though short relative to the second, is extremely important, for here Kurtén summarizes his own ideas on Pleistocene faunal evolution, evolutionary trends in size, problems of the origin and extinction of species, faunal turnover, the rate of the change of a fauna as expressed by its half-life and the mean longevity of a species, the low endemicity of the European fauna at all periods in the Pleistocene, and human effects on the fauna (particularly at the close of the Pleistocene and after). The wonder is that so much information and so many worthy ideas could be compacted into 37 pages.

The detailed faunal data available for most periods of the European Pleistocene make possible such analytical studies, with the results often determined statistically and presented graphically. As would be expected, evolutionary change accelerated during the period of the glacials and the interglacials as compared with the Villafranchian. An unexpected conclusion is that the rate of human evolution, from the Holsteinian through the Würm, although rapid in comparison with that of most mammals, was exceeded by that of the European elephants for the same period.

This short third section has implications of importance to all evolutionary studies, particularly where the fossil fauna is rich, with multiple specimens of many species. The Pleistocene, with its many major climatic changes, mostly within the last half-million years, was a period of intense selection and rapid faunal evolution. Kurtén has done an admirable job in organizing and explaining this complexity in understandable terms.

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Plasma Waves

Ondes dans les Plasmas. DANIEL QUÉMADA. Hermann, Paris, 1968. 384 pp., illus. Paper, 48 F. Collection de Physique du Centre National d'Etudes Spatiales.

Of the wide range of phenomena and techniques encompassed by plasma physics, Quémada's cogent, carefully prepared monograph deals with a single, but remarkably rich, aspect: the bewildering variety of waves that can propagate in plasmas. Even this subject is further restricted to phenomena susceptible of description by a linearized theory, so that only scant allusion is made to instabilities and wave interactions. Nevertheless, the author has rendered an important service in systematically characterizing the properties of waves in plasmas, particularly as regards the diagnostic capabilities they provide.

The book is written in a lucid style and should be clear even to readers with only a modest knowledge of technical French. The author claims to have addressed his work primarily to students of plasma physics, but it should not be considered a textbook. A beginning student would be well advised to acquaint himself with the more basic aspects of plasmas before turning to this monograph. The first chapter does in fact provide a review of the general properties of plasmas, so succinct, however, as to comprise little more than a list of topics *not* covered in the main text, among them diffusion, particle orbits, sheaths, transport properties, kinetic theory, and nonlinearities.

The bulk of the work analyzes and catalogs the properties of waves in plasmas for a variety of regimes of the parameters. Numerous graphs of relations among the characteristic parameters are presented. Applications of wave properties to plasma diagnostics are discussed and illustrated, including the important practical cases of reflection from an inhomogeneous plasma column and of whistler mode propagation. Energy transfer and the group velocity of waves receive the emphasis they deserve. The author undertakes detailed wave analyses without losing sight of the underlying physics and injects frequent reminders of the limits of validity of the theories applied. The thorough presentation of the intricate Clemmow-Mullaly-Allis diagram and the elucidation of ray-tracing techniques merit particular commendation.

The work is marred by a faulty analysis of the radiating modes of a bounded plasma, wherein the radiation condition at infinity has unaccountably been ignored and is not satisfied. The unwary reader should also be warned of a number of typographic errors, primarily involving missing subscripts and superscripts. Consistent use of mks units and of radian frequency is a boon to students, but the text thereby loses touch with nearly universal practice in the technical literature on plasmas.

While the monograph may best serve the researcher as a compendium of plasma wave properties, it will certainly reward the student who turns to it for a survey of the theoretical analysis, practical applications, and useful characterizations of waves in plasmas.

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Single-Nucleon Behavior

The Nuclear Independent Particle Model. The Shell and Optical Models. A. E. S. GREEN, T. SAWADA, and D. S. SAXON. Academic Press, New York, 1968. xiv + 370 pp., illus. $16.

The "nuclear independent particle model" means different things to different people. To the theoretical spectroscopist it implies a space of many-particle wave functions, essentially uncorrelated except for exclusion principle effects, in which he can hope to simulate the effects of various physical operations. Such a space can have a great deal of structure, and with it one can attempt to handle a great quantity and a great variety of nuclear data. The understanding derived in this way has been somewhat superficial, not only in the literal sense that it mostly involves the "valence" nucleons but in the other sense as well. Those who have wanted a more fundamental understanding, without the usual model assumptions, have restricted themselves to gross features and have considered *nuclear matter* rather than finite nuclei.

The viewpoint of the present book is different from either of these. The book is concerned with gross features of *nuclei,* as revealed by their single-nucleon behavior, dealing then with such quantities as single-nucleon separation energies and optical potentials for nucleon scattering by nuclei. It is not then concerned with derivations of these quantities from the basic nucleon-nucleon interaction, though the last chapter does give a compact and readable account of the foundations of the shell and optical models. That chapter comes too late and doesn't really make contact with the six chapters that come before and that really form the essentials of the book.

These chapters are given over to a treatment of one-body potentials for bound states and scattering states. There is a fair amount of detail about the nuclear energy surface, and a great deal about optical model scattering