SCIENCE.—SUPPLEMENT.

FRIDAY, DECEMBER 17, 1886.

THE PSYCHOLOGY OF SPIRITUALISM.

THE history of thought, says Dr. Bastian, has a double aspect. Its main object is to record the advance steps in the progress of civilization, to trace the normal, psychological growth of racial culture, and set forth the evolution of rationality. But it is hardly less instructive to regard the shadowy side of the picture, and study the mental movements of that ever-present and vast portion of mankind who by occult and mystic proceedings attempt to short-circuit the roads to knowledge and immortality. Weird notions and strange theories find a ready home in the disordered brains of such semi-morbid fanatics; and, when once they gain hold on the popular imagination and belief, such inhuman pages of history as those that record the horrors of witchcraft, the follies of alchemists and searchers for the philosopher's stone or the fountain of eternal youth, the wide-spread misery of mental epidemics or the bestial self-tortures of crazed ascetics, must be written. These deviations from the normal lines of progress — back-slidings, as the Hebrew prophets termed them — present close analogies in the mind of the evolutionist to atavistic reversions in some ways, and to useless rudimentary organs in others. They appear as reversions to more primitive modes of thought in the light of what anthropology has told us of the psychic life of savage tribes.

Hardly a page in the story of the vagaries that have turned aside the minds of our ancestors from the straight path of knowledge but can find its parallel in the fancies built up by untutored savages to satisfy their dearest longings and quiet their most constant fears. In brief, it is in the statistics of thought that our author finds the material for the complete study of intellectual evolution, and quite as much of those modes of thought that are reversions or survivals as of those that are in the direct line of advance. Modern science has decided to accept as its logic that system of principles most conveniently described as Baconian; but this process seems slow and insipid to those who have the final goal of all revealed to their ecstatic insight, and the logic on which they stake their faith is such as can only be fully appreciated when the eyes are calmed in dimly lit chambers, the brain flushed with excitement, and the judgment unsettled by intense expectancy.

Spiritualism, theosophic lore, occult science, and all the mysteries that follow in their train, are simply the expression which this atavistic tendency of human thought has taken in our scientific century. When introspection, meditation, revelation, or dogma were the current modes of discovering truth, the occultists, mystics, and the rest claimed them as the foundations of their creed. To-day we experiment, observe with the senses, photograph, and so on; accordingly the 'vital influence' and 'telepathic impact' has been forced to leave its record in childish scribblings; our ghosts have been weighed and smelled and photographed; yes, even the methods of scientific psychology (reaction-times) have been employed to discover the most beneficial kind of 'smell-pills' and the clothing in which our soul can most conveniently disport itself. The Hipp chronoscope is pictured on the frontispiece of Jäger's 'Entdeckung der seele.' Every insane-asylum is a microcosmus of the world without. Formerly our paranoics heard voices in the air: now they hear them through the telephone. So, too, this morbid pseudo-scientific spirit apes the manners of the true goddess, and by such disguises sues the favor of the world.

It is in some such strain as this that Dr. Bastian as an anthropologist not alone familiar with the culture-history in which we form a link, but thoroughly at home in the mind-habits of 'natural' savage tribes not uncivilized but with a peculiar civilization of their own, calls up the procession of modern spiritualists, theosophists, and their like, and sits in judgment upon them. He shows them how they are simply repeating, with new costumes and improved scenic effects, the tragic comedy of former times, and falling back upon the play-tricks of the childish savages whom they profess to despise.

It would be a vain attempt to fill out, however roughly, this sketch of Dr. Bastian's point of view. For that, the reader must (though not without misgivings on the part of the reviewer) be referred to the original. The author is no stylist. There is no attempt at any classification or subdivision; no index; a preface that reads like part of the text; no chapters, simply 216 pages of tersely written paragraphs. Add to this, constant quotations from seven or eight languages (in one passage five languages occur in four lines) and a

In sachen des spiritismus und einer naturwissenschaftlichen psychologie. VON A. BASTIAN. Berlin, *Stricker*, 1886. 12°.

most puzzling and frequent use (one parenthesis to every two and a half lines) of the parenthesis, and some slight notion of the extreme Teutonic character of this valuable pamphlet will be obtained. JOSEPH JASTROW.

THE VENOMS OF POISONOUS SERPENTS.

THE experimental work which forms the basis for this valuable contribution to science was carried on in the physiological laboratory of the University of Pennsylvania. The reputation of its authors is such as to make it a standard work of reference. It brings our knowledge of the composition and effects of the venoms of serpents up to the present time, and we surmise that many years will elapse before the results recorded will be modified to any great degree. The subject is one, which, while it is full of interest to the reader, must nevertheless have been one involving no inconsiderable danger to the experimenters. To have handled two hundred living venomous serpents, one of them eight and a half feet long, weighing nineteen pounds, and furnishing one and a half drams of venom, cannot have been a very delightful task; and those who were willing to undertake it must have been enthusiastic investigators, as indeed we know they were. The serpents upon which the experiments were performed included rattlesnakes (Crotalus adamantus and C. durissus), moccasons (Ancistrodon piscivorus), ground rattlesnakes, copperheads, and coral-snakes. The venom of the cobra was obtained from India, while all efforts to obtain the poison of the Indian viper (Dabsia Russellii) were unsuccessful. The authors started with the theory, long held by Dr. Mitchell, that snake-venoms are not simple in composition, but are composed of two or more poisonous substances, and that in the qualities and quantities of these agents would be found an explanation of the differences between serpent-venoms as to power to kill and mode of causing death. All fresh serpent-venoms are more or less alike in appearance, being fluids varying from the palest amber tint to a deep yellow. When a drop of the fresh venom of the C. adamanteus was examined under the microscope with a $\frac{1}{12}$ Zeiss. homog. immersion lens (amplification, 800 diameters), in addition to oval nucleated red blood-corpuscles, leucocytes, and club-shaped epithelial cells, certain colorless particles are seen, some larger and of an albuminous character, others smaller. Some of these particles resemble bacteria, but are not: they do not multiply in cultures nor stain with the aniline dyes. In addition to these, there are, however, bacteria in fresh venom of a micrococcus form. Although careful search was made for ptomaines, none were found. An insoluble precipitate was obtained, which does not seem to have been recognized, and, when injected into pigeons, produced no toxic effect. Certain globulins were also obtained from the venom, to which the writers have affixed the names of water-venom-globulin, copper-venom-globulin, and dialysis-venom-globulin, from the method by which they were obtained. In addition to the globulins, peptones were also obtained. The differences in the proportions of the various globulins and peptones in different venoms are of immense importance in affording an explanation of the physiological peculiarities exhibited in poisoning by different species of snakes. The proportion of globulins in Crotalus is over three times the quantity in the Ancistrodon, and nearly fifteen times that in the cobra. The investigation, which has continued over a period of several years, included a study of the effects of various agents on venom, the effects of venom when applied to mucous and serous surfaces, their effects on the nervous system, and a comparison of globulins and peptones as regards their local poisonous activity. The action of venoms and their isolated globulins and peptones upon the pulse-rate, upon arterial pressure, and upon respiration, was thoroughly examined. Elaborate experiments were made with filtered venom, and with cultures for the study of the morphology of the bacteria contained in the venom. The anatomical changes produced in the animals experimented upon were carefully studied and recorded. The conclusions to which the authors arrive, as the result of their patient and laborious investigation, are, 1°, that venoms bear in some respects a strong resemblance to the saliva of other vertebrates; 2°, that the active principles of venom are contained in its liquid parts only; 3°, that venoms may be dried and preserved indefinitely with but little impairment of their toxicity; 4°, that there probably exist in all venoms representatives of two classes of proteids, globulins and peptones, which constitute their toxic elements; 5°, that potassic permanganate, ferric chloride in the form of the liquor or tincture, and tincture of iodine, seem to be the most active and promising of the generally available local antidotes. The fact that the active principles of venoms are proteids, and closely related chemically to elements normally existing in the blood, renders almost hopeless the search for a chemical antidote which can prove available after the poison has reached the circulation, since it is obvious that we cannot expect to discover any substance, which, when placed in the blood,

Researches upon the venoms of poisonous serpents. By S. WEIR MITCHELL and E. T. REICHERT. Washington, *Smithsonian inst.*, 1886.