5669

The Invariants of the Electrocardiogram.*

ERNEST BLOOMFIELD ZEISLER. (Introduced by Louis N. Katz.)

From the Heart Station, Michael Reese Hospital, Chicago.

By recording electrocardiograms with many different leads it is possible to find those characteristics which are common to all the curves, that is, which are independent of the particular lead employed. Such characteristics are called the *Invariants* of the electrocardiogram and correspond to the essential properties of the electrical changes created during the heart action. It is found that these invariants are (1) recurring cycles of 3 complexes each, and (2) the time-intervals between the complexes and of the span of the individual complexes.

5670

Electrocardiographic Studies in Subtotal Atelectasis and Pneumectomy in Dogs.

WAYNE GORDON AND W. E. ADAMS. (Introduced by E. Andrews.)

From the Departments of Medicine and Surgery, University of Chicago.

Changes in the shape of the complexes of the electrocardiogram have been observed in pathologic intrathoracic conditions not primarily cardiac. These conditions include pericarditis,[1] pericardial effusion without demonstrable inflammation,[2] and lobar pneumonia.[3] Bettman and Priest[4] described the electrocardiograms of patients before and after chest operations, including in their series 7 patients on whom extrapleural thoracoplasty was performed. One of the 7 developed the so-called "coronary type" T-wave and 3 others diminution in the amplitude of the QRS complex. These findings suggested a study of the electrocardiograms of dogs following the production of atelectasis or the removal of one or more lobes of

* Aided by the Emil and Fanny Wedeles Fund of the Michael Reese Hospital for the Study of Diseases of the Heart and Circulation.

1 Porte, Daniel, and Pardee, H. E. B., *Am. Heart J.*, 1929, **4**, 584.

2 Scott, R. W., Feil, H. S., and Katz, L. N., *Am. Heart J.*, 1929, **5**, 68.

3 Shearer, M. G., *Am. Heart J.*, 1930, **5**, 801.

4 Bettman, R. B., and Priest, W. S., *Am. Heart J.*, 1930, **5**, 366.