

tween chromosomes. The other papers of this section are either revised repetitions of material published elsewhere or else report interesting novelties in some specialized areas of animal cytology.

The smaller volume, *Chromosome Manipulations and Plant Genetics*, contains the proceedings of a symposium held at the Tenth International Botanical Congress at Edinburgh. In it, the most recent information on the cytogenetics of six important crop plants—tobacco, tomato, potato, wheat, oats, and cotton—is in each case presented and analyzed by a cytogeneticist who has spent his life with and is a world authority on the plant species in question. Plant cytogeneticists who have followed this literature will find little that is new, but for those who have not done so, this is a most convenient volume. Of particular value are the comparisons between different crop species which are undertaken by many of the authors in their discussion sections. The final résumé by D. U. Gerstel and T. J. Mann is most helpful and forms a fitting conclusion to the volume.

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Directions of Cultural Diffusion

Ecuador. BETTY J. MEGGERS. Praeger, New York, 1966. 220 pp., illus. \$7.50.

"All paths lead to Ecuador," says Betty Meggers, and in this unique book on Ecuadorian prehistory (one of the series *Ancient Peoples and Places*) she goes far to prove it. A mere 15 years ago very little was known of the now demonstrated importance of this country to New World archeology. Most excavations had been carried out in the highlands and produced little in the way of a usable chronology.

This situation has been reversed by the remarkable excavations undertaken by the team of Meggers and her husband Clifford Evans, working in close collaboration with the late Emilio Estrada, a millionaire amateur of archeology whose abiding passion was to unravel the prehistory of the Ecuadorian coast. Their findings have attracted worldwide attention and stirred up considerable debate among prehistorians. *Ecuador* is a clear, well-written, and (considering the author's involvement in the controversy) unper-

turbed summary of the coastal sequence as it now stands. Meggers bravely attempts to include the highlands in her survey, but the information from there is so fragmentary and confusing (stemming mainly from the outmoded excavations of Jijón y Caamaño, who inflicted such monstrous phase names as "Proto-Panzaleo I" upon the scholarly world) that, except for the Inca and other historically documented groups, that region might have been omitted altogether.

What makes ancient Ecuador so exciting is not its level of cultural development—for, Meggers' enthusiasm notwithstanding, it has nothing comparable to the high civilizations of Mesoamerica or Peru—but its extraordinarily early move toward fully settled life and its intensive and long-term contacts with Mesoamerica and other, closer areas such as Colombia and Peru. Meggers compares it, geographically speaking, to a keystone in the arch of the northern Andes, but it might just as well be called a keystone of New World prehistory. Coastal Ecuador is strategically placed to receive marine travelers from both north and south, and it is no accident that the greatest aboriginal seafarers of the New World, the Manteco, were found on its shores.

The story begins with the Preceramic period, for which there is little evidence beyond the important highland site of El Inga, which has produced a Paleo-Indian obsidian industry with strong affiliation to the fluted-point complexes of North America and to the fish-tail-point horizon of southern South America. There is an effective gap in the archeological record between the Preceramic period and the early ceramic culture of Valdivia on the coast, with which Meggers' Formative Period begins (at about 3000 B.C.). As just about everyone must now know, Meggers and Evans propose that a boatload of Jomon fishermen from Neolithic Japan were blown off course and landed in Ecuador, thereby introducing ceramics to the New World. However, few of their colleagues, even those most sympathetic to hypotheses of long-distance diffusion, have accepted this explanation, and I suspect that the reason is that it has by no means been proved that a local pottery-making antecedent for Valdivia does not exist somewhere on the coast. Until Meggers and Evans show us that there is a *preceramic* culture extending right up

to the beginnings of Valdivia, with a sudden appearance of a Jomon-like ceramic complex, we will remain unconvinced. Furthermore, on the Caribbean coast of Colombia there is another ceramic phase, Puerto Hormiga, which has equal claims of antiquity, and unless the relations between it and Valdivia are solved one could just as easily propose that Valdivia arose from a native, Puerto Hormiga-like development as from an accidental introduction from across the wide Pacific.

I think that there is much more enthusiasm among other New World archeologists for interareal diffusion between Ecuador and Mesoamerica, mainly because the evidence is better and has, in fact, been cumulative. These relations extend from the Late Formative Period (1600–500 B.C.) until the Spanish conquest. The pioneer Andean archeologist Max Uhle at one time would have ascribed them to continued migration from Mesoamerica, but today the general feeling is that there was a two-way exchange based upon maritime trade. The traits on which this hypothesis is based are generally not found in the Intermediate Area (from Nicaragua through Colombia), and it has therefore been concluded that coastal traffic, probably by means of great sea-going, sail-driven rafts such as those used by the Manteco, was the principal route of diffusion. Certainly many parts of Mesoamerica were involved—Pacific coastal Guatemala, western Mexico, and, particularly in the case of the Tolita culture of the Regional Developmental Period (500 B.C.–A.D. 500), southern Veracruz. This implies, of course, some overland trading. A good case can be made for the introduction from Ecuador to Mesoamerica of metallurgy and such ceramic techniques as iridescent painting, rocker-stamping, and negative painting and such traits as stirrup-spouts and the pottery mold. Coming in the other direction would be napkin-ring ear spools, chili-grater bowls, clay roller-stamps, the very odd three-pronged censers, and a host of other things.

But of course adjacent Peru remained the most powerful influence on Ecuador (and probably vice versa). Less impressive are the relations with Amazonia, for the artistically exciting Napo culture of the eastern lowlands, in spite of Meggers' claim of a highland derivation, is part of a widespread horizon style that is found on a late

level (A.D. 1100–1200) all over the Amazon drainage, and it is probably autochthonous to that jungle-covered basin.

Meggors calls her final epoch preceding the Inca takeover the "Integration Period," but it seems to have been nothing of the sort. Ecuador was always Balkanized. Perhaps it was the exposure of native Ecuadorian peoples to such a heterogeneity of influences that precluded the rise of any well-defined art style (the mark of a homogeneous civilization). In this, there is close similarity to other great trading cultures such as those of the Phoenicians and other peoples of the ancient Levant or of the highly cosmopolitan tribes of central Asia. International commerce and great art apparently do not mix, at least in the ancient world.

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Microwave Spectroscopy

Ferromagnetic Resonance. S. V. VONSOVSKII, Ed. Translated from the Russian edition (1961) by H. S. H. Massey. D. ter Haar, translation editor. Pergamon, New York, 1966. 339 pp., illus. \$10.

This book is a collection of review articles on the phenomenon of resonant absorption of microwaves in ferromagnetic materials. As the editor points out in the foreword, the authors of these chapters have themselves made significant contributions to the subject and therefore the work is (at least in part) original. It is a very lucid collection and contains a sufficient amount of detail so that it will make not only a good reference work but also an interesting book for new students who wish to start work on ferromagnetic resonance. It is somewhat dated in that few if any references later than 1963 are cited, and the papers more recent than 1960 that are cited are, very naturally, Russian.

There are nine chapters. The first, by Vonsovskii, is an elementary survey. Chapter 2, by G. V. Skrotskii and L. V. Kurbatov, is a more detailed discussion of the phenomenological theory. It contains a very clear account of the various phenomenological equations which have been introduced since the classic work of Landau and Lifshitz in 1935 and presents solutions for a few typical cases. Special cases such as effects of multiple

domain structure are also discussed. In chapter 3 E. A. Turov discusses the magnetic resonance phenomenon as an excitation of spin waves. Thin-film spin-wave resonance, ferromagnons excited by high-frequency electromagnetic fields, and spin waves in antiferromagnetic systems are described. The special roles of anisotropy fields and demagnetizing fields are also included. M. I. Kaganov (chapter 4) deals mainly with insulating ferromagnetics. The discussion concerns itself only with magnon-phonon relaxation processes. The ferromagnetic system is assumed to be ideal, that is, free from dislocations, impurities, surface flaws, and so on. Chapter 5, by Turov, concerns ferromagnetic resonance in metals and discusses particularly the role of conduction electrons, that is, the exchange-conductivity mechanism. The case of short mean free paths (normal skin effect) is discussed in detail, but the situation at low temperatures (anomalous skin effect) is discussed only in a rather oversimplified manner; the main conclusions essentially agree with the more sophisticated recent theoretical work. In the next chapter Turov continues with a survey of the experimental data on line widths and their comparison with the theoretical work described in the earlier chapters. In the latter part of this chapter other sources of line-broadening, such as inhomogeneities, are considered. Chapter 7, by V. G. Bar'yakhtar and M. I. Kaganov, is concerned with further details of spin-wave excitations by an external high-frequency field, in particular the case of nonuniform high-frequency fields is discussed. Walker modes are described in considerable detail. Next, A. G. Gurevich (chapter 8) deals with nonlinear processes in ultra-high-frequency fields. He concerns himself mostly with a study of various ferrite devices. Ya. A. Monosov and A. V. Vashkovskii describe nonlinear phenomena in ferrites in chapter 9. The first part of this chapter gives data on long-wave oscillations in a ferrite, and the second part deals with phenomena when the ultra-high-frequency power is considerably increased.

In this volume there is somewhat more coherence and continuity than is usual in a mere collection of papers. It should therefore prove quite useful to workers in the field.

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Superconductivity and Helium

Quantum Fluids. Proceedings of the Sussex University Symposium (Brighton, England), August 1965. Edited by D. F. BREWER. North-Holland, Amsterdam; Interscience (Wiley), New York, 1966. 368 pp., illus. \$13.50.

The symposium whose proceedings are reviewed here was intended primarily as an informal discussion meeting, with emphasis on problems pertaining to both helium and superconductivity. D. F. Brewer has done a creditable job of transforming the proceedings into a useful reference volume.

About 34 papers presented at the symposium comprise the framework of the book. These papers vary from fairly general reviews to quite specific reports on recent experiments. Review papers are presented by P. W. Anderson, J. Bardeen, G. Careri, P. G. Genes, E. P. Gross, B. D. Josephson, P. C. Martin, P. Nozières, P. L. Richards, W. F. Vinen, J. C. Wheatley, and A. D. B. Woods. Many of the papers are concerned with vortex lines in the superfluid. Wheatley's describes experiments on He³ performed at very low temperatures (near 3.5 millidegrees).

Several papers discuss the properties of ions in liquid He⁴. Discussions of microscopic theories of helium, tunneling, flow properties of superfluids, and inelastic neutron scattering from He⁴ are also included among the papers. Roughly one third of the book relates to superconductivity, one third to He⁴, and the remaining third to He³ and He³-He⁴ mixtures. Author and subject indexes are included.

The majority of the papers are of a specialized nature and require some previous familiarity with the field. Assuming this familiarity, however, most of them are quite readable. Edited transcripts of the discussions that followed each paper are included; these are of considerable interest, although, because of their necessarily brief nature, some of the remarks contained in the discussions may not be immediately clear to the reader. *Quantum Fluids* is recommended for interesting reading as well as a reference for those concerned with research on quantum fluids.

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