ORGANS OF THE MIND.

ADDRESS OF DR. HAMMOND BEFORE THE NEUROLOGICAL SOCIETY.

MANIFESTATIONS OF MIND FORCE NOT CONFINED TO THE BRAIN—CONNECTION OF THE MIND WITH THE NERVOUS SYSTEM—THE BRAINS AND INTELLIGENCE OF ANIMALS—EXPERIMENTS ON CREATURES AFTER REMOVING THE BRAINS—REFLEX AND VOLITIONAL MOVEMENTS—THE SPINAL CORD AS A NERVE CENTER COMPARED WITH THE BRAIN.

The Neurological Society held its annual meeting last evening at the College of Physicians and Surgeons at Twenty-third-st. and Fourth-ave. The chair was occupied by W. A. Hammond, M. D., President of the association. There was present a large audience, including Drs. Clark, Dalton, Parsons, True, Peaslee, Rockwell, Hamilton and Goodwillie, and Professors Darlbee and Paulon. Before delivering his inaugural address, Dr. Hammond read a short report of the progress of the society, in which he stated that it now contained 73 active members. Drs. Goodwillie and Hamilton were then elected members of the Society. Then followed Dr. Hammond's address. When the paper was finished, Dr. T. E. Clark rose and begun the discussion of the views advanced by the President. He stated that a majority of naturalists held that mental characteristics were discovered in the animal kingdom long before even the first traces of a nervous system were followed out. In the Amœba, for instance, the mental peculiarities could not be supposed to be limited to any particular part. In the higher portions of the animal kingdom the mind force seems to have its seat in no one part of the organism. The same remarks apply to man and the higher vertebrates. Dr. Clark did not approve of limiting the mind force to the gray matter of the cerebro-spinal system. The nerve fibers and cells of the sympathetic system greatly resemble the nerve fibers and cells of the cerebro-spinal axis. The experiments described do not compel the exclusion of the mind from the ganglia of the sympathetic system. Dr. Clark closed by saying: "May it not be true of man as it appears to be of the lowest forms of life, that the mind pervades the whole body?"

Dr. Parsons then joined in the discussion. He said that the soundness of Dr. Hammond's views rested on the basis upon which the paper was written. The whole discussion turned, he said, on the definition of the word "mind." Dr. Parsons said, among other things: Dr. Hammond claims that certain acts beyond the range of consciousness are termed volitional. This is open to question. The limbs, by a course of training, become so accustomed to certain movements that they carry on those movements without the aid of the brain. As, for instance, in the case of the frog. It is difficult to tell how often the frog had made motions which he made after being deprived of his brain. The higher cerebral centers educate the extremities until they perform their functions naturally. In reply Dr. Hammond said that without its brain the frog acted the same as it did before the brain was removed. It passed one foot over the irritated spots, and not over any other place. That foot cut off and the frog used another foot. What further could it do? It used every means to escape from the irritation, and in doing so did all that could be expected from a decent frog.

Dr. Hammond's inaugural address on "The Brain not the Sole Organ of the Mind," is given herewith.

THE ADDRESS.

GENTLEMEN: Again I have to thank you for conferring upon me the honorable office of President. In the brief review of the progress of the Society, which, as the outgoing President, it was my duty to make, I have touched upon those points in our affairs which appeared specially worthy of attention; and it now only remains to me to deliver the inaugural address on assuming for the second time the office to which by your partiality I have been elected. In choosing the subject, "The Brain, Not the Sole Organ of the Mind," it appears to be necessary that I should, in the first place, as clearly as possible express my ideas relative to the connection between the mind and the nervous system, and of the nature of that power which, in its full development, places man at the head of all other animals. We have no evidence to show that the mind can exist independently of the nervous system. On the contrary, every fact in our possession bearing upon the question of their relation goes to prove that where there is no nervous system there is no mind, and that where there is injury or derangement of the nervous system there is corresponding injury or derangement of the mind. The nervous system consists of two essentially different tissues, which are distributed in varying proportions throughout the organism. The use of these, the ganglionic, or gray tissue, is collected in masses in the brain, the spinal cord, and in the course of the ramifications of the great sympathetic nerve. The other, the white tissue, exists in much larger proportion, and is also found in the brain and spinal cord, of which it constitutes the larger quantity. Examined microscopically the gray matter is found to be composed of cells, while the white matter consists of fibers. As regards function the difference is still greater, for the gray matter is the generator of nerve force, while the white simply serves as the medium by which the force is transmitted.

The brain is by far the largest mass of nerve substance contained in the body of any animal possessing a brain—indeed, it far exceeds in bulk and weight all the rest of the nervous system together. The researches of European observers give 49½ ounces as the weight of the average brain of the white inhabitant of Europe, the maximum that of Cuvier, being 64½ ounces, and the maximum consistent with a fair degree of intelligence 34 ounces. Webster's brain—allowance being made for disease which existed—weighed 63¾ ounces; Dr. Abercombie's, 63 ounces, and Spurzheim's, 55 1/16 ounces. The average of 24 American brains accurately weighed by Dr. Ira Russell was 52.06 ounces; the same observer found the average full negro brain as determined from 147 specimens to be only 46.96 ounces. The capacity of Webster's cranium was the largest on record, being 122 cubic inches; that of the Teutonic family, including English, Germans and Americans, is 92 cubic inches. In the native African negro it is 83 cubic inches, and in the Australian and Hottentot only 75. The brain of the idiot seldom weighs over 23 ounces, and it is often much less than this. In one instance coming under my own observation the weight of the mature brain was only 14½ ounces. Mr. Gore has related in *The Anthropological Review* the particulars of a case of microcephaly, in which the brain weighed only 10 ounces and 5 grains. The subject, a female, though 42 years of age, had an intellect which is described as infantile. She could say a few words, such as "good child," "morning," with tolerable distinctness, but without connection or clear meaning, and was quite incapable of anything like conversation. Her habits were decent and cleanly, but she could not feed herself, at least with any degree of method or precision. She was fond of carrying and nursing a doll. In a case described in a subsequent number of the same journal by Prof. Marshall, the weight of the entire brain was only 8½ ounces. The subject was a boy 12 years of age. Nothing is said relative to the intelligence manifested.

THE BRAINS OF ANIMALS.

Secret found the mean proportional weight of the brain to the rest of the body to be in fishes as 1 to 5,668. The range in these animals is, however, very great. In the bass I found it as the result of 11 observations to be as 1 to 523; in the eel, after 22 observations, as 1 to 1,429, and in the goldfish, after 9 observations, as 1 to 8,915. In reptiles of different orders Secret determined the average to be as 1 to 1,321. I found the proportion in frogs to be as 1 to 520; in lizards as 1 to 180, and in the rattlesnake as 1 to 1,825. The brain of an alligator over six feet in length which I examined weighed only a little over half an ounce.

Next in order come the birds, and here we find a very decided increase in the proportion. From many determinations made by Halter, Cuvier, Carus, and himself, Secret gives the average as 1 to 212. In the tomtit he found it as 1 to 12, in the canary bird as 1 to 14, in the pigeon as 1 to 91, in the duck as 1 to 241, in the chicken as 1 to 377, and in the goose as 1 to 3,600. These are very great differences, and, as Secret remarks, have no constant relation to the intelligence. It is worthy of notice that the brain is proportionately smaller in those birds which are domesticated, and which consequently do not have to make so severe a struggle for existence, than in the wild birds, and their bodies, therefore, are more incumbered by fat. From determinations which I made it was ascertained that the brain of the canary bird in the United States, in weight, compared to that of the body, was as 1 to 10.51, and in the Arette sparrow as 1 to 11. No observations on record show proportionally larger brains than these.

Among mammals we find a still greater increase in the weight of the brain, as compared with that of the body. Secret found it to range in the monkey as 1 to 22, 24, and 25; in the dolphin it was as 1 to 36; in the cat as 1 to 94; in the rat as 1 to 130; in the fox as 1 to 205; in the dog as 1 to 305; in the sheep as 1 to 351; in the horse as 1 to 700, and in the ox as 1 to 750. The mean for the class of mammals, exclusive of man, was as 1 to 186. My own observations accord very closely with those of Secret. I find that in the prairie wolf the proportion between the brain and the body was as 1 to 220; in the wild-cat as 1 to 188, and in the rat as 1 to 132.

If these figures teach anything at all, it is that there is no definite relation between the intelligence of animals and the absolute or relative size of the brain. It is true that taking the data collected by Secret as the basis there is a well-defined relation between the mental development of the brain as regards the several classes of vertebrate animals; for, in fishes, the lowest, the brain is only 1 part of the body; in reptiles, the next highest, it is 1 part; in birds, next in the ascending scale, it is 1 part, and in mammals, the highest of all, 1 part. There is, therefore, beginning with the lowest class, a regular ascent in the volume of the brain till it reaches the maximum in mammals.

But when we look at the relation as it exists between the different orders and genera of any one class, we can not say that there is any such variation in the degree of mental development as we should expect to find if the brain were the only source of the intelligence, and the members of the very lowest class have relatively larger brains than certain animals of the very highest. Thus, the brain of the bass is to the body as 1 is to 523, while in the horse it is 1 to 700, and in the ox as 1 to 750. If the relative size of the brain is to be taken as the indication of the degree of intelligence, we must regard the bass as a more intellectual animal than either the horse or the ox. The lizard has a brain which bears the high proportion to the body of 1 to 180. This is greater than that existing in the fox, the dog, the sheep, and several other mammals. The canary bird and the Arctic sparrow have brains proportionately larger than those of any other known animals, including man; and yet no one will contend that these animals stand at the top of the scale of mental development. Man, who certainly stands at the head of the class of mammals, and of all other animals so far as mind is concerned, rarely has a brain more than one-fifteenth part of the weight of the body; a proportion which is much greater in several other mammals, and is, as we have seen, exceeded by many of the smaller birds. Even in absolute weight, and independent of any relation to the rest of the body, the brain of man is not the largest, being exceeded by that of the elephant and the whale.

QUANTITY OF GRAY NERVE TISSUE IN MAN.

But when we inquire into the matter of the absolute and relative quantity of gray nerve tissue, we find that in this respect man stands pre-eminent; it is to this fact that he owes the great mental development which places him so far above all other living beings. For it is the gray tissue which originates mind—the white, as is well known, serving only for the transmission of impressions and impulses. Unless regard be paid to this point, we would certainly fall into serious error in determining the relation existing between the mind and the nervous system; but having it in view the connection is at once clear and well defined, there being no exception to the law that the mental development is in direct proportion to the amount of gray matter entering into the composition of the nervous system of any animal of any kind whatever. But all the gray tissue of the nervous system is not confined to the brain. A large proportion of it is found in ganglia of the sympathetic and some other nerves, and an amount—second only to that of the brain in quantity, and, indeed, in some animals larger—is present as an integral constituent of the spinal cord. And I propose to discuss on this occasion some of the more important questions connected with the qualities of the force evolved from this gray tissue of the cord, and to call attention to some of the phenomena attendant on its evolution.

By the term mind I understand a force developed by nervous action. It bears the same relation to gray nerve tissue that heat, or electricity, or light do to chemical or mechanical action. Why mind should result from the functionation of gray nerve tissue is no more a mystery than the fact that the combining of water with sulphuric acid develops heat, or that rubbing of a piece of sealing-wax with a piece of silk causes the evolution of electricity. All are equally beyond our understanding; all are equally ultimate facts in science, and speculations in regard to the rationale of all are equally vain and unprofitable. All the manifestations of which the mind is capable in its fullest development are embraced in four groups—perception, the intellect, the emotions, and the will. Either one of them may be exercised independently of the others. Thus an individual may have a perception without any intellectual, emotional, or volitional manifestation; and so the intellect, the emotions, or the will may be brought into action without the necessary participation of each other. It is, however, clearly established that all mental processes have their origin in perception, and that an individual born without the ability to perceive, either from defects in the external organs of the senses or of the central ganglia, by which impressions of these organs are converted into perceptions, would be devoid of intellect, emotion and will, would be in fact lower in mental development than the most degraded types of animated beings.

Perception is the primary manifestation of mind, and is that part the office of which is to place the individual in relation with external objects. Thus an image is formed upon the retina; the optic nerve transmits the excitation to its ganglion. This at once functionates; the force called perception is evolved, and the image is perceived. If the retina be sufficiently diseased, the image is not formed; if the optic nerve is in an abnormal condition, the excitation is not transmitted; if the ganglion be disordered, the perceptive force is not evolved. Therefore, in order that a true perception may be experienced, an organ of sense, a nerve, and a mass of gray nerve tissue are necessary, and no other organs are required.

REFLEX AND VOLITIONAL MOVEMENTS CONSIDERED.

It is rarely the case that an individual perceives an impression made upon any one of the organs of the senses without a higher mental operation being performed. This is especially the case when the perception is of such a character as to be irrelative. Thus, if an exceedingly bright light be allowed to impress upon the retina, the lines are corrugated, and if it be still more intense the eyelids are closed so as to shut it out altogether. If a very loud noise strikes upon the tympanum, the head is turned so as to prevent the undulations of the atmosphere reaching the ear in full force. If the skin be irritated, the part is, if possible, drawn away, and if the irritation be so great as to excite pain, the whole body is thrown into contortions, and efforts are made to escape. Some of these movements appear formed in direct opposition to the will, and thus they are said to be reflex; that is, that they are the result of the conversion of a sensation into a motor impulse without the accompanying action of any ganglion the action of which is the evolution of volitional force.

Now it is very evident that some of the actions in question are apparently altogether involuntary, and are thus true reflex movements, and it is no difficult matter to separate them from those other, which are clearly volitional, determinate, and performed with a definite purpose in view, as, for instance, an irritative substance be applied to the interior of the nostril, the action which we call sneezing is produced. This consists of a spasmodic contraction of certain muscles, by which the air in the lungs is forcibly exhaled through the nostrils. It is automatic and preservative in character, the object being to get rid of the offending substance. It is always performed in the same way; the muscles brought into action are always the same, and it is spasmodic, sudden, and without deliberation or judgment, so far as we can determine from our own consciousness. Again, if the soles of the feet are tickled, they are drawn away, although it is possible for the impulse to remove them to be restrained by the exercise of the will. And indeed some individuals can prevent sneezing by strong volitional power evolved from the higher ganglion of the brain. But let us suppose the case of a man with a disease of the upper part of the spinal cord, of such a character as to prevent its conveying volitional impulses from the brain to the muscles of the lower limbs. Now let the soles of the feet be tickled, and we will find that they are drawn away and generally with very much more force than when the brain is allowed to act. Such a movement is probably one of a true reflex character. It is spasmodic and indeterminate, being more extensive than is necessary.

But let us go still farther in our suppositions, and imagine that in such a case the mere drawing away of the foot was not sufficient to escape the irritation, and that the individual deliberated, lifted up the other foot in the attempt to remove the offending object, and that this action not proving adequate, he made two or three leaps in order to escape. What would we call these movements? Would they not be evidences of perception and will? Would they not be movements performed with a definite purpose—the very best possible under the circumstances to escape from the irritation even though the brain were unconscious of them? It must be remembered that consciousness is not the necessary accompaniment of volition, as we shall presently see from examples which I shall advance; and this being the case, I cannot avoid the conclusion that actions performed under the circumstances I have stated would be based upon perception and done through the force of volition.

RESULTS OF REMOVING BRAINS OF ANIMALS.

Warm-blooded animals are for many reasons not suitable subjects for experiments such as are required in the study of the phenomena under consideration, but in some of the lower animals, as the frog, for instance, we find those conditions present which fit them for such investigations. Thus, if the entire brain be removed from a frog, the animal will continue to perform those functions which are immediately connected with the maintenance of life. The heart beats, the stomach digests, and the glands of the body continue to elaborate the several secretions proper to them. These actions are immediately due to the sympathetic system, though they soon cease if the spinal cord be materially injured. But in addition still more striking movements are effected, movements which are well calculated to excite astonishment in those who see them for the first time, and who have embraced the idea that all intelligence resides in the brain.

For instance, if in such a frog the web between the toes be pinched, the limb is immediately withdrawn; if the shoulder be scratched with a needle, the hind foot of the same side is raised to remove the instrument; if the animal is held up by one leg it struggles; if placed on its back—a position to which frogs have a great antipathy—it immediately turns over on its belly; if one foot be held firmly with a pair of forceps, the frog endeavors to draw it away; if unsuccessful, it places the other foot against the instrument, and pushes firmly in the effort to remove it. Still not successful, it writhes the body from side to side, and makes a movement forward. All these and even more complicated motions are performed by the decapitated alligator, and in fact may be witnessed to some extent in all animals. I have repeatedly seen the headless body of the rattlesnake coil itself into a threatening attitude, and, when irritated, strike its bleeding trunk against the offending body. Upon one occasion a teamster on the Western plains had decapitated one of the reptiles with his wally, and, while bending down to examine it more carefully, was struck by it full in the forehead. So powerful was the shock to his nervous system that he fainted, and remained insensible for several minutes.

NO GRAY NERVE TISSUE WITHOUT MIND.

This subject has been well studied by Dr. Fowler of New-Orleans, and several others. I have performed a great many experiments and made numerous observations relative to the matter, and have, for a number of years, taught in my courses on diseases of the mind and the nervous system, the doctrine now set forth, that wherever there is gray nerve tissue in action, there there is mind also. To the details of some of these experiments I beg to invite the attention of the Society, merely premising that I have quite recently gone over the ground with great care, verifying with as much exactness as possible the results obtained by others and by myself, and extending the scope of the experiments in several important particulars.

First experiment. I removed the brain of a large frog, and then waiting a few minutes for the animal to recover from the shock of the operation, I proceeded as follows: I pinched the left hind foot with a pair of forceps, and the limb was at once withdrawn. I pinched a little harder, and the animal struggled vigorously to escape, and succeeding, made several leaps, each of two or three feet in length. I then touched the right side of the abdomen with a glass rod, in which was a drop of vinegar. The right hind foot was at once carried to the exact spot I had touched, and was rubbed energetically against the skin. The left side was treated similarly, and the rod being held in contact with the skin it was pushed away by the left hind foot. The skin over the left shoulder was then seized with a forceps and slightly held. Efforts were made to remove the instrument with the left hind foot, then with the left fore foot, and then not succeeding the whole body of the animal was violently agitated, and through the struggling the hold of the forceps was broken and the frog gave two leaps. Laid upon its back, it immediately resumed the ordinary position on its belly, with its hind legs drawn up. I then held the glass rod, with a drop of vinegar against the right dorsal region. The frog tried to push the instrument away with its right hind foot. I cut off this foot, and it then made similar efforts with the left hind foot. This not being effectual, it made a leap of about a foot, and then scratched the irritated spot with the left hind foot.

Second experiment. I removed the brain from a toad, after waiting as before for the immediate effects of the operation to disappear, placed the animal in a state of quiet. It immediately began to swim. I held a sponge so that the animal's head would come in contact with it and prevent further progress. Continued efforts to swim were made for a few seconds and then ceased. Removing my hand the animal again swam. Of these movements Vulpian says that when the frog is placed in water an excitation is produced over the entire surface of the body in contact with the water. This excitation provokes the mechanism of swimming, and the mechanism ceases as soon as the cause of the excitation has ceased to act by the removal of the frog from the water. If this were a true explanation, the movements of swimming would certainly be continued, notwithstanding the interposition of an obstacle. It is, as we have seen, they are arrested. Ovimus shows conclusively that I have verified his experiments—that Vulpian's explanation is not correct, or as he declares it, if frogs without brains, and from whom the skin has been carefully removed, are placed in water, the movements of swimming are continued, which proves that the excitation of the cutaneous surface is not the cause of the movements.

Now what do such experiments show? If they do not prove that the spinal cord has the powers of sensation and volition, what do they prove? What is the animal possible to do to escape the uneasiness? It is subjected by having an irritation applied. It must be remembered that it has only one sense—that of touch—left, and that one-half of one lobe of the gray nerve tissue of the organism has been removed. It will not suffice to say, with Dr. Maudsley, that these experiments are no more evidence of consciousness and will than is the fact that in the double decomposition of a chemical salt, one acid chooses voluntarily the other base. For in the first place the acid and the base are not organized and living creatures; and in the next place they always act in precisely the same way under similar circumstances, which is not the case in the movements of the frog deprived of its brain. It is true that there is a general similarity of actions, but so there is when the brain has not been removed; and so there is also in the higher animals, man included, when the circumstances determining certain actions are identical. And this is so well known a fact that we can predict with exactness what movements will be performed under known conditions, not only as regards the lower animal, but man himself. Dr. Maudsley admits that the actions in question are for a definite end, and have the semblance of being designed consciousness and will; but he then says that they may be quite unconscious and automatic. And he forgets that in all our relations with our fellow-creatures the only evidence we have of their consciousness and volitional powers is derived from an knowledge of their actions. We can say with absolute certainty that any other person is performing an act because we know that it is a matter which is only in relation to the individual himself or itself, and, in case, however conscious the frogs subjected to such experiments may seem, we have no means of ascertaining the fact except by the careful study of the psychical and physical phenomena manifested. We in strictness then, and the answers are perfectly logical and definite. No less so, in fact, than they would have been had the brain not been removed.

THE SPINAL CORD A CENTER OF PERCEPTION AND VOLITION.

But there are many other facts which go to show that the spinal cord is something more than a mere center for reflex actions, and a conductor of impulses to and from the brain. Paton in a salamander divided the vertebrae and spinal cord immediately below the brachial plexus, so that the anterior extremities were still in nervous communication with the brain through the upper part of the cord, while the posterior extremities were cut off from it, and only received nervous influence from the lower part of the cord. After allowing a few minutes to elapse the following phenomena were observed: The animal raised itself upon its fore legs, and began to move forward, but did not drag its hind feet like an animal that had suffered paralysis. He supported its body on them as on its fore legs, and executed them distinctly in the act of locomotion. I could observe no difference between these movements and those which it performed before the division of the cord, except that it now walked with less power and energy. I allowed the animal to continue at rest for a short time, and then slightly touched with the point of a needle the integuments of the right dorsal region, and it raised up its right-hand foot and passed its toes across the part. On irritating the integuments of the left side of the abdomen it raised up its left hind foot again and again to the part. After a short interval I touched with the point of a needle the upper portion of the left dorsal region, immediately below the division of the cord, and it raised up its left hind foot and passed its toes distinctly over the part. I continued the irritation and the animal repeated the movement, raising up its left hind foot and passing its toes over the part. This experiment was repeated with some variation of the detail, but with the result of obtaining an elegant movement. Thus it was clearly proved that the posterior extremities of the animal are capable of being brought into harmonious action with the anterior, though the former are completely separated from all the nervous relations with the brain, and as a consequence that the spinal cord is a center for perception and volition.

Dr. Carpenter says of frogs, that "if the spinal cord be cut off without the removal of the brain, the hinder limbs may be excited to movement by an appropriate stimulus, though the animal has clearly no power over them, while the upper remain under its control as completely as before." And from this fact he adduces the argument that the spinal cord is not a center of voluntary action. But Paton's experiments with the salamander show that however true this may be of frogs, it is not true as regards all other animals, and more Dr. Carpenter's reasoning is of no force. Dr. Carpenter then goes on to say that it is merely somewhat that sensation should be felt and the force exerted through the instrumentality of the portion of the cord which remains connected with the posterior extremities, but which is cut off from the brain; for if this were so, he alleges, there must be two centers of sensation and will in the same animal, the anterior of the brain not being affected, and by dividing the spinal cord into two we make more sign his we might thus create in the body of one animal two or more such independent centers in addition to that which still holds its proper place within the head. This reasoning is very correct, but the condition which Dr. Carpenter assumes to be impossible actually exists, not only in the salamander, as shown by Dr. Paton, but in other animals, especially those belonging to the class articulata.

Thus in the centipede there is a closely-united pair of ganglia for each segment of the animal's body, and in the anterior extremities of the body a larger pair which unite and for the brain. Now, as is well known and as Dr. Carpenter himself says, if the head of the centipede be cut off while it is in motion, the body will continue to move on and by the action of the legs, and the same will take place in the separate parts if the body be divided into several distinct portions. After these sections have come to an end, they may be excited again by irritating any part of the nerve centers of the entire activity of the nervous cord. The body is moved forward by the regular and successive action of the legs, as in the normal state; but the movements are not those of a regular backward, and are only directed to one side when the forward movement is checked by an interposed obstacle. If this obstacle be not more than the might of the animal, the body mounts over the obstruction and continues its course. It will not suffice to say with Dr. Carpenter that, though these movements seem to indicate consciousness, they do not in reality, and that they are merely manifestations of reflex excitability. Not only do they show perception and volition, but they establish the very fact which as we have just seen, Dr. Carpenter denies that there are several centers of sensation and of volition in these animals if not in all.

In birds, the phenomena observed after removal of the brain go to show that perception and will are equally with cold-blooded animals in the spinal cord. A pigeon turns its head in [illegible] once with the motion given to a lighted candle over [illegible] its eyes; it smooths its feathers with its bill when they are ruffled; it places its head under its wing when it sleeps; it opens its eyes when a loud noise is made close to its head. Ordinarily removed the brain from young ducks hatched and brought up by a chicken. These ducks had never been in the water, yet when placed in a basin they immediately began to swim. Their motions in swimming were as regular as in other ducks which had lived in the water. This series of experiments shows that even the inborn instinct of animals is not solely resident in the brain.

PLACE OF THE SPINAL CORD AS A NERVE CENTER.

Now, when we come to man and observe the experiments which are constantly being made for us both in health and disease, we cannot avoid placing the spinal cord much higher as a nerve center than it is usually placed by physiologists. In monsters born without a brain, we have interesting examples of the fact that the spinal cord is possessed of perception and volitional power. Sym describes one of these beings which lived for six months. Though very feeble it had the faculty of sucking, and the several faculties of the body appeared to be well performed. Its eyes clearly perceived the light, and during the night it cried if the candle was allowed to go out. After death the cranium was opened, and there was found to be an entire absence of the cerebrum, the place of which was occupied by a quantity of serous fluid contained in the arachnoid. The cerebellum and pons varolii were present. Fabriza of Pavia report the case of a male infant which lived 15 hours. Respiration was established, but the child did not cry; nevertheless it was not insensible. Light impressed the eyes, for the pupils acted. A bitter juice put into the mouth was immediately rejected. Loud noises caused movements of the body. On post-mortem examination there was found no vestige of cerebrum or cerebellum, but the medulla oblongata and pons varolii existed. There were no olfactory nerves; the optic nerves were atrophied, and the third and fourth pairs were wanting. All the other cranial nerves were present.

Olivier d'Angos describes a monster of the female sex, which lived 20 hours. It cried, and could suck and swallow. There was no brain, but the spinal cord and medulla oblongata were all developed. Sarlard relates the particulars of a case in which there were no cerebrum, cerebellum, or any other intra-cranial ganglion. The spinal cord began as a little red thread; but this being opened and shut its eyes, cried, sucked, and even ate broth. It lived four days. Mr. Lawrence has published the details of a very interesting case in which there was no brain. But the excited motory functions were well performed; the child moved briskly and gave evidence of feeling pain. Its breathing and temperature were natural. Its movements did not afford evidence of a very high degree of intellect, but they were precisely such as are performed by all new-born infants possessed of brains. [illegible]

not indicative of the existence of mind, we must deny this force to all human beings on their entrance into the world.

But we are not obliged to rest on the phenomena approved by monsters without brains for all the evidence that the spinal cord of man is a center of perception and volition. We have only to observe the manifestations of its action, which are of daily occurrence in our own persons; and in bringing them to your notice I shall quote from a little work on "Sleep and its Derangements," which I wrote a few years ago. If an individual engaged in reading a book allows his mind to be diverted to some other subject than that of which he is reading, he continues to see the words, which, however, make no impression on his brain, and he turns over the leaf whenever he reaches the bottom of the page with as much regularity as though he comprehended every word he had read. He suddenly perhaps brings back his mind to the subject of his book, and then he finds that he has perused several pages without having received the slightest idea of their contents. Again, when for instance we are walking in the street, and thinking of some engrossing circumstance, we turn the right corner and find ourselves where we intended to go, without being able to recall any of the events connected with the act of getting there. In such instances as these—and many others might be adduced—the brain has been so occupied with a train of thought that it has taken no cognizance or superintendence of the actions of the body. The spinal cord has received the several sensorial impressions and has furnished the nervous force necessary to the performance of the various physical acts concerned in turning over the leaves, avoiding obstacles, taking the right route, and stopping in front of the right door.

All cases of what are called absences of mind belong to the same category. Here the brain is completely preoccupied with a subject of absorbing interest, and does not take cognizance of the events which are taking place around. An individual, for instance, is engaged in solving an abstruse mathematical problem. The whole force of his brain is taken up in this labor, and is not diverted by circumstances of minor importance. Whatever actions these circumstances may require are performed through the force originating in the spinal cord. The phenomena of reverie are similar in some respects to those of somnambulism, to which attention will presently be directed. In this condition the mind pursues the train of reasoning, often of a most forcible character, but yet so abstract and intense that though a thousand may be performed by the body, they have no relations with the current of thought, but are essentially automatic and made in obedience to sensorial impressions which are not perceived by the brain. Take a person in a state of revery will answer questions, obey commands, go through a good deal of muscular action, and perform other complex acts without disturbing the current of his reverie. When the state of mental abstraction has disappeared there is no recollection of the acts which may have been performed. Memory resides in the brain, and can only take cognizance of those mental acts which spring from the brain or of impressions which are made upon it.

In the case of a person performing on the piano, and at the same time carrying on a conversation, we have a most striking instance of the diverse though harmonious action of the brain and spinal cord. Here the mind is occupied with ideas, and the spinal cord directs the manipulations necessary to the proper rendering of the musical composition. A person who is not proficient in the use of the instrument cannot at the same time play and converse with ease, because the spinal cord has not acquired a sufficient degree of automatism. Darwin gives a very striking example of the independent action of the brain and spinal cord. A young lady was playing on the piano a very difficult musical composition, which she performed with great skill and care, though she was observed to be agitated and preoccupied. When she had finished she burst into tears. She had been secretly watching the death struggles of a favorite hound. Though the brain was thus absorbed, the spinal cord had not deserted the office of carrying on the muscular and automatic actions required by her musical performance.

In human subjects the brain is subject, and this quiescence of the organ is often accompanied in the commoner and exciting reasons by an excited condition of the spinal cord, which we have the highest forms of somnambulistic manifestations, such as walking and the performance of complex and apparently systematic movements. If the sleep of the brain be somewhat less profound or the spinal cord less excitable, the somnambulistic manifestations do not extend beyond sleep-talking. A still less degree of cerebral inaction or of spinal excitability produces simply a restless sleep and a little muttering; and when the sleep is perfectly natural and the nervous system of the individual well balanced the movements do not extend beyond changing the position of the head and limbs and turning over in bed. The phenomena of catalepsy, trance, and allied states are also indications of an independent action of the spinal cord, inasmuch as the power of the brain is not exercised over the body, but is subjugated or entirely crossed with subjection to such impressions upon it. Some of the manifestations of mind shown under these conditions are exceedingly interesting, and are altogether outside of the domain of cerebral consciousness.

And now I must bring this address to a close. Though I have by no means exhausted all the facts and arguments which could be brought forward. I by no means contend that the spinal cord, to say nothing of the sympathetic system, is, in the normal condition of the animal body, as important a center of mental influence as is the brain. The latter organ predominates; the very highest attributes of the mind come from it, and the cord is subordinate when the brain is capable of acting. But it seems to me illogical to deny mental power to the spinal cord after a consideration of such experiments and other facts as I have brought forward, and hence we are, I think, justified in concluding:

I. That of the mental faculties perception and volition are seated in the spinal cord as well as in the central ganglia.

II. That the cord is not probably capable of originating mental influence independently of sensorial impressions—a condition of the organism till it has accumulated through the operations of the senses.

III. That as memory is not an attribute of the mental influence exerted by the spinal cord, it requires, unlike the brain, a new impression in order that mental force may be produced.

COLLOQUIAL ENGLISH.

ERRORS THAT ARE OFTEN MADE.

To the Editor of The Tribune.

SIR: Your correspondent "M. C. R." has made, in your issue of the 10th inst., many pertinent remarks upon the question, "Has the English language been corrupted in America?" and in the latter part of the communication has touched upon what is probably the most noticeable, as well as the most deplorable peculiarity of "American English"—the shocking bad grammar constantly used colloquially by people of education and cultivation. It is perhaps not to be expected, nor desired even, that we should, in ordinary conversation, always exercise that accuracy and precision in clothing our thoughts in language which distinguishes a *Spectator* essay or a TRIBUNE editorial; yet there is too great a difference between such models of elegant diction and the current slovenliness of speech which is well-nigh universal among the best informed Americans.

If an educated man, such as it has been said, and educated English man, looks us to think there are great and superiors in the use of spoken English colloquially. For example, I ask if an educated man is to hear such an English man in his conversation, blunder of using "don't" in the third person singular; while in this country it is quite exceptional, so far as my observation goes, to hear the proper contraction of "does not." People rarely seem to remember that "don't" is properly a contraction only of "do not," and that the only admissible elision in "does not" is that of the last vowel, giving "doesn't." Instances of the common violation of this very evident rule may be found daily in the verbatim report of a certain trial, which may have attracted the attention of some of your readers now and then during the present year. The eminent counsel in that case have probably no superiors at the bar in intellect, in education, or in cultivation; yet a page of what carried reading of the report in question has failed to bring to my eyes a single instance of the use of the grammatical "doesn't" in lieu of the ungrammatical "don't" in the third person. One of the legal luminaries, who is nothing if not a cross-examiner, makes constant use of the odious provincialism, "How?" in the sense of "What?" or "What did you say?" Other instances of incorrect or inelegant English might be given from the same source, but perhaps the great verbatim report will sufficiently emphasize to all its readers the necessity of forming and fostering a habit of carefulness and thoughtfulness in uttering their daily commonplace thoughts. G. S. S. H.

Annapolis, Md., April 29.

BENEFIT OF THE HOMESTEAD LAW.

To the Editor of The Tribune.

SIR: A correspondent, signing himself "J. A. F.," in a recent letter to THE TRIBUNE, criticised the Homestead law, and expressed the opinion that it has an evil influence on the fortunes of Western States, and that lazy men avail themselves of the law in order to escape taxes.

I think that many persons will agree with me when I say that paupers and lazy men are not the ones who take homesteads. The homesteaders are hard working people, who are willing to endure hardships at first in order to make for themselves a home and to educate their children. Where do you find a more complete school system than in the Western States, and even among the homesteaders?

I know of several men who, when they took their homestead, had only money enough to pay their land-entry fee, and for years fought poverty and misfortune. Sometimes, when a full harvest that would place them on their feet seemed sure, they would have it cut off by some misfortune. But they persevered, and are now the owners of good farms, with excellent buildings and a plenty of stock. * * * The assertion that they do not pay their share of the taxes, "which they know so well how to assess," because their homestead and $200 of personal property are exempt from taxation, I would like to answer. A homesteader pays a poll tax, a road, a State school, a State university, a district school, bridge, and a bond tax for a railroad. If his homestead were taxed, it would be only a small additional sum, and if he has cows, pigs, &c., each and every one bears a tax. His agricultural machinery is likewise taxed. The tax on the land is as nothing compared with these other taxes. The homesteader is the man who pays his taxes and gives thrift and life to the country. Who build with such rapidity the Western towns and cities but the homesteaders? No one will deny the existence of large and flourishing cities where eight years ago there were only wild prairies. First the railroad, then the homesteader, then the town and cities, has been the rule.

Yonkers, N. Y., April 20, 1875. A HOMESTEADER.

PRESIDENTIAL PROSPECTS.

To the Editor of The Tribune.

SIR: It seems a foregone conclusion that we are to have Gen. Grant for a third term, and it is simply because no better man has been brought before the country. But where, it may be asked, is a better man to be found? In the Senate or in the House of Representatives? With one exception all are enlisted in the service of party interests rather than those of their country. Now if we put one party man in the place of another, what shall it profit? There seems to be no man before the country at the present time fitted for the Presidential trust save one—Senator Schurz, and he is ineligible. W. S.

Newark, N. J., May 1, 1875.

THE COURTS

CITY CHANGES AND FIXED COVENANTS.

SUIT TO PREVENT THE OCCUPATION OF A GOING FOR BUSINESS PURPOSES.

In the Superior Court, General Term, the decision in the case of the Trustees of Columbia College against Anna M. Lynch, in favor of the defendant, has been affirmed. Mrs. Lynch derived title to a lot at Fifteenth-st. and Sixth-ave. from Joseph D. Beers. In July, 1859, the College Corporation and Mr. Beers entered into a mutual covenant that their property should not be used for manufacturing or business purposes, the covenants to run with the land. Mrs. Lynch has complied with the provisions as to the building, but has permitted her basement to be occupied by a broker, who has a sign on the Sixth-ave. front, and has also rented an upper part of the house to a person who takes orders for painting, and who also has a sign.

The College sued to enforce the covenant. Judge Speir, giving the opinion of the Court, holds that the intent of the covenant clearly was to preserve the side streets for residences, the College having no lots on the avenue, and therefore, though the covenant is valid, the breach, the object of the covenant being considered, was too trifling to be made the ground of relief in an equitable action. After speaking of the great changes in the city since 1859, when the covenant was made, which have changed vacant lots into crowded streets, and carried business high up the streets, Judge Speir adds: "It seems impossible to disregard the very different state of affairs which has taken place in the business relations in certain portions of the City of New-York during 15 years. Contracts, which may construed the progress in trade, commerce, and population, should be strictly interpreted. It is the duty of the Court to take notice of these changes. I am of the opinion that the plaintiffs should not prevail for two reasons—first, equity will not interfere if the plaintiffs have suffered no damage; and, secondly, it will not interpose where changes of circumstances render it inequitable to do so. The judgment must be affirmed with costs." Judge Sedgwick concurs.

HISTORY OF ONE OF TAINTOR'S LOANS.

SUIT OF S. E. WILLIAMSON AGAINST THOMAS F. MASON AND OTHERS.

**Judge Van Brunt, in Supreme Court, Special Term, has decided the suit of Samuel E. Williamson against Thomas F. Mason and others. The plaintiff deposited with "F. L. Taintor, Cashier" of the Atlantic National Bank, 166 shares of the Lake Shore and Michigan Southern Railroad Company and 300 shares of the Cleveland and Pittsburgh Railroad Company, with power to sell them at a certain price. Taintor had them transferred to himself as cashier, and pledged them with F. P. Wallace & Co. as collateral on a loan to the bank of $