Book Reviews

Change in a Community

The Winds of Tomorrow. Social Change in a Maya Town. RICHARD A. THOMPSON. University of Chicago Press, Chicago, 1974. x, 182 pp. $12.50.

The Winds of Tomorrow in many ways realizes the possibilities that have been generated for the social anthropology of complex societies in the past 45 years by Redfield, Steward, and their students. Thompson has analyzed the changes in the stratification or ranking system in a small town in Yucatan, Mexico, that has undergone vigorous industrialization since 1940. Among his methods are random sampling, an emic approach to stratification, quantitative analysis of survey data, and a projection of past trends into the future by means of a stochastic model. He claims that his book is essentially an analysis of a process of social change. Although his claim to have analyzed process is somewhat extravagant, his accomplishments are real and solid.

Much of social-cultural anthropology has been devoted to the study of what is called primitive man. It was only around 1930 that serious attention began to be given to people who are integral participants in complex societies. And at first such people were studied as if they also were independent tribesmen. If other kinds of people (such as merchants or colonial officers) lived in the same community, or nearby, they were mentioned only briefly. The inevitable and very important linkages of the peasants with the local economic, political, and religious institutions of the state were largely ignored. By the mid-'50's the general accounts of the prominent scholars (for example, Kroeber, Redfield, Steward, Wolf) recognized that the peasants were only one part of a state, but there were few case study monographs that explicitly dealt with these facts. Knowledge of the effects of changes in international commodity markets, of revolutions, of the waxing and waning of imperial powers was reserved to the historian, the economist, the political scientist. Only a few anthropologists were explicitly concerned with these contemporary manifestations of the constant flux that the world's agrarian peoples live in.

The social anthropologists continued to produce case studies of particular communities, more often than not focusing upon a single category of person, the peasant. Since the fieldwork rarely lasted more than 18 months, the analysis usually concentrated upon the yearly cycle, and since the fieldworker rarely left the community or became intimate with the economic and political elite of the town, the analysis almost never took into account the commercial, political, and religious linkages to the outside. Such studies, and there are legions of them, especially for Latin America, have a peculiar quality of being isolated in time and space. And they are in distinct opposition to the interests expressed in the more general, synthetic accounts.

The Winds of Tomorrow is a welcome exception for its concern with all the people, not just the peasants, in a complex town, with their ranking system, and with change. I have reservations about the design of the study, and about some of the results, but the book is a signal advance for the case study literature and takes the discipline much closer to the promise schematically presented to us by the synthesizers.

The town Thompson studied was Ticul. In 1900 there were two categories of people in Ticul. One, the *catrines*, were of European cultural heritage, and dominated both the industrial base of the countryside (hennequen) and the market, commercial, and service functions of the market town. The other, locally called *mestizos*, were descendants of Maya Indians. These were divided into two sets, a small political elite (called *caciques*) and a vast mass of corn farmers and manual laborers. The *mestizos* had a colonial-Indian culture. Starting with World War II, there was an opportunity to increase craft production in the town. Leather shoe and straw hat industries started a rapid growth, responding to changes in the national and international markets. By 1968, fully one-third of the household heads in town were occupied in these industries. About half were still corn farmers, and the rest were in service occupations of one sort or another. By then the stratification system was far more complex. There was a biethnic division, as before, but each division now had three sections; and, Thompson claims, there was still a single hierarchy, with the three *catrin* sections on top of the three *mestizo* sections. Furthermore, the people between the top and the bottom had parents who were on the former bottom. The people in the middle were now wearing shoes, working for wages in a factory-like setting, or acting as industrial entrepreneurs and were urging education and monetary occupations on their sons. These are all items of European, rather than Indian, culture. Since only 10 percent of the population had migrated into town in the past 30 years, it was clear that the middle sectors were an innovation and must have come from the older *mestizo* households. In this sense, then, there has been very considerable social change and social mobility in the town, which has accompanied the growth of the industrial activity.

The analysis of the dimensions of the local social ranking system is the core of the book. First of all, Thompson concentrates on prestige, rather than on economic power or political position. Second, he explicitly focuses on local concepts and perceptions of prestige. His names for the social categories are Ticul names, and a primary research strategy was to use a bilingual native assistant to make judgments about the social position of each member of a sample of males from the community. In addition, he discovered the local dimensions of social position and then analyzed those data quantitatively.

Thompson starts from, and wants to stay close to, Ticuleño forms of thought, combined with quantitative and sampling techniques. He finds that Ticuleños have six named social positions (*niveles sociales*), and he finds further that they think of five primary dimensions, including ethnicity, occupational prestige (six levels), education, wealth, and fluency in Spanish. There are other, subsidiary dimensions which apply only to ranking within a *nivel social*. Thompson's procedures for discovering and validating that these are in fact native categories of thought are not presented.

Thompson rated 123 male heads of households (in a random sample of the entire town) for social position, and on each of the dimensions. He then correlated three dimensions (wealth, education, occupation) with social position. The highest r was for occupation on status ($r + .70$). A multiple regression was .75. It would appear, therefore, that there are strong statistical reasons for his conclusions.

These results constitute a significant advance in our understanding of ranking systems in particular localities. It is hard even to think of other community study monographs with which this one might be com-

pared. For this reason almost everything Thompson has to say is relevant and interesting.

There are, however, aspects of his methods that are troubling. In doing work of any sort in another culture, one has a choice. One can attempt to work primarily with categories of thought and action that adequately predict what people do, regardless of how the locals understand the situation, or one can work with and through the local conceptions and judgments. This difference is at the core of what is probably the most intractable epistemological problem in social science today, the relativism or equivalence problem. There are several oppositions of terms used to label the difference, including etic-analytic-outsider-objective as opposed to emic-folk-insider-subjective. Thompson would appear to fall clearly on the emic side, for he uses what he claims are Ticul thoughts and principles. But he does not explicitly raise as methodological problems the complex and subtle issues in this area. He simply proceeds with his account. Yet his work presents de facto solutions. What I wish to do is to raise to consciousness some of the problems and Thompson's apparent solutions.

The first problem concerns the values of the dimensions of prestige (occupation and so on). These values for social position, and for occupation, are given by the local people themselves. The other variables are said to be derived from their (rather than from Thompson's) thinking, but for the purposes of his quantitative analysis he imposed arbitrary values. Furthermore, these values look very much like those in use in the fully industrialized countries of the North Atlantic. On income, for example, he splits the range into seven values, including 0 to 999 pesos, 1000 to 2999 pesos, up to 11,000 pesos and more. He splits his education variable into six values (0 to 1 year, 2 to 3 years, and so on), even though the local teachers reported that the fourth grade is a breaking point in level of schooling (because they feel that there is a significant gain in ability to speak Spanish at that point). On neither of these variables has he followed to the end the principle of letting the local people determine the concepts to be used, and his methods are therefore contradictory. He further assumes that his variables are measured with interval scales, and therefore feels justified in using r as his statistic of correlation. Establishing equal intervals on the scale necessary for a parametric statistic is a difficult job at best. It might well be the case that an emic approach would be a strong justification for establishing an interval scale. But Thompson has not explicitly raised this issue, and he should have. He failed to use the variable of fluency in Spanish in his quantitative analysis, primarily because he could not figure out a way to measure it. Here again, his informants might well have shown him how, and given an interval scale to boot.

A more interesting gap in Thompson's quantitative analysis exists with regard to ethnicity. He states that ethnicity is an overriding and underlying dimension of prestige, yet he does not include it in his quantitative frame at all. This is surprising, since it is easily measured.

Finally, Thompson has not explained the relationship between his quantitative analysis and the emic analysis he is doing of the prestige ranking system. We do not know if he thinks of the quantitative analysis as a validation procedure, or if he is testing the systemic nature of the Ticuleños' concepts. If instead the study is simply a practical mix of two research strategies, that has not been explained either. It is clear that there is some correlation among at least some of the dimensions of prestige, but since Thompson did not use, or justify not using, two of the most important dimensions in his quantitative analysis, it is unclear what the correlations might mean or what he thinks they mean. One suspects that the relationships between an emic analysis, with all its ethnoscientific strategies, and the formal methods of analysis worked out by Western scientists have not as yet been fully integrated. Much work remains to be done in this intellectual realm. The neatness of Thompson's analysis points to what can (and indeed should) be done. We have yet to understand the epistemological implications of what has been done.

Thompson pays considerable attention to the process by which Ticul has been changing, with special reference to the ranking system. Process is something of a magic word in anthropology at the moment, and this study unfortunately falls into some of the traps set for the unwary. It is a truism that all studies of process must somehow have measurements for at least two points in time. But the social anthropologist is usually doing a synchronic field study. How is the dilemma resolved? The usual strategy is to regard variation in the contemporary period as representing structural variation in time. (The major form of this method in the other social sciences is cohort analysis.) The other method is actually to measure the phenomena one is interested in at two or more points in time. If one is studying primitive peoples, it is very difficult indeed (though often not impossible) to measure social-structure variables at past times, but with peasants and other citizens of complex states with writing, censuses, and other records, it is not so difficult, especially if one is interested primarily in the 20th century. Thompson's analysis of process unfortunately is based on a very weak control of time.

In order to predict the future, Thompson abstracts the intergenerational mobility trends in his sample and projects them onto the future in a stochastic model. Whereas in 1900 about 10 percent of the population of the town were in the elite and 90 percent in the lower rank, by 1968 there were 5 percent in the elite, 57 percent in four middle categories (ordinary *catrin*, poor *catrin*, *mestizo fino*, and ordinary *mestizo*), and 38 percent poor *mestizos* (half of whom were ordinary corn farmers). Thompson's projections for the future say that the middle categories will expand greatly, while the poor corn farmer category will contract in size.

It is not clear whether Thompson relies exclusively upon his cohort analysis for an estimation of the ranking pattern of 1940 and before. If, as seems likely, much of his analysis is based on his contemporary sample then it would seem that the research strategy offered more opportunities than he availed himself of. Recording the dates at which the various informants did certain things, like change status or occupation, would at least have given some microhistorical data to work with.

But there is a more serious problem in this part of the process analysis. One of the striking aspects of what has happened in Ticul in the past 30 years is that the change in ranking for individuals has been made possible by a vast increase in the industrial sector of the town's economy (there was a 50 percent increase in the number of shoemakers, from 400 to 600, between 1963 and 1968 alone). Rates of mobility, then, depend in a fundamental way upon rates of expansion (or contraction) of available social statuses, which depend hardly at all upon motivations or decisions of the local residents (at least for such towns as Ticul) but are usually a response to national and international economic and political events. While the environment does not determine the mobility of individuals, it certainly sets strong limits. Therefore Thompson's projections of individual mobility rates into the future have failed to take into account the rate of change in the number of statuses available, and his stochastic model assumes that the environment in which the changes are occurring will continue to change at the same rate. The model is an interesting exercise but, it seems to me, fundamentally disconnected from the reality of Ticul.

I do not wish that my criticisms of Thompson's analysis should obscure his very real achievements. It is very difficult

to study such refractory topics as the ranking system, where a language (or two) and a new set of cultural norms must be learned. The adaptation of the necessary research strategies to a strange locale is a difficult, lengthy, and subtle process. And the informants are not accustomed, as we are, to survey research. Thompson has utilized a relevant and important sampling strategy, and has attacked serious problems with determination and skill. His book deserves to be read with respect and care, for it has much to offer.

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Altering Surfaces of Solids

Ion Beams. With Applications to Ion Implantation. ROBERT G. WILSON and GEORGE R. BREWER. Wiley-Interscience, New York, 1973. xii, 500 pp., illus. $19.95.

Ion implantation is gaining wide acceptance in both science and industry as a new technique for altering the near-surface properties of solids. Materials scientists are finding that many of the physical constraints (such as solubility limits and diffusion rates) imposed by normal materials preparation techniques can be circumvented by ion implantation because it is a nonequilibrium process. Solid state researchers are gaining new insights into the electrical, mechanical, chemical, optical, magnetic, and superconducting properties of solids that have been selectively altered by implanting controlled amounts of impurities from an ion accelerator. Firms in the semiconductor industry are finding that ion implantation is a powerful and economically superior technique for fabricating microelectronic devices such as those used in hand-held calculators.

Few scientists wishing to exploit this new technique will have the background to design the proper system for their particular application. This book by Wilson and Brewer is therefore timely. It contains all the principles and design criteria required for making an enlightened choice in buying or designing an implantation facility.

This book also complements the existing literature on ion implantation. The earliest book in the field, *Ion Implantation in Semiconductors* by J. W. Mayer, L. Eriksson, and J. A. Davies (Academic Press, 1970), emphasized the physics of the implantation process, ion channeling, and lattice location experiments by ion scattering, concentrating, as the title implies, on semiconductor aspects. A more recent book, *Ion Implantation* by G. Dearnaley, J. H. Freeman, R. S. Nelson, and J. Stephen (North-Holland, 1973), is more comprehensive, treating the physics of ion-solid interactions, radiation damage, the production and manipulation of ion beams, and applications of ion implantation to semiconductors and in other fields. These two books provide an excellent overall view of ion implantation, but lack the extensive coverage of the ion implantation system itself that is provided by *Ion Beams*. Although the book by Dearnaley *et al.* has an excellent section devoted to ion beam systems, it is not as complete as the present book, and a researcher interested only in the experimental aspects of ion implantation is apt to think twice before paying $79 for it.

Ion Beams covers systems design and the principles of operation of the component parts, from ion sources to sample chambers, and gives examples of practical applications to ion sputtering and to ion implantation. The chapter on ion sources presents the physical principles necessary for understanding the operation and relative merits of a wide variety of sources. The coverage is complete enough to orient the uninitiated reader, and a categorized bibliography is supplied to guide the more advanced reader. A particularly good chapter covering the principles necessary for design and evaluation of beam extraction and transport systems is provided. The chapter presenting total ion implantation systems design considerations will be particularly helpful to the researchers trying to select a commercial system. The chapter discussing specific applications and some of the attendant problems (such as radiation damage and channeling effects) is weak.

The merit of *Ion Beams* is not that it presents new information or better coverage of any of these topics than exists elsewhere but that it brings together the points that are relevant to ion implantation. Many helpful appendices are included (graphs of calculated projected ion ranges in a variety of solids and tables, charts, and guidelines for choosing the proper type of ion source and ionizable material to get the element desired from the source). Reading the book is a little like sharing an author's lab notebook, the effect being enhanced by some printing mistakes and other errors in need of correction.

I can recommend *Ion Beams* to the scientist who knows what research utilizing ion beams he wishes to do but doesn't know enough about the "black box" that injects energetic ions into his scattering chamber. As any scientist who has had to use positive ion accelerators in his research can attest, an intimate knowledge of accelerator physics and ion-solid interactions is painfully inseparable from the primary research objective. Accelerators operate in a continual state of collapse, ion sources deteriorate, extraction electrodes sputter away, insulators corrode and become conductors, accelerator tubes suffer radiation damage, power supplies fail, and so on. *Ion Beams* can head off some of these problems and should help solve others after the fact. It will not be the only reference required, because it does not, for example, cover ion-solid interactions or the physics of the ion implantation process thoroughly, but it will be helpful for any small-accelerator user.

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Introducing the Solid State

Inorganic Solids. An Introduction to Concepts in Solid-State Structural Chemistry. D. M. ADAMS. Wiley, New York, 1974. xvi, 336 pp., illus. $22.50.

It is true, as those relatively few chemists who are interested in the solid state often charge, that typical chemistry curricula give too little attention to the subject. Chemists prefer gases and solutions where reactions and properties of individual molecules are conveniently studied. The solid state tends to interest them only insofar as x-ray crystallography is a uniquely powerful and invaluable means of determining molecular structure.

This book is written by a man who believes that "a good case can be made for structuring a majority of the inorganic syllabus around a core of solid-state theory." There, I think, he overstates his case, almost ludicrously. However, some corrective to the present neglect of the solid state in the teaching of chemistry does seem desirable, and this book could be a useful instrument to effect such change.

The book is important because it gives a comprehensive overview of the solid state as perceived by a chemist, specifically an inorganic chemist concerned with structure, bonding, and physical properties. It is written in a lively and pleasant style, and the author's own zest for his material comes through in a stimulating way. I should think students would be "turned on" by it. The treatment is intended to be, and largely succeeds in being, complete, logical, critical, and up to date, at a level suitable for juniors, seniors, or first-year graduate students in chemistry. I know of no other book that sets itself this particular