on the subject from the Royal Society of Edinburgh. This was in February, 1877. No special reason was assigned, but the terms of the letter indicate clearly that Sir Wyville dreaded some injury to the scientific reputation of the body of naturalists of whom he was the chief, and for whom, as connected with the 'Challenger' expedition, he was in some degree responsible. He had not himself at that time, I believe, fully accepted the new doctrine. But that would have been no sufficient reason for discouraging free discussion, if it were indeed as free as it ought to be. In my article I understated the delay which was thus occasioned. Three years, not two, elapsed before Mr. Murray was at perfect liberty to advocate his views in the proper place, before a scientific body.

But the challenge of Professor Huxley has brought to my knowledge a new bit of circumstantial evidence to the same effect, which is highly significant. Among the investigators of the Pacific corals, no man has done better work than Dr. Guppy, surgeon of H.M.S. 'Lark.' Since my article was written, his volumes on the Solomon Group of islands have been published. The geological volume is an admirable memoir. It is the record of observations as patient, detailed, and conscientious as have ever been made on the great geological problem which is at issue. After his return home, he was advised by Mr. Murray to offer a paper on his researches to the Geological Society of London. He did so in the spring of 1885. But his paper was refused, much to Dr. Guppy's disappointment. It was not orthodox. His facts effectually removed some difficulties in the way of Mr. Murray's theory, — facts which in more than a corresponding degree were adverse to the theory of Darwin. As a consequence the Royal Society of Edinburgh has had the honor of receiving and publishing Dr. Guppy's most interesting memoir. As a Scotchman, I am proud of this contrast. I make no accusation of wilful unfairness against the authorities of the Geological Society of London, of which my critic Professor Bonney was, I believe, at that time the president. They did not consciously discourage truth. On the contrary, they probably smelt heresy. But if their minds had been free from this prepossession, — if they had been alive to the breadth and sweep of the questions at issue, and open to receive with welcome the crucial evidence bearing upon them which is contained in Dr. Guppy's paper, — the rejection of it would have been impossible.

As regards Darwin's own state of mind upon the subject, I can only say that my information was as good as that in the possession of Professor Huxley. I am not struck by the perfect candor of his reference to Darwin's letter to Professor Semper in October, 1879. If he had quoted the very next sentence to that which he does quote, a very different impression would have been left on the reader's mind. But I attach no importance to this point. I prefer to believe that Darwin's mind was open to conviction, and to hope that others will follow his example. ARGYLL.

THE AMERICAN PUBLIC HEALTH ASSOCIATION.[1]

DR. CARL HORSCH of Dover, N.H., read a paper entitled 'The Necessity of Burial-Permits and Inspection of Bodies of Deceased Persons.' He based this necessity on the following grounds. (1) It is the best safeguard against the possibility of premature burial, and also that the apparently dead may not be placed in cold rooms or on ice, and frozen to death. (2) Cases of concealed contagious and infectious diseases will be detected, and an epidemic may be averted. (3) Murder and suicide may be detected; and if cremation, the surest method for the destruction of disease-germs, is generally established, there will be also less danger that the body of a murdered person will be cremated, and the crime concealed. (4) Life-insurance frauds may be prevented. (5) Where the fear exists of being buried alive, the family physician can overcome that fear by that examination, and his assurance that the loved one is dead. (6) In order to sign a certificate for a burial-permit legally, that inspection gives the most important evidence. If a physician gives his signature to such a certificate without seeing the body, he may be brought in the following unpleasant position: he is called into court, the certificate is laid before him, the questions asked, "Did you sign that certificate?" Answer, "Yes." "Did you know that the person was dead?" The only answer could be, "The undertaker or somebody informed me." Then the culprit is brought before him, and the fact revealed that he indirectly aided a criminal.

Dr. Rohé, secretary of the committee on disinfectants, presented the report of that committee. The following conclusions were drawn from their work: —

1. The temperature required to destroy the vitality of pathogenic organisms varies with the different organisms.

2. In the absence of spores the limits of variation are about 10° C. (18° F.)

3. A temperature of 56° C. (132.8° F.) is fatal to the bacillus of anthrax, the bacillus of typhoid-fever, the bacillus of glanders, the spirillum of Asiatic cholera, the erysipelas coccus, the virus of vaccinia, of rinderpest, of sheep-pox, and probably of several other infectious diseases.

4. A temperature of 62° C. (143.6° F.) is fatal to all of the pathogenic and non-pathogenic organisms tested, in the absence of spores (with the single exception of *sarcina lutea*, which in one experiment grew after exposure to this temperature).

5. A temperature of 100° C. (212° F.), maintained for five minutes, destroys the spores of all pathogenic organisms which have been tested.

6. It is probable that some of the bacilli which are destroyed by a temperature of 60° C. form endogenous spores, which are also destroyed at this temperature.

Dr. John S. Billings, U.S.A., read a paper on some forms of tables of vital statistics, with special reference to the needs of the health-officer.

A resolution was adopted to appoint a committee, with Dr. Sternberg as its chairman, to study experimentally the methods and effects of protective inoculation against infectious diseases.

Dr. Horsch presented a paper entitled 'Inspection of Animals required for Food,' in which he recommended the inspection of animals by competent persons before they are slaughtered, and a thorough examination of their viscera afterwards.

Dr. Azel Ames, jun., of Chicago presented a paper on the meat-food supply of the nation, and its future. In it he gave statistics of the resources of the country with reference to its animal food, and showed, that, as the population increased and the grazing country diminished, these resources were proportionately declining. He criticised adversely the policy of the general government in dealing with the public lands. Legislation was asked of Congress for the suppression of pleuro-pneumonia, and for the taking of a thorough census of the cattle of the country and their products. Dr. Ames denounced the tax imposed by the oleomargarine act as being unjust to the poor, and wrong in principle, and demanded its repeal.

A paper by Dr. J. H. Rauch, secretary of the State Board of Health of Illinois, dealing with the subject of cholera and quarantine, excited great interest. Dr. Rauch described the defects of the quarantine at the port of New York, and said that in the West its results were looked upon with distrust. He asked that the entire quarantine system of the United States should be placed under national control. In the discussion which followed, Dr. A. N. Bell criticised most severely the arrangements of the New York quarantine, but expressed the opinion that the measures which had been applied by the health-officer in the management of the passengers of the steamers 'Alesia' and 'Britannia' had been successful.

The paper of Dr. Dickinson was discussed by a number of the members of the society. Dr. Eliza M. Mosher remarked that the point of greatest interest in connection with the subject was whether the loose corset injured the health of the wearer, and, if so, what could be offered as a substitute. Most girls, according to her experience, wore them sufficiently tight to limit respiratory movements. It was difficult to measure the injury done, since the chest was already crippled, and its expansion was below its possibilities. In addition to the thinning of the abdominal wall described by Dr. Dickinson, there was atrophy of the entire surface covered by the corset, with lack of development of muscular tissues due to restricted movement. This was apparent by the often-repeated remark of ladies that they could not sit up straight without their corsets. It was often observed how useless were the arms of most young ladies for any manual labor, even though their lower extremities were capable of long-continued muscular movement. A well-developed nipple was almost an unknown thing with a woman or girl who had worn

[1] Continued from *Science* of Nov. 25.

a corset for any length of time. The respiratory murmur below the fifth rib was very faint compared with the sounds above, and these ladies found it impossible, as a rule, to move the strength 'spirometer' the fraction of a degree. From these facts, she concluded that the capacity of the chest had become limited, and the muscular fibre of the diaphragm impaired, by the unyielding walls of the corset-prison. Not very great compression upon the line of attachment of the diaphragm was required to interfere with its contractile power. Loss of strength in the abdominal muscles and diaphragm prepared the way for a slow and painful, if not instrumental, labor. Loss of respiratory capacity implied increase in rapidity of the heart's movements: this meant weakening of its force, and thus came the cold extremities and easily chilled skin so common in those who wore corsets. She had not been able to demonstrate the displacement of the liver spoken of, because doubtless the examinations were made with the corset off. With a large experience in treating girls suffering from displacements of the uterus (mainly retroversion and downward crowding), little could be done to relieve the sufferers until the corset was laid aside. Active muscular movements and corsets were not compatible, and unless the corset and its equivalent, tight clothing, were discarded, she was not sure but girls were better off without active physical exercise. What could we substitute for the corset, which, without producing pressure or displacement, would give the trim and tidy look so much admired by the sterner sex? A good dressmaker had more to do with this matter than the corset had. An underwaist without bones, with skirts snugly fastened to it; a dress-waist well shaped, containing a few bones, and loose enough to permit a long breath without limitation, — would make nine girls out of ten look just as trim and tidy as a corseted waist. If something more supporting was demanded, the 'Ferris waist' was all that was required. Without steels in front, and without bones, if worn loosely with the skirts attached, it might be accounted healthful. Dr. R. G. Eccles spoke of the comfort women derived from the corset. He had noticed that the more intelligent the women, the more they were corset-wearers. Dr. Jerome Walker spoke of the evils of corset-wearing, among which he mentioned the shallow breathing as particularly objectionable. Dr. William Anderson thought if we educated the women to despise the corset, it would disappear. The president remarked that we did not use our chests to their full capacity except when making unusual exertion. A woman under ordinary circumstances had her breathing but little restricted. If the servant laced herself in her ordinary working costume as she did on Sunday, she would suffer severely.

MENTAL SCIENCE.

The Mechanism of Attention.

M. TH. RIBOT, whose useful compilations on English and German psychological movements, on heredity, on the diseases of memory, of will, and of personality, have gained for him a world-wide reputation, contributes to the *Revue Philosophique* (of which he is the editor) an interesting and convenient account of the mechanism of the processes of attention.

Attention is not so simple a phenomenon as popular analysis makes it. It is not always one and the same state, but varies indefinitely in intensity, from the momentary attention necessary to brush off a fly, to the most complete absorption. This intensity is gained either by the accumulative results of a long-continued strain, or by an intense focusing of all energies to one group of sensations. Regarding attention thus as a state varying in degree, we are ready to make a distinction on which M. Ribot lays much stress; namely, between spontaneous and voluntary attention. Our notion of attention is derived almost exclusively from the latter. Attention we regard as a purposive effort. But this is really not the typical nor the most important aspect of attention. The former has been much neglected, and to it M. Ribot devotes his first article. The distinction between the two forms of attention is easily made clear. The first is a natural impulse to let such things make an impression upon us as excite our interest. The second is an artificial product of civilization, that we have learned at school. To look at flowers and be impressed by them is a result of spontaneous attention; to dissect and minutely analyze their parts, of voluntary attention. The main characteristic of attention, and especially of its typical, natural form, now under discussion, is its motor aspect. As Maudsley puts it, whoever is incapable of controlling his muscles is incapable of controlling his attention. All attention, however, is, in a sense, an abnormal, exceptional state. Such states cannot last long, because they are opposed to the ever-present change that is the law of life. We see this abnormality when attention is carried to the extreme, producing clouding of the mind, a mental void, or vertigo. Their analogy with fixed ideas and states of ecstasy is also close. The normal process of 'cerebrising' consists of an ever-changing focusing on one set of impressions, then a diffusion of these to give place to another group, and so on in an ever-successive lighting and skipping; the laws of association governing the order and connection of the several foci. Normal thought is thus a 'poly-ideism,' while attention is a 'mono-ideism.' It is a focus concentrating into itself all the available energies; it is the substitution of unity for diversity. Attention is further characterized by being directed towards an end: it is not a subjective process, but is adaptive, convergent. If a definition be desirable, we might define attention as "an intellectual mono-ideism with spontaneous or artificial adaptation of the individual."

Spontaneous attention is well seen in children and in the higher animals. Its cause is universally an *emotional* state. It is only the sensation-exciting, the interesting, the agreeable or disagreeable, that is naturally attended to. An animal incapable of feeling pleasure and pain would by that fact be incapable of attention. This general fact is exemplified in the biographies of great men, showing in some cases how the hero of the tale is for a long while restless, listless, until he falls upon the occupation that interests him, enthuses him, and brings out his genius by focusing his attention to a single line of thought. This passion for work has its analogue in other less desirable passions. The drunkard's attention is critically intense in the presence of the glass. But these intense states cannot endure long, and they only last as long as they do because a small amount of flitting really goes on, continuous as the state seems to us.

The physical conditions and accompaniments of attention are of great importance. The general law under which they are to be considered is that there is no thought without a tendency to its expression in motor terms. Thought is initial action. The motor expressions of attention are visible in three directions, — the vaso-motor phenomena, the respiratory phenomena, and the expressional phenomena. The first is recognized in the increase of blood in certain parts of the brain under mental work, as ascertained by direct experiments of Mosso and others. The slightest mental strain produces this result. The second is characteristic of the attitude of attention. The breath is slowed or held; sighs occur; and all this suggests the abnormality of the process. The third kind of movements are psychologically the most interesting; and many theories, notably that of Darwin, have been proposed to explain their origin. Duchenne experimented by applying electrical stimuli to muscles of etherized patients, and noting the facial expression thus aroused. He regarded the contraction of a single muscle as characteristic of one emotion. The frontal muscle furrowing the forehead is the muscle of attention; the orbiculars contracting the orbital space and lowering the eyelid of reflection, and so on. The motor expressions will be different according as the attention is directed inwards (reflection, contemplation) or outwards, as is usually the case. The motor expressions of the two are opposed: in the one the forehead is lowered, in the other the eyelid is lowered, the mouth closed as in effort, and so on. Darwin calls the attitude of reflection that of difficult vision turned inwards. The general attitude of attention is immobility, a tendency to unity of action, to convergence. It is a concentration of both motions and thoughts; and the degree of attention is inversely to the amount of motion. An attentive audience is quiet: an inattentive one shuffles and moves in a hundred ways.

To this rule there is an apparent exception in the common habit of walking, beating, etc., when deep in thought. This is to be accounted for by the increase of brain-activity thus brought about. Such movements are dynamogenic, re-enforcing, arousing the motor centres, and thus adding to the available energy.