

Use of an Electric Drill-operated Trepine in Preparing Turtles for Heart Beat Studies

JAY A. SMITH

*Department of Physiology and Pharmacology,
The Chicago Medical School, 710 S. Wolcott Avenue, Chicago*

The turtle heart is excellent for many studies of the heart and its beat, both for teaching and research, because it has a strong beat, is relatively insensitive to manipulations, will beat for hours under average laboratory conditions, and requires only amphibian Ringer's solution as perfusate or as a washing solution.

The heart can be exposed only with some difficulty, since the tough shell must be cut or a portion removed. Formerly we cut the plastron from the carapace with a hack saw; this usually caused considerable hemorrhage, with resulting deterioration of the specimen.

We now use a trephine powered by a small electric hand drill. Our trephine cuts a hole $1\frac{3}{4}$ inch in diameter, but any trephine cutting a hole $1\frac{1}{2}$ –2 inches in diameter will serve excellently. The handle of the trephine is removed, and the shaft is turned or ground down to a diameter of $\frac{1}{4}$ inch to fit into the chuck of the drill. The center spike of the trephine is adjusted so that it protrudes $\frac{1}{2}$ inch.

In use, the turtle is pithed and then held, back down, on a solid table. The spike of the trephine is placed a trifle cephalad to the center of the plastron. The drill is started, and run until the disc is cut from the plastron (Fig. 1). In a good preparation, the underlying muscles are not damaged in the slightest. The disc may then be pulled from the muscles, leaving a hemorrhage-free area overlying the heart which can be seen through

the tissues, beating serenely. The dissection is completed by cutting through the muscles, avoiding large blood vessels. The heart may be used *in situ* or excised for perfusion experiments.

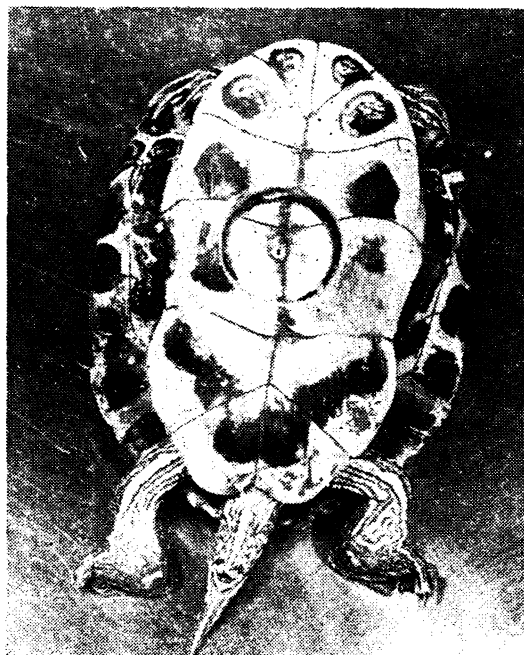


FIG. 1

This simple technic of cutting through the plastron with a trephine speeds the preparation of turtles for routine class use and prevents hemorrhage, insuring an excellent preparation.

Book Reviews

Sexual behavior in the human male. Alfred C. Kinsey, Wardell B. Pomeroy, and Clyde E. Martin. Philadelphia-London: W. B. Saunders, 1948. Pp. xv + 787. (Illustrated.) \$6.50.

It is indeed a peculiarity in our human society to consider appropriate and in good taste the investigation of any structure, function, or behavior characterizing man, as a means of understanding our species, with the exception of well-directed studies on problems in sex and reproduction. However, the great advances in this field within the last 30 years have done much to provide a good foundation for further sound advances, and constructive fundamental researches on the multiple problems of sexuality are much needed.

The endorsement and support of this large research project, of which this volume is a partial report, by the Committee on Research in Problems of Sex of the National Research Council during the past 6 years; the excellent support rendered by the University of Indiana both in personnel and working facilities; the financial support and encouragement of the Rockefeller

Foundation; and the preface by Dr. Alan Gregg, director of the Division of Medical Sciences of the Rockefeller Foundation, collectively assure the propriety, the merit, and the scientific soundness of the investigation. Whereas the facts revealed will shock many sensitive individuals who, like the majority, believe they know the pertinent facts of human sexual behavior because of their acquaintance with their own pattern which they consider 'normal,' the present volume will unfold an unbelievable variation among the members of the human population that must, of necessity, be comprehended before any degree of intelligence can be exercised by such counseling agencies as physicians, social workers, prison executives, institutional counseling personnel, or military authorities.

Representing some of the results from a study begun approximately 9 years ago by Prof. A. C. Kinsey, who is schooled in sampling techniques from his earlier investigations on variation among insect populations, this volume is the first in a series of 9 projected volumes in the investigation, which is scheduled for measurable completion within a period of 20

years. Dr. Kinsey has had the able cooperation of the two specially trained co-authors, who have developed the requisite technique and skill required to obtain the basic data, and also of an excellent staff of assistants; the statistical computations employed in the presentation of the materials have been enormous.

The research "is a fact-finding survey in which an attempt is being made to discover what people do sexually and what factors account for differences in sexual behavior among individuals, and among various segments of the population." It was approached in a commendable and necessary attitude of absolute unconcern with, or lack of any preconception of, what is rare or common, what is normal or abnormal, or what is morally or socially significant. The aim has been to accumulate facts and to attempt to understand the principal factors involved in a motivation of the different behaviors. The accumulated data are magnificently documented in 173 graphic illustrations and 151 tables, followed by a final chapter containing 48 pages of clinical tables with explanations for their use, and an appendix of 27 pages of tables and computations on sample size; a bibliography of more than 600 titles is included. To suggest but a very small number of the topics among those discussed, one finds data relating to early sexual growth, total sexual outlet, premarital, marital and extramarital intercourse, masturbation, nocturnal emissions, homosexuality, and the relations of age, social level, religious backgrounds, and other factors to the various facets of the general problem.

The procedures involved in the investigation are carried out by direct questions in a personal interview during which the sexual history is recorded in an essentially unbreakable code form; no written questionnaire has been employed. The strictest confidence has been maintained invariably, and the successful rapport established between interviewer and subject is nothing short of phenomenal, eliciting information which would in many instances be measurably condemnatory of the individual. The 12,000 histories already in hand come from every state in the Union, from individuals representing an age range of 5-90 years, and from all social levels—inmates of penal institutions, the underworld in general, laborers, clerks, farmers, business executives, grade schools, high schools, colleges and universities, and such professional levels as lawyers, physicians, clergymen, college professors, psychiatrists, and others. Adequate samples of histories from all social levels and geographical areas are included and will be further sought among the 100,000 histories estimated to be required to complete a final adequate assay of the total population. The present volume is based upon approximately 5,300 histories of white males. Succeeding volumes will include behavior studies in the human female comparable to the present volume on the male, sex factors in marital adjustment, legal aspects of the sexual problem, heterosexual-homosexual balance, and others.

A review of a book frequently carries criticisms of its shortcomings perhaps relative to an ideal. However, one is so thoroughly impressed with the courage demonstrated in the pursuit of this most difficult problem, with the extensiveness of the materials, with the adequate statistical treatments, with the openmindedness with which the entire project has been carried on, with the consummate artistry required to gain the basic information, and with the tenacity exhibited in the collection and presentation of the facts revealing such an unappreciated variation in human behavior, that criticism

seems out of place. Some shortcomings and unfilled gaps do exist, but the authors themselves have pointed out many of them. The entire 800 pages are replete with data; what use will be made of these data remains for the acumen of the populace to demonstrate. The facts are now available, and in so effectively presenting them the authors are due the gratitude of all intelligent peoples interested in the advancement of knowledge.

CARL R. MOORE

The University of Chicago

Vector and tensor analysis. Louis Brand. New York: John Wiley; London: Chapman & Hall, 1947. Pp. xvi + 439. \$5.50.

This book develops the algebra and calculus of vectors, motors, dyadics, tensors, and quaternions. There are extensive applications to geometry, including a chapter on the differential geometry of surfaces, to analytical mechanics, and to hydrodynamics. A tensorial treatment of electrodynamics, rotating electric machines, and relativity is reserved for a projected second volume. The range of subjects is so extensive that it is easier to point out a surprising omission, such as the representation of an arbitrary vector field in terms of its divergence and curl, than to detail the contents. The book emphasizes the main ideas rather than details of rigor; the treatment is clear, concise, and formal. A principle merit is the careful interrelation of the five disciplines presented. For example, covariant and contravariant components of vectors are introduced in the first chapter on vectors; base vectors are used throughout the chapter on tensors, and a tensor is defined as an invariant under arbitrary change of base vectors; homogeneous coordinates are introduced in the chapter on vector analysis and employed also in the development of motors; the development of vector analysis from quaternions and the alternate interpretation of three-term quaternions as real plane vectors or complex numbers is explained.

There are numerous excellent illustrations and applications set as problems. The reviewer feels that this book satisfies the needs of a serious student of mathematical physics in the five disciplines included and differential geometry as well.

C. A. TRUESDELL

Naval Ordnance Laboratory, Washington, D. C.

Differential and integral calculus: functions of one variable. Francis D. Murnaghan. Brooklyn, N. Y.: Remsen Press, 1947. Pp. x + 502. (Illustrated.)

This represents an attempt on the part of a front-rank mathematician to present the calculus as the mathematician always dreams it might be taught. The book fully justifies the author's statement that "the method used is radically different from that of the currently popular texts." The ϵ , δ process, nested sequences, the finite covering theorem, all the machinery which one usually associates with courses in advanced calculus, mathematical analysis, functions of a real variable are used throughout to build a genuine theory of the calculus. That the result is pretty formidable is fully realized by the author, who frequently admonishes the student to read hastily over the theory and start working the exercises. Of these there are over 1,200, many with hints for the student, for the author says experience has taught him that calculus can be