SCIENTIFIC BOOKS

INFANT BEHAVIOR

Atlas of Infant Behavior: A Systematic Delineation of the Forms and Early Growth of Human Behavior Patterns. By ARNOLD GESELL. Vol. I—Normative Series, in collaboration with Helen Thompson, and Vol. II—Naturalistic series, in collaboration with Alice V. Keliher, Frances Lillian Ilg and Jessie Jervis Carlson. 921 pages. Yale University Press, New Haven, Conn. 1934. $25.00.

IN these well-planned and extraordinarily well-printed volumes, Arnold Gesell, who for three decades has pioneered in research on the infant and young child, presents thirty-two hundred photographs, enlarged from motion picture frames, delineating the behavior of infants during the first year of life. Those in the first volume, taken in the photographic dome of the Yale Psycho-Clinic under laboratory conditions, show the development of 24 behavior sequences which cover posture, locomotion, perceptual, prehensive and adaptive behavior at 4, 6, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48 and 52 weeks, respectively. For instance, there is a series of photographs showing the behavior of an infant while sitting, another showing stair climbing, another showing behavior in the ring and string situation.

The enlargements in the second volume show the behavior of infants in naturalistic situations—*i.e.*, under a duplication of home conditions, in a special studio room to which both the infant and the mother, who was present, have been habituated. One purpose of the second volume is the portrayal of individual differences in development. The behavior situations and episodes illustrated center about feeding, bathing, posture, social behavior, play and locomotion. Each volume contains a description of the methods of securing and treating the films and of the apparatus, cameras and observation chambers used. Each photograph in a sequence is accompanied by a brief verbal description and is timed—*i.e.*, the time elapsing from the beginning of the particular response is stated.

In the first volume the pictures are arranged by behavior patterns in age sequences; in the second volume by children. Both volumes are loose-leaf with the photographs printed on only one side of the page to facilitate rearrangement for cross comparison in accordance with the reader's interests. Thus all the pictures dealing with the development of eating or bathing habits can be put together. The excellent quality of the enlargements in the first volume is exceeded by those of the second volume—indicating the superiority of 35 mm over 16 mm film.

The approach to the study of infant behavior as presented in the atlas is so new that its evaluation is difficult. There is no doubt of its vivid and striking portrayal of infant behavior and its worth for teaching and demonstration and for directing the attention of scientists, students, parents, artists and other workers to various aspects of infant development. Only the future can determine its scientific value. The statistical data necessary for the interpretation of the normative and naturalistic pictures are not given. Nor is it clear how a particular picture or sequence was selected as normative. On the other hand, taken as a whole, rather than examined critically in detail, the sequences give a graphic and total picture of development that may for some purposes be of more value than the fractionating of behavior into minute parts to which we have become so accustomed.

Gesell states (p. 41) that the atlas is offered as "a systematic collection of specimens of infant behavior patterns," and goes on: "In format, arrangements, and mechanical makeup both volumes are designed to make this collection useful for conducting both analytical and comparative studies. Interpretive comment is withheld and the course of the behavior alone is described." The atlas therefore presents the material from which scientific conclusions may be drawn without itself actually generalizing. This raises an interesting question. Is the description of behavior in verbal terms or with the aid of fine instruments, such as the cinema, any more than the presentation of raw data? A partial answer is found in the fact that the pictures presented in the atlas were selected by one of the outstanding students of infant behavior from millions of cinema frames available in the Yale Psycho-Clinic. In the introduction to the atlas, Gesell mentions another publication, entitled "Infant Behavior: Its Genesis and Growth,"[1] which contains an exposition of the findings of the normative research and which he says may be used as a detailed handbook for the interpretation of the illustrations in the atlas.

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MATHEMATICAL PHYSICS

Principles of Mathematical Physics. By WILLIAM V. HOUSTON. Pp. xi + 265. McGraw-Hill Book Company, Inc., 1934.

THIS book is a text of intermediate grade designed to give the college student specializing in physics a working knowledge of the fundamental methods of mathematical physics, without attempting any elaborate exposition of physical theories. A thorough knowledge of elementary physics on the part of the

[1] Arnold Gesell and Helen Thompson, "Infant Behavior: Its Genesis and Growth." McGraw-Hill. New York, 1934. 343 pages.

student and a familiarity with analytical geometry and calculus is assumed.

Subjects treated include mechanics, thermodynamics, electricity and magnetism, together with a short discussion of the special or restricted theory of relativity. Mechanics is emphasized not only because it furnishes fundamental concepts for all other branches of physics, but also because its development provides examples of a number of important mathematical methods. The treatment of Hamilton's principle and the discussion of Gibbs's statistical mechanics, in particular, although not elaborate, are very satisfactory. On the other hand, more space could well be devoted to thermodynamics, and the same is true to a less extent in connection with the portions of electricity and magnetism dealing with material media.

In addition to the above, chapters are devoted to differential equations, calculus of variations and vector analysis. The treatment of these subjects, although compact, is clear and should be very useful to the student of physics with only the average preparation in mathematics. No attempt is made to develop any of the various subjects in great detail, much being left to the student in the form of problems, of which there are a large number. For those interested in collateral reading an excellent list of references is appended to each chapter.

The most serious defect in the book is the almost entire lack of figures. There are but three altogether, although at many points a figure would undoubtedly be an aid to the student's comprehension of the analysis.

"Principles of Mathematical Physics" should prove satisfactory as a basic text in a lecture course introducing mathematical physics and also should be of value as an auxiliary in more advanced courses, particularly in the field of mechanics, as there are a number of items included here which are often omitted from other texts. The book is not well suited, however, to independent study by the average student, as supplementary physical background should be supplied in many places.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

INTRATRACHEAL INOCULATIONS IN THE RAT[1]

As a preliminary step in the study of lobar pneumonia in the rat, the following method of intratracheal inoculation has been developed.

The anesthetized animal is placed on its back with the head at the edge of the table and held by an assistant, who grasps the tongue with a hemostat. Traction is applied to the tongue so that it is held firmly to the side of the mouth and against the lower teeth. The root of the tongue is raised by spreading the blades of a curved hemostat inserted far back in the pharynx and held by the operator. The field is illuminated by reflected light from a head mirror. Under direct vision a specially devised cannula may then be inserted into the trachea.

The cannula is made of brass tubing 7 cm long, 2.5 mm outside diameter and 1.6 mm inside diameter. The tube is bent upward at an angle of 15°, 0.5 cm from the distal end. The tip is beveled on the upper surface, care being taken to avoid sharp edges. Near the proximal end of the tube a brass rod 5 cm long and 3 mm in diameter is soldered at right angles to serve as a handle.

To enter the trachea, the beveled tip of the cannula is placed just under the epiglottis, which is then raised slightly. The handle of the instrument is depressed and the cannula passed gently into the trachea. When the cannula is in the trachea a drop of soap solution placed over the proximal end will form soap bubbles which break explosively. If the cannula has entered the esophagus bubbles may form but do not break with expiration. This test is important.

In the final step of the procedure a No. 5 French ureteral catheter (1.5 mm in diameter) is passed through the lumen of the cannula and withdrawn 0.5 cm at the first sense of resistance. This serves to free the tip of the catheter. Up to 0.5 cc of material may be injected from an attached syringe.

After an experience of over 300 inoculations made by this method, it is believed that with limited practise one should be able to make successful inoculation in at least 95 per cent. of the trials. Guinea pigs may also be inoculated by this method, although greater difficulty is encountered in passing the cannula into the trachea.

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[1] From the Department of Bacteriology, Northwestern University Medical School, Chicago, Illinois. Aided by a grant from the American Medical Association.

THE PRESERVATION OF CARTILAGE

THIS technique was evolved to obviate certain difficulties in handling the cartilaginous structure of a chimaeroid fish, *Hydrolagus colliei* (Lay and Bennett). In this case the cleaned cranium was dehydrated by ordinary histological methods. After it had been placed in paraffin, the temperature of the