INFANT PSYCHOLOGY.

THE modern psychologist must be a very busy man. We may suppose him to be a college professor, introducing his students into the principles of his science. Besides this, he is the director of a psychophysical laboratory, where he subjects himself and others to tortuous and tedious experiments, almost deserving the name of vivisection. Moreover, he must be intimate with the asylums for the insane and the idiotic, in order to study the mind in its morbid conditions; he must be at home in institutes for the blind and for deaf-mutes, in order to appreciate the *rôle* played by each sense in the sensual and intellectual life; he must talk to the inmates of prisons and poor-houses in order to understand the condition of those in whom the instinct of morality and the power of the will are at a low ebb; he must be active in psychic research and be ready to investigate the claims to unusual mental faculties; and now for what remains of his time, he is called into the nursery.

'Infant psychology' (by which name we must now know this field of study) has for its aim, the tracing of the mental development,—the psychical evolution,—of the infant from birth upward. The literature of the science is as yet small; every single contribution, however, has been made by able hands; and the work of M. Perez[1] is a good type of this new tendency in modern psychology. In his former educational works as well as in his ingenious study of his 'two cats' (Mes deux chats), M. Perez has proved himself possessed of an unusual psychological acumen. We probably owe the appearance of this book in an English dress to Mr. James Sully, who prefaces it with an appropriate introduction; great credit is due to the translator (Alice M. Christie) for her careful and easy rendition.

It would be impossible here to do more than indicate the general lines of interest pursued in the book, and sample its method and wealth of facts.

We may trace as many as five distinct interests which such study furthers:—

1. It interests the pyschologist, as an important chapter in the study of mind, its psychogenesis.

2. It interests the anthropologist, to whom the remarkable analogy between the mental world of the child and that of primitive savages, is rich in suggestiveness. Impulsiveness and irascibility, to give one of a host of examples, are seen almost in the same aspect in savages and children. 3. It interests the alienist who finds, in the degeneration of mental tissue as shown in his insane patients, the same mental peculiarities, but occurring in a reverse order, as in the process of brain building in the child. The earliest memories are the last to fade away: the old man becomes childish. 4. It interests the student of comparative psychology, who notes the strong resemblances between the reasonings of the child and those of the higher animals. They fall into the same kind of errors and exhibit the same kind of peculiar tendencies; witness how often a child is called a 'monkey,' or a 'pussy.' 5. Lastly it interests the educator. The human child spends its first years in a condition of helplessness such as is seen in no other animal. It needs more watchfulness, more care, more education. To give this education, in a rational way, requires the study of the infant's mind, "for the cardinal principle of modern educational theory is, that systematic training should watch the spontaneous movement of the child's mind and adapt its processes to these" (Sully).—All of these will find that none of their points of view has been neglected in this book.

The scope of the work is wide: it covers really everything that can be called psychic in the first three years of life. Indeed the first chapter treats of the 'Faculties of the infant before birth.' From its first cry on entering this world (which Schopenhauer takes as a pessimistic omen), his first movements, sensations, emotions, expression of will power, all are recorded and from them his mental status deduced. Systematic experiments are arranged and spontaneous movements and expressions noticed as well. The last chapters are devoted to the reasoning powers of children, their language, their logic, their æsthetics, their ethics, and, a very interesting point, their dramatic instinct.

Take the sense of taste for example. It is in the sphere of this sense that the child's first pleasure is felt, a few hours after birth, in the appeasing of hunger. At an early period disgust through taste is possible. A child 2½ months old refused its bottle with determination and a face of disgust, because it was not sweetened with sugar. Illusions of taste appear early. The taste of children changes easily, which is a reason for not forcing them to eat things against their inclination. Its most vivid sentiments are for a long time connected with this sense. "Their first affections are those of an epicure; their first feelings of gratitude are awakened by the stomach; they test their first tactile experiences as much as possible by the sense of taste." Everything goes to the mouth. "*Pretty to look at*, and *good to eat*, are synonymous terms to babies." We can see how largely their earliest mental horizon is dominated by the feeling of hunger and the sense of taste.

The emotional life of the child begins early. Fear is one of its first emotions. Darwin has

[1] *The first three years of childhood.* By BERNARD PEREZ. Translated by Alice M. Christie, with an introduction by James Sully. London, *Sonnenschein*, 1885. 294 p.

noticed signs of fear at an unexpected noise or strange face in the first weeks. Between the 3d and the 10th months, fright is caused more often by auditory than by visual impressions. A child of 3½ months showed no sign of fear at a conflagration, though surrounded by flames, until the noise of the fire engine was heard, and then he trembled and cried. Thunder terrifies rather than lightning. This is referred to as hereditary and the result of anterior experiences, which have "rather predisposed the race to listen for dangers which are near at hand, than to be on the lookout for distant ones." The reverse is true of most animals.

Finally as an example of the logical powers of infants, that of generalization will serve. Dogs generalize; they bark at all beggars; yet they distinguish one beggar from another on nearer approach. A child had a tin box into which he used to delight to stuff things; he soon found that other of his toys had the power of holding things; then he tried to find an opening in everything, into a glass stopper because it was transparent; in short, he had acquired a general idea of an opening. Another child had a canary named 'Koko'; when he saw chickens in the yard or ducks in the pond, they were 'Koko' too. While these young children generalize before the acquisition of language, they do not compare. A child was shown a print and stretched out her hands for it; then a colored print was shown; her joy was beyond bounds. In a second experiment both were shown at once; she took them for one picture and threw herself towards both; her attention was not directed to the brighter one. These illustrations are doubtless sufficient to indicate the character of the volume.

The record of one or two infants is naturally unsatisfactory; individual peculiarities are certain to enter. What is wanted is a collation and average of many observations. For England, Darwin and Pollock, for France, Taine and Perez, for Germany, Tiedemann, for Austria, Preyer, for Italy, Ferri, have contributed to this study. May we not soon expect to hear as to the psychology of the American baby? J. JASTROW.

LEGAL OHM STANDARDS.

AFTER the decision of the Paris electrical congress of 1884, that the standard resistance, or legal ohm, should be the resistance of a column of mercury of one square millimetre cross-section, and 106 cms. in length, at zero centigrade, it became necessary to construct standards that should represent this resistance. In France this task was intrusted by the minister of posts and telegraphs to M. J. R. Benoît; and in England Mr. R. T. Glazebrook, at the request of the electrical standards committee of the British association, undertook the same work.

M. Benoît attacked the question *ab initio*. From a large number of glass tubes, of about 120 cms. length, and 1 mm. diameter of bore, the four that had the most uniform bores were selected. These tubes were laboriously calibrated to determine the cross-section at every point, and each was then cut off so that the resistance of the column of mercury filling the tube should be as nearly as possible the same as that of the column defined as the standard. The points where the tubes were cut off were determined from the calibration. The resistance of each tube was then calculated from its dimensions, with the following results: —

Tube 1 = 0.999999 legal ohms.
2 = 1.000004 ,, ,,
3 = 0.999979 ,, ,,
4 = 0.999994 ,, ,,

The tubes were then cleaned by passing through them successively strong nitric acid, ammonia, and distilled water; then filled with pure mercury, and their resistances compared by balancing them against each other in a Wheatstone's bridge. This comparison showed, that, if the mean of the calculated resistances be the mean of the true resistances, the resistances of the several tubes are as follows: —

Tube 1 = 1.000018 legal ohms.
2 = 0.999996 ,, ,,
3 = 0.999959 ,, ,,
4 = 1.000003 ,, ,,

Accepting these as the true resistances, M. Benoît made a number of secondary standards, of glass tubes doubled upon themselves and bent into compact forms, and with cups at each end for making contact. The resistances of these tubes, when cleaned and filled to certain marks on the cups with pure mercury, were determined by comparison with the primary standards mentioned above.

Mr. Glazebrook considered it unnecessary, for the construction of the required standards, to go through the laborious process adopted by M. Benoît, for the specific resistance of mercury had been determined in terms of the British association standards, in several elaborate investigations by Lord Rayleigh, Mascart, Strecker, and others, and so based his standards on the value of the resistance of mercury adopted by the British association committee; viz., a column of mercury at zero centigrade, one metre long, and one square mm. cross-section, has a resistance of .9540 B. A. units.

Mr. Glazebrook has made a careful comparison of his legal ohm standards with those made by Benoît, and finds that there is a difference of .0005 ohms between them, the Benoît standards being less by that amount.