SCIENCE

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ON THE TEACHING OF ANATOMY TO ADVANCED MEDICAL STUDENTS.[1]

THE importance of anatomy to the physician and surgeon has caused the method for teaching this science to be largely determined by practitioners. The student is taught the elements of histology, the shapes and numbers of organs, the outlines of regions, and their mutual relations. Other facts than those named belong in a very remote degree to the needs of practice; and when the great number of medical topics is considered, which is of necessity brought to the attention of the student, it is no wonder that governing bodies are disposed to disregard all phases of instruction that do not have direct claim upon the physician's time and service.

But science is rarely pursued for practical good. The acquisition of knowledge for its own sake — the determination of general principles that reveal the existence of law — awakens and maintains pleasures and interests in the mind of the anatomist compared with which the practical uses that he can make of the knowledge appear to be poor and mean. With as much propriety one might say that navigation is the highest use that can be made of the study of astronomy, as to assert that the chief end of the study of anatomy is to apply its tenets to medicine. These statements are made not to lessen the dignity and importance of practical work, but respectfully to claim that such work does not comprise all the value, indeed scarcely more than a small fraction of the value, that pertains to the whole.

In his "New Atlantis," Lord Bacon says: "We have three of our fellows that bend themselves, looking into the experiments of others, and cast about how to draw out of them things of use and practice for man's life, and knowledge, as well for works as for plain demonstration of causes, means of natural divinations, and the easy and clear discovery of the virtues and parts of the bodies. These we call dowrymen or benefactors. Lastly, we have three that raise the former discoveries by experiments into greater observations, axioms, and aphorisms. These we call the interpreters of nature."

I hear a response to the foregoing statement that the structure of animals exhibited on a broad scale is already taught to classes in the scientific schools, and that, in the scheme of a university education, the biological subjects are as well advanced as any others in the curriculum. This is an imperfect, if not misleading, presentation of the facts. It is true that the rudiments of the structure and functions of animals and plants are taught. But to students already advanced by general training and by preliminary work in natural history, little is presented that prepares them to discuss the more intricate problems.

To my mind the scheme of university work is unsatisfactory until opportunity is afforded to men, who, after completing their biological and medical training, may desire to still further advance. Conceding that the question of maintenance has been settled, either by the possession of private means or by endowment of fellowships, what courses of instruction are afforded these advanced men? As a rule, nothing, or next to nothing. It is customary for such novitiates to reside abroad for several years, where, amid numerous centres of learning are found one or more masters, the disciples of whom they become. The advantages of travel being considered, it may be said that with the comparatively easy means of obtaining the best instruction the present scheme is on the whole adequate. With such a conclusion I cannot agree. If it were true, we might in reason have stopped long ago in our lines of university expansion. Independence in intellectual as well as in political life should be the object of American citizenship.

First, and always, let us remember that medical investigators are those it is desired to train. It is for men that are already imbued with the desire to pursue their researches in anatomy that I appeal. They stand in this field with what preparations can be given them for usefulness. They are medical biologists — medical anatomists. They are not restricted to the problem of the relief of suffering, and yet they are occupied with those other problems upon which the true solution of all depends.

For such instruction I would have a specially-designed museum and a specially-equipped laboratory. It may be assumed that in every great medical school, from among the large number of matriculates (men already trained and of the best quality), two or three of the type described will present themselves for an advanced course in anatomy. I am prepared for the objection that this is too large a number. But, so far as I know, no one has attempted to ascertain how many men in each class of graduates would come forward, and my impressions are based upon the number of workers in the general field of biology — some of whom, at least, would have pursued these or similar studies had any systematized course been presented to them. I will, therefore, begin with three men a year. To this number may be added as many young teachers, tutors, curators, and prosectors, who would avail themselves of the instruction. The work might be initiated in either of the halls of biology or of medicine. If the course were well established, it would be well to institute a laboratory and museum distinct from any on the university grounds. I am of the opinion that the administrative success of such separation of collections would be assured. All must approve of the ethnological collection of Harvard being distinct from the Museum of Comparative Zoology, and of both in turn being set apart from the museum in the Medical School. In like manner, I assume that there is no reason why series of specimens arranged in illustration of principles that are not taught either in the preliminary or in the proper medical courses, should be necessarily connected with one or the other museum. The collections should be in the main designed to accommodate the preparations that are used in the illustration of general lectures. Museums that teach by the specimens being removed from the cases to the lecture halls are radically distinct from museums that teach by the conservation of series that are

[1] Also published in The Medical News, December 26, 1891.

Nature had these little leaflets in mind long before she brought them forth, as shown by the veins on the first leaf of our little seedling.

But let us return to the perfect leaflet, which has been given off and now enjoys the responsibility of individuality. Observing it carefully, we discover that nature has planned a repetition of the process of division. Leaf No. 4 demonstrates the progress of this conception. The new leaflets can be readily perceived, though they yet live with the mother leaflets, if we may so designate the latter, which continue to elaborate nourishment for their offspring until they no longer need direct parental care.

In leaf No. 5, nature has almost reached the highest type of blackberry leaf of the present. In it, the fifth leaflet is about to bid adieu to its mother-leaflet; it stands on the threshold of individual existence; soon it will reach maturity and have a petiole all its own. The truth of this assertion is demonstrated by leaf No. 6, which represents a normal blackberry leaf, with five fully developed leaflets.

Nature never does anything in a hurry. Whether it took ages or æons to evolve the five leaflets from the single leaf we do not know, but he who runs — through a blackberry patch — may read on every plant or bush some chapter of the story of evolution she has written on the leaves. The single leaflet will not be met with so commonly, but various stages of transition, from three to five leaflets may be found on any blackberry plant.

Agassiz insisted that the laws of geological succession and embryonic development are the same, that embryology, or the development of the individual, is an epitome of the development of the entire series. In the leaves of the seedling blackberry we have, as it were, an epitome of the evolution of the blackberry leaf from the ancestral form to the present type.

The social world is sometimes disturbed and startled by the appearance of a reformer, who casts from him superstitions, dogmas, old beliefs, and mounts to a higher mental plane. So, too, there are reformers among plants; for instance; a blackberry leaf of six or seven leaflets is sometimes found; it is true such leaves are considered monstrosities, or abnormal specimens.

If we again permit ourselves to read between the lines, will we not be able to see in these abnormal leaves that nature is at work now as in the past? Favorable conditions and hereditary influence are now, as formerly, the tools she furnishes her favorites for working out their evolution.

The trifoliate leaf existed in embryo, as it were, in our ancestral seedling leaf. Nature said, "Move on!" When the whole brotherhood had reached the dignity of the perfect trifoliate leaf, she bade them still "move on!" All have not yet attained to the degree of progress represented by the five leaflets. But nature will continue to "move on," and the occasional reversions and reformers are the sign-boards which indicate to us the road she has taken.

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NOTES ON THE FOOD OF THE BOX TORTOISE.

SEVERAL years ago, walking one morning in a wood in Pennsylvania, I surprised a wood turtle or box tortoise eating his breakfast. The season had been rainy, and many varieties of large fungus had attained a prodigal growth. The woods were full of what are popularly called toadstools; many of them were of the diameter of a tea plate, and stood five or six inches high. As I walked through the wood I observed that many of these fungi had been gnawed off evenly, as if cut by a knife, leaving only the central pillar intact. What had done this? I soon discovered, for moving noiselessly over the mossy earth, I came to a little opening, where grew one of the finest of these toadstools, and there was a wood turtle taking his breakfast.

The animal had already made one or two rounds of his plate, and was eating with praiseworthy deliberation. He would bite off a mouthful of toadstool, chew it carefully until he had extracted all the juice, then open his mouth and drop out the chewed fibre, and take a fresh mouthful, biting not inward toward the stem, but breaking off the morsel next beside that which he had just eaten. He paced round and round the fungus as he took his bites, eating his plate like Æneas and the other Trojans, and as the fungus decreased in regular circles the circle of chewed fragments increased. In three quarters of an hour he had eaten all the disk of the fungus to the stem part, and then he walked slowly off to look for another.

I found the crumbs that had fallen from his vanished table quite dry, nothing nutritious being left in them. Why he rejected the central part of the fungus and the stem I could not imagine, but he left it in every instance. If he came upon a decayed or wormy portion of the toadstool he did not "bite round it," but abandoned it altogether and went for a fresh one.

Last summer I took home with me a box tortoise to experiment on feeding it. He ate flies and other insects from my fingers at once, showing no signs of fear; he ate bread and milk with evident relish. I put a blackberry in his open mouth and he closed upon it, but at once, with every appearance of deep disgust, stretched his mouth wide open, and, taking his right front paw hand-wise, wiped all the berry from his mouth. He repeated this performance many times, both with blackberries and blueberries, always using his right paw to cleanse his mouth.

J. MCNAIR WRIGHT.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Hypnotism among the Lower Animals.

THE power attributed to the snake and feline families, of "charming" their victims, seems to me past dispute. Is it not merely a form of hypnotism? Livingston tells us that when at one time seized by a tiger, he felt neither terror nor pain, all his senses seemed to be benumbed. Bates, in his "Naturalist on the Amazons," states that one day in the woods a small pet dog flew at a large rattlesnake. The snake fixed its eyes on the dog, erected its tail, and shook its rattle; it seemed in no haste to seize the dog, but as if waiting to put the dog into a more suitable condition for being seized. As to the dog, it neither continued the attack nor retreated, could not or would not move when called, and was with difficulty dragged away by its master.

I have seen one case of a snake charming a bird, but I had a better opportunity to study a cat charming a bird, and probably the process is much alike in both.

The cat placed itself on the outside sill of my window, near to a pine tree. A bird presently lit on the pine tree, no doubt not observing the cat. The cat fixed its attention on the bird. The cat's eyes were widely opened, and shone with a peculiar brightness; its head was raised and intent, the fur on its neck and about its face slowly stood up, as if electrified. Except for this rising of the fur, and a certain intensity of life in the whole attitude of