SEA-SICKNESS.[1]

SEA-SICKNESS is one of those minor miseries of existence for which there appears to be no cure. Many have been loudly trumpeted, but none have really succeeded in susceptible persons. As a matter of fact very little serious study has been given to the subject; persons who do not suffer are apt to despise those who do, and persons who do suffer are too glad to forget their misery to be disposed to give any thought to its source. Professor Rosenbach of Breslau has recently published a small monograph, the outcome of observations and study of the phenomena of sea-sickness extending over ten years. He gives his experiences in the form of a thesis, which he uses as the basis of his explanations and arguments as to the nature of the disease.

His argument of facts is as follows: 1. The malady commences as soon as the vessel pitches, that is, rotates on its transverse axis. 2. The rolling, that is, rotation on its long axis, is less severe, but the combination of the two is very unfavorable. 3. The phenomena appear more quickly and are more severe the farther the patient is from the middle of the ship. Persons sleeping are attacked, also small children and animals. In small boats without sails very sensitive persons may be affected; when sails are used sickness is more likely to occur. 4. A moderate amount of food in the stomach and a small quantity of alcohol is more likely to act as a preventive than an empty stomach. 5. The horizontal position on the deck acts in some degree as a preventive. 6. Anxiety and apprehension precede sickness; a certain exhibition of energy and resolution may in short voyages and with slight vessel motion control the tendency to sickness. Soft winds (for example, sirocco), strong odors, etc., are unfavorable. 7. There are two categories of the affection dependent on individual predisposition; in one the head, in the other the abdomen is principally affected. Cases where both are affected are common.

In regard to intensity: (*a*) Some women begin to feel uneasy from the beginning of the voyage, in perfectly smooth conditions of the surface; they are pale, and have no appetite. There is a certain dread also. It is questionable if they are cases of sea-sickness. Perhaps they represent the purely psychical form. (*b*) In another variety there is a general irritation of the nervous system during the whole voyage. The digestive organs are unfavorably affected. (*c*) This series forms a transitional variety. Slight motions of the vessel affect sensitive persons and produce sickness with general loss of appetite, indisposition to move or speak, and painful sensations in the head or abdomen. These symptoms are a delicate reagent to the disturbing action of the vessel.

As to the theories of the disease, they are arranged under three heads: 1. The psychical theory (so named by the author), according to which all the symptoms are produced through the action of certain sensory organs upon the consciousness, giving rise to uncomfortable or unwonted sensations or disturbed equilibrium. 2. The theory of disturbed equilibrium, according to which the permanent disturbances of equilibrium act as painful irritations to the contents of the skull and of the abdomen, and are thus the causes of the phenomena. 3. The theory of the disturbance of the circulation, according to which the disturbances of equilibrium and the swinging motions of the body produce circulatory disturbances in certain parts.

As regards the psychical theory, the arguments generally adduced in its favor are: 1. That the sight of the pitching vessels and of the up and down motions of the vessel favor the occurrence of sickness. 2. That the abnormal effects do not occur with the eyes shut. 3. That sleepers generally escape. This conclusion the author rejects, for he states that energetic will and closure of the eyes do not quite succeed in warding off the attack.

The action of visual disturbances in inducing the sickness he considers very important, but only secondary as factors in the result. That the sufferers may be roused from sleep in a full paroxysm of the attack; that children at the breast and young children suffer, though less than adults; and that horses, who in their boxes do not see the movements, also suffer — these facts prove, the author states, that the external mechanical influences alone must be the cause of the sickness. These facts, on which the author seems to rely for his conclusions as to the secondary importance of visual disturbances, if in themselves correct, do not appear to demonstrate that visual disturbances were absent in the cases mentioned, and it is to be remarked that in a note the author speaks of closure of the eyes or avoidance of the sight of the mast and bulwarks of the ship as being of great assistance in preventing the attack.

The third theory — that of circulation-disturbances — the author rejects. The second theory is particularly developed, and the disturbing effects of various kinds of unwonted improvement are described and analyzed. Thus, it is shown that backward travelling may produce illness, pains, even vomiting. The motion in swings, the effects of circular motion, are next described. The effects of rapid upward or downward motion have been particularly experimented on by the author in the rapidly-moving American elevators. The author thinks that he has discovered a new and substantial explanation of the action of external movement impulse by the phenomena observed in rapid elevators. It is found that in ascending with the eyes closed, no noise being heard, there is experienced a peculiar feeling at the epigastrium which goes off during the rise, say, of four or five floors, but reappears the moment the elevator stops. The same thing occurs when the elevator moves downwards, the sensation being felt only at the outset and on the arrest of the motion. In the motion of the elevator there occurs a sudden movement and sudden arrest of the movement, and the effect of this in producing the epigastric disturbance is held to be analogous to the effect of the motion observed in the vessel at sea. This explanation furnishes a theory which the author accepts, because it covers the ground to the necessary extent. Further, the author is led to the conclusion that the complex symptoms of sea-sickness are due to the molecular disturbances produced by rapid movements arising from sudden change of direction of the motion, whereby a severe intramolecular shaking and irritation primarily acting on the cells and the protoplasm of particular organs is produced.

The immediate transition from one movement to another movement in a different direction is assumed to be the cause of the disturbances experienced. Thus the painful sensations in sea-sickness, in the act of swinging, in the oscillation liable to occur in rapid railway journeys, agree in this, that the peculiar symptoms of irritation, the distressing feeling at the epigastrium, the cold sweats, the general feeling of illness, and the headache, appear at the moment when the direction of the movement changes.

As regards the cure of sea-sickness, the author considers that the only real cure is "custom." He speaks favorably of certain medicines as being often operative for very short sea voyages — quinine, antipyrine, bromide salts, cocaine, morphine, chloral, and other anæsthetics. He speaks with approval of the advice of older writers that the horizontal position at mid-deck should be taken before the voyage begins, and that a bandage should be tightly placed over the liver, whereby the intensity of the motion is diminished, and a certain degree of fixation of the abdominal contents promoted.

Professor Rosenbach has made a most valuable and suggestive contribution towards the solution of the much-vexed question as to the nature and cause of sea-sickness; and no doubt his views will excite discussion calculated materially to advance our knowledge of the subject.

[1] From the British Medical Journal.

DIET AND ANIMAL TEMPERATURE.

A QUESTION has been put to us by a correspondent, says the *Lancet*, whether the animal temperature of persons who subsist on a vegetable diet is lower than that in animal or mixed feeders. The inquiry has never been investigated in the human species on a sufficiently comprehensive scale to be of any value, but such comparative facts as throw light on the matter tend to indicate that vegetable feeders, among the lower creation, have a high temperature. Dr. John Davy, brother of Sir Humphry, and one of our keenest physiological observers of a past day, was among the first to make comparative observations of the temperature of different animals in their normal state; and to a certain extent John Hunter, Pallas, Despretz, and Samuel Metcalfe carried out the same research. In 1869 Dr. B. W. Richardson, in one of h

lectures on experimental and practical medicine, classified the results of most of these previous authors, and tested them by a new series of direct observations. His table of mean results showed that vegetable feeders have a high temperature. The sheep gave a temperature of 104°, the goat of 104°, the pigeon of 108°, and the common fowl 108°. The rabbit showed 103°, while the dog and the cat, animal or mixed feeders, showed 102°. But some herbivora were comparatively low, the ox, for example, 101°, and the horse 100°. The differences here stated were supposed by the last-named observer to depend on the cutaneous covering of the animal more than on any other cause. In the case of the pigeon, on which this author made ninety-four observations, the high temperature was attributed to the non-conducting character of the feathers, a marvellous protection to a swift-flying animal in a cold atmosphere. In man, from 100 observations, he came to the conclusion that in a strictly natural state 98° F. was the truest standard. These researches are useful as comparative studies; still, it is an open question whether in man, or in any species of animal that can live on a mixed diet, there is a variation of temperature according to the mode of diet; and it would be a good work to inquire on a large scale if, under a purely vegetable form of dietary, the temperature in man is reduced. Our correspondent informs us that in him (a healthy man) and in his wife (a healthy woman), both in the prime of life, the temperature now ranges from 96° to to 97.4° F. He for three years and a half, and she for two years and a half, have been total abstainers from alcohol, and have subsisted on fruit and vegetables, with addition of "butter, cheese, milk, eggs, and a little fish." Previously to adopting this system his temperature had never fallen under 98° "in so far as he remembers," and he therefore is inclined to the view that under his new regime he lives as healthily as before, at a lower expenditure of energy. If such prove to be correct, and if it should be demonstrated that a minimum animal diet (for our correspondent, be it observed, is not strictly a vegetarian) will support life efficiently under reduced combustion and reduced waste of material, a valuable as well as curious fact will be added to our practical knowledge. Evidently there is here open a fine field for a patient, perfectly unbiased, and truthful investigator.

EVOLUTION.[1]

IN the course of that theory of natural science best known to the outer world as that of evolution or development (whereof Darwin was the principal expounder), it becomes necessary for the theorist to endeavor to bridge over the gaps which are very easily to be discerned betwixt existing classes of animals. No doubt geology has supplied not a few of those "missing links," and has undoubtedly proved, for example, how the modern one-toed horse has descended from a four or five toed ancestor; and how birds and reptiles, which every zoologist knows are near kindred, can be linked by at least one fossil bird, which is neither bird nor reptile, but a very decided mixture of both groups. Still, the geological record is an imperfect one, and always will be. If every living thing which had ever existed had been preserved in a fossil state, and had been placed at the disposal of the geologist and anatomist for investigation, there might have been few or no difficulties in the way of piecing together the bits of the puzzle of life. As, however, fossil animals and plants constitute the mere chance preservations of the life that was, we have perforce to be content with a very meagre knowledge of existence in the past ages.

There remains, however, another method of arriving at the relationship which science seeks to show exists between apparently diverse groups of animals and plants. In plain language, when we study the development of an animal or a plant, and see how it works its way from the germ to become the adult form, we are brought face to face with a series of changes and scenes which are significant enough to the thinking mind. Suppose we discover that a frog begins life as a fish, a fact every schoolboy knows, what is the meaning of this strange becoming on the part of that tailless animal? Natural history replies that the frog's development we see to-day is really a recapitulation of its past descent. Witnessing how a tadpole becomes a frog, we are really looking at a moving panorama of the rise and progress of the whole frog-race, whereby that race must have sprung from a fish-like stock, and must have gradually grown into the lung-possessing, air-breathing creatures of the present time. This seems to be the only reasonable interpretation to be placed upon the marvellous changes which we see represented in the development of animals and plants; and this, at least, is the meaning which science attaches to the unfoldings of form and structure discernible in the course of the living being's progress from its beginning, in the egg, to its assumption of its adult character.

In the course of studies in the development of animals, we meet with some very curious discoveries and theories relative to the origin of the various zoological groups; and certain ideas of the origin of backboned animals at large, lately promulgated, seem to be worthy of mention here, as tending to keep us *au courant* with the progress of thought in biology. The puzzle of naturalists has been that of accounting for the origin of the vertebrated animals aforesaid, because these backboned tribes (which range from the fishes to quadrupeds) seem really to stand out very distinctly and by themselves as a specially defined sub-kingdom. The backboned branch of the animal tree, in other words, has presented great difficulties in its being traced to its connection with the parent stem. There is a certain fish, the lowest of its class, called the lancelet, which is found to present, both in its development and in its adult structure, certain close affinities to a lowly tribe of creatures known as tunicates, or sea-squirts. A sea-squirt is simply a kind of animated bag with two openings, somewhat like an ancient "leather bottel," which remains attached to a rock or stone. Hence, from the likeness between the sea-squirt's development and that of the lowest fish, many zoologists are given to regard the former as the putative parent of the vertebrate animals. The sea-squirt, in this view, is the very far-back ancestor (or representative of the ancestor) of the backboned tribes.

More recently, however, certain adventurous spirits in biology have ventilated new ideas of the origin of the backboned forms, and these ideas, I fancy, are more startling even to biological minds (given to feel surprised at nothing whatever) than any previous theories which have been advanced. Seeking for the ancestors of backboned animals among the annelids or worms has not been a process attended by success, in so far as evidence of probability is concerned; but higher in the series of jointed or articulate animals we find the insects, spiders, and crustaceans, of which class the lobster is a fair representative. One scientist declared that for choice he finds the most likely origin of the backboned tribes in the spider-class. What induces this belief is the tendency to head development, among other signs of advance, which the spiders, scorpions, and their allies exhibit. What we call a scorpion's head is really its head and chest united, and a close examination of this region shows that in the arrangement of its nerve-masses, its nerves, sense-organs, and so forth, there is to be traced a very exact resemblance to the similar arrangements in the vertebrate head. Again, it is held that in the development of the scorpion and spider, essentially similar features to those seen in backboned development are to be traced. So that the far-back ancestor of the highest animals, on this belief, are to be sought for in some primitive scorpion, which, getting on in the world, gave origin to the higher group. There might be a difficulty regarding the transition from air to water, from scorpion to fish, no doubt; but I presume it is maintained that out of a common type of primitive breathing organ the modification in question could easily have occurred.

The other theory of vertebrate origin also sees the ancestor of backboned animals in some primitive jointed animal or other. Tracing the development of the backboned brain and spinal cord, an observer regards these important structures as having been formed by the elaboration of jointed nerve-masses placed on the outside of a tube. There is such a tube in the middle of the spinal cord, and this tube extends onwards into the brain. The bold idea has therefore been formulated that the central nervous canal of the backboned tribes represents the digestive tube of the vertebrate ancestor; certain dilatations of the tube in the brain corresponding to the stomach of that ancestor, whose own nervous system (lying

[1] Dr. Andrew Wilson, in the Illustrated News of the World.