology, vol. 6.

This collection of reviews bravely and accurately encapsulates the current confusion regarding signal transduction in plants. Some chapters are less satisfactory than others, but the weaknesses have more to do with the material than with the treatment. Acetylcholine, for example, has been on the brink of recognition as active in plants for years, and still no one is sure whether it plays a role. The highlights in this regard are two exciting-to-read central chapters, one on a plant analogue of platelet-activating factor, the other on the plant versions of fatty acid-derived messengers. These compounds are clearly proving important, and it is noteworthy that though the latter share mode of production with the animal equivalent, the resemblance doesn't extend much further. Pride of place must go to the chapters of balanced evaluation in which evidence for each of the currently popular models of signal transduction is sifted and marshaled. It is a pleasure to report that the trustworthiness of some of the data is perceptively scrutinized and, even, occasionally found wanting.

One matter on which virtually all contributors agree: we do not understand signal transduction in plants. Various reasons are offered.