transitions of the "second kind." On page 159 there is an unqualified statement that a neutral atmosphere does not influence the vapor pressure. It is true that the effect is very small, but it is definite and may be deduced by thermodynamic methods, as in Lewis and Randall, page 183, first edition, for example. The treatment of work function and potential differences in the chapter on the electron and ion clouds I think is very confusing and in need of radical clarification. On page 267 it is made to appear that the potential used in the analysis is the classical electrostatic potential; in a footnote on page 274 it is explained that it is not the classical potential, but is derived from the force on the electron *under the actual conditions* (that is, it includes the image force) and then on page 275 the Volta contact potential difference is found by subtracting two of these, whereas the Volta difference by definition is the difference of the classical potentials. Later, on page 367, the same confusion leads to a completely unjustified relation between Volta difference and Peltier heat.

One can excuse these various defects, some of them copied from the literature, in view of the fact that the author has put into the book a number of results of his own independent investigations. His little investigation of the historical background of the first law and why it was first formulated by men outside physics will be found illuminating. There is a chapter on the le Chatelier principle which is much more carefully done than usual, and recognizes that really two different principles are involved. There is a final chapter on the limitations of thermodynamics reproduced from the author's contribution to the "Commentary on the Writings of Gibbs" recently issued by the Yale University Press. All in all, a most useful career may be anticipated for this book.

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HIGHER ALGEBRA

Modern Higher Algebra. By ADRIAN ALBERT. Chicago University Press, xiv + 319 pages, $4.00.

THE title of Professor Albert's "Modern Higher Algebra" is very apt. The book is "modern" in its organization of algebraic theory around such central abstract concepts as those of a group, a ring, an integral domain and a field. This organization was perhaps inspired by van der Waerden's now classic "Moderne Algebra," but has never before been done in an English or American text.

The book is also a "higher algebra," in that it deals with such relatively advanced topics as the classification of fields and matrices, the abstract extension of fields by adjunction of roots of polynomial equations, Galois theory, Galois fields and valued fields ("bewertete Korper"). The study of matrices goes beyond anything in van der Waerden, but ideal theory is not studied.

The exposition of these subjects is extremely clear in detail throughout. On the other hand, the abstract point of view will not easily be assimilated by the average college undergraduate, who will also be hampered by the absence of any treatment of such "elementary" things as complex numbers and determinants. The dabbler, too, will find it hard to detach morsels of intellectual nourishment from a complex and highly coherent mass of ratiocination.

But the serious student of mathematics will find Professor Albert's book stimulating and packed with ideas. It is in a class quite apart from the mediocre and nearly identical "college algebras" which American commercial publishers seem to prefer. The University of Chicago is to be congratulated for publishing an indispensable book, which every specialist in algebra should own.

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SPECIAL ARTICLES

DEVELOPMENT UNDER STERILE CONDITIONS OF THE SHEEP STOMACH WORM HAEMONCHUS CONTORTUS (NEMATODA)

IN a paper now in press we report the cultivation of bacteria-free larvae of *H. contortus,* in a suitable medium, up to the infective stage, *i.e.,* through the two larval free-living stages. The larvae obtained from such cultures differed from those grown under natural conditions in that they were slightly smaller, although the size ranges overlapped. These *Haemonchus* larvae produced in a susceptible lamb normal adult forms.

We wish here to report progress in the cultivation of the parasitic stages. At first we used for the inoculum the bacteria-free larvae from the cultures of the free-living stages. It was, however, difficult to secure enough larvae from the initial medium and we therefore used larvae that had reached the end of their free-living stage in sheep feces. These larvae were isolated in a Baermann funnel.

Since bacterial sterility appears to be an absolute requirement for further progress, the infective larvae were washed by sedimentation many times in sterile water in long glass tubes. To expedite the sterilization and also to unsheath the infective filariform larvae, Labarraque's solution, diluted one to twenty parts with distilled water, was also used. Unsheathing takes only about fifteen minutes, but the entire procedure includ-