to obtain benefits for which they are already eligible. The second tier entails more radical long-term measures aimed at the reduction of extreme poverty, which Rossi contends is the breeding ground for homelessness.

Down and Out in America provides an informative and far-reaching account of contemporary homelessness. But it is also one that invites a number of critical questions and alternative interpretations. Its estimates of the size of the homeless population both in Chicago and nationally can be challenged, for example, on the basis of several considerations. First, how it was determined that fewer than one in ten of the people encountered on the streets between 1:00 and 6:00 a.m. were actually homeless is unclear. Was the determination based on casual observation or verbal inquiry? If the latter, it seems plausible that a significant number disavowed their homeless status because of fear or suspicion of the interviewers. Additionally, Rossi's procedures do not fully account for two categories of the literal homeless: the street homeless who try to get out of harm's way at night and thus avoid detection and those who occasionally spend the night in a cheap motel or hotel by themselves or with others. Both of these groupings, which constitute a portion of the "hidden homeless," are acknowledged by Rossi but not fully incorporated into his actual estimates. The question of how many of these hidden homeless were missed, and by what factor the estimates should be inflated, thus remains. For these reasons estimates such as Rossi's, which have already generated debate, should be regarded as lower-boundary estimates at best.

A second and more serious issue concerns the incidence of disability among the homeless. Rossi, as well as others, indicates that it is considerable, with the vast majority of homeless having one or more disabilities. But several considerations prompt the question whether the magnitude of disability has been overestimated. First, it seems probable that it is the most functional homeless who are most likely to succeed in concealing themselves, leaving the more disabled more likely to be identified. If so, the incidence of disability among the street homeless would be exaggerated by the surveys.

Second, we wonder if restless or drowsy persons interviewed by strangers in the middle of the night are not likely to be anxious or even bitter over such intrusions during this culturally defined "time out" period. Such anxiety might manifest itself in their responses, even though they agreed to be interviewed, and thereby color the findings. After all, it is easy to imagine how we might respond to a pollster's phone call in the dead of the night. Should we expect the homeless to respond any differently to such nocturnal intrusions, even when awake and compensated for the inconvenience? (It is worth noting that, whatever the methodological utility of such procedures, they represent an indignity that would not be tolerated in research on the domiciled and raise ethical questions about procedural liberties sometimes taken with marginal populations.)

A third troublesome aspect of the disability research concerns the use of batteries of questions standardized on domiciled populations and the decontextualized interpretation of the responses. Can a high score on a depression scale among the homeless be interpreted as representing disability in the same fashion as among the domiciled? More concretely, might not evidence of abnormal thought patterns and affective states among the homeless, such as depression and passivity, be better understood as the result of the trials of homelessness rather than as the effects of mental illness, and thus interpreted as contextually normal rather than pathological? Taken together, these concerns provide good reason to suspect that reports of disability on the streets have been misunderstood and unwittingly exaggerated.

Finally, these concerns lead to what we regard as the book's most questionable contention: that those among the domiciled extremely poor who become homeless are those with one or more serious disabilities. Though the incidence of disability among the homeless may be considerably higher than among the extremely poor, to argue in the absence of longitudinal or panel data that the disabilities identified are the primary determinants of homelessness is premature. And such a conclusion is especially doubtful when the disabilities in question can also be precipitated by the condition of homelessness itself. That these disabilities are in part a consequence of the brutalizing experience of homelessness thus strikes us as an equally plausible interpretation to the one trumpeted by Rossi.

For those interested in the problem of homelessness and its connection to poverty more generally, *Down and Out in America* is certainly a book to read. It is a significant contribution to the discourse on homelessness in contemporary America, but it is one that is likely to fan rather than douse the flames of controversy regarding this pressing problem.

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Information from Ice

The Environmental Record in Glaciers and Ice Sheets. H. OESCHGER and C. C. LANGWAY, JR., Eds. Wiley-Interscience, New York, 1989. xvi, 400 pp., illus. $98. Dahlem Workshop Physical, Chemical, and Earth Sciences Research Reports. Based on a workshop, Berlin, March 1988.

When at a Dahlem Conference more than a decade ago alteration of global chemical cycles by humans was examined the need for information on earlier atmospheres and climates was evident. Aside from study by way of sediments and sedimentary rocks, the then-emerging techniques of glacier coring seemed to offer the most promise for producing such information. The complexities of ice systems were great, but the need for information was a strong driver and pioneering work was under way. The workshop here reported goes a long way in vindicating that promise, at the same time verifying the complexity of the system and the wealth of information yet hidden.

This book, prepared by some of the pioneers of a new scientific adventure, is a welcome consolidation of information developed to date in what must still be considered a science in its infancy. It conveys from different points of view a sense of the variables involved in the formation and movement of glacial ice and the kinds of information, each with its own usefulness and limitations, held in the various glaciers. It also covers methodology and presents examples of recent findings and unexplored pathways.

The massive glaciers of Antarctica and Greenland, potentially storing information from their local environments for 150 million years or more, also hold information on atmospheric constituents of long residence time for which the rate of meridional transfer is sufficient to provide a "global" value. In addition to annual information and trends over decades or centuries, these polar glaciers considered together should reflect relatively long-period processes such as the precession of the equinoxes and changes in the obliquity of the ecliptic, or even variation in the eccentricity of Earth's orbit. The "alpine" glaciers (those between the 60th parallels), although they pose special problems in interpretation, offer information on other sorts of processes. Their characters differ greatly. The Quelccaya Ice Cap in the Peruvian Andes (14°S, 71°W), is sharply varved and in addition to giving local climate information is well positioned to identify effects of El Niño and the Little Ice Age. The Mt. Logan ice field in the Canadian St. Elias Mountains, by contrast, samples the long fetch of the Pacific Ocean and is less influenced by local human activities. It pro-

vides a well-preserved record of perhaps a millennium of temperature (^{18}O) and stratospheric aerosols.

Verifying ice core chronology is a major challenge. Annual layering is useful, particularly for some alpine glaciers where clear differences between seasons make for visible varving, but frequently is blurred by ablation, erosion, or other factors. Other, more subtle, seasonal differences in such variables as ^{18}O concentration or electrical conductivity frequently can be employed, but these also are subject to blurring, particularly as compression and ice movement narrow annual bands.

Radioactive constituents such as ^{14}C, ^{10}Be, and ^{81}Kr produced in the atmosphere by cosmic radiation can be useful for dating within the ranges of their respective half-lives, but processes of diffusion and adsorption may have influenced the quantity entrapped, and there is a possibility (as yet not determined) that they may be created in situ. Ironically, although it was ^{14}C in ancient carbon of known age that was first used to establish the constancy of cosmic radiation, which in turn established the usefulness of the isotope as a clock, the constancy was not absolute. Thus a variability in radiation coupled to a variability in climate might go undected because of a bootstrap connection between the climate and the clock.

The injection into the atmosphere of radionuclides by testing of nuclear weapons and other means has provided an inadvertent tool for calibration of processes by which atmospheric constituents, including both aerosols and gases, are entrapped in ice. The mechanisms of fallout and occlusion, the transition from snow with its burden of adsorbed materials and air in pores to a more consolidated firn with shrinking pores and enclosed bubbles, and diffusion of materials within the ice all make for smearing of the time horizon. These processes, which differ from glacier to glacier as a function of climate and other variables, can be calibrated through this artificial pulse of radioactivity.

Volcanic eruptions or other episodic events can also provide timing markers to the extent that their timing is known. Where there is no historical record they permit concordance between time scales of various glaciers.

The many serendipitous surprises that have come from these early investigations include the evidence of the storms of the Kalahari, Atacama, and Australian deserts in the Antarctic ice, with attendant information on atmospheric circulation, and the trapping of extraterrestrial particulates, providing similar information about cosmic processes. There is an opportunity for mineralogy and crystallography at micrometer scale.

Abrupt changes in carbon dioxide concentration during an approximately 10,000-year period at a depth of about 2 kilometers in ice from the Dye 3 core (southern Greenland) and their evident correlation with changes in ^{18}O values arouse great curiosity. Other abrubt (on a geologic time scale) changes in such parameters bear witness to large changes in climate in periods of a century or less.

The presence of pollen, although not a surprise, testifies to the large body of unexploited information in these cores. Dating of pollen deposits, identification of species, and correlation of the resulting data with varve information on continental and ocean sediments should give new insight into climate change, species adaptation, forest migration, and back trajectories of air masses.

In retrospect, in view of the vast record of study of sediments and sedimentary rocks, it seems surprising that stratigraphic study of the atmospheric profile has been so long in coming. The logistics and methodology are now in place. The situation is reminiscent of a century ago when the significance of the sedimentary record began to be recognized. The excitement is considerable.

As might be expected in a new endeavor, there is a need for standardization of usage. One is required to translate between stratigraphic depths and time, between mass and molar values or mixing ratios, and between global units, mass per unit area, and percent or per mil values. For example, because of inability to translate between two records, I was unable to determine whether a CO_2 minimum might have been correlated with a sulfate or hydrogen ion spike. A favorable consequence of the youthful nature of this glacial sedimentology, however, is that it has not yet developed a protective shell of jargon. Aside from several acronyms one must learn and a few new words to identify previously unrecognized phenomena, this volume is remarkably easy to read. I would characterize it as difficult to set down, were it not that to do so could be interpreted as imputing some populism to what, after all, is a professional volume.

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