

ANIMALS IN THE LABORATORY

THE LIGHT thrown by the "new psychology" on the habits and modes of life of animals has been gained very largely by experiments on captured animals. Many outdoor naturalists object to this mode of experimentation on the ground that it can not give us information about natural animal life in the open, any more than observation of a man in the condemned cell in Sing Sing would afford data on the lives and thoughts of the average American. Among these objectors is John Burroughs, the veteran observer of woodland creatures. In an article on "Animal Behavior and the New Psychology," contributed to *McClure's Magazine* (New York, July), Mr. Burroughs, while granting the many valuable and interesting discoveries of the laboratory naturalists, objects to many of their conclusions and especially to their rejection of the old idea of "instinct"—a term which he thinks we shall do well to retain, in fault of a better. He writes:

"I confess that this short cut to animal psychology through the laboratory interests me very little. Laboratory experiments can lead to little more than negative results. They prove what the animal does not know and can not do under artificial conditions, but do they show what it does know and can do under natural conditions?"

"I grant that you can prove in your laboratories that animals do not reason—that they have nothing like our mental processes. But the observer in the field and woods, if he exercise any reason of his own, knows this. We see that the caged bird or the caged beast does not reason, because no strength of bar or wall can convince it that it can not escape. It can not be convinced, because it has no faculties that are influenced by evidence. It continues to struggle and to dash itself against the bars, not until it is convinced but until it is exhausted. Then, slowly, a new habit is formed—the cage habit, the habit of submission to bars or tethers. Its inherited habits give place to acquired habits. When we train an animal to do certain 'stunts,' we do not teach it or enlighten it, in any proper sense, but we compel it to form new habits. We work with the animal until it goes through its little trick in the same automatic manner in which its natural instincts were wont to work.

"I do not care to know how a laboratory coon gets his food out of a box that is locked; but I should like to know why he always goes through the motion of washing his food before eating it, rubbing it in the sand or sawdust or straw of his cage, if no water is handy. I should like to know why he is fond of shellfish, and how he secures them, since he is in no sense an aquatic animal. In the laboratory you may easily learn how a mink or a weasel kills a chicken or a rat; but how does it capture a rabbit by fair running in the woods or fields, since the rabbit is so much more fleet of foot? In the laboratory you might see a black snake capture a frog or a mouse; but how does it capture the wild bird or the red squirrel in the woods? It is this interplay of wild life, the relations of one animal with another, and how each species meets and solves its own life problems, that interests us and can afford us the real key to animal behavior."

With very low forms of life, of course, the case is different,

as they are almost independent of artificial conditions. Loeb's experiments with the medusæ, ascidians, worms, and mollusks established many things that could have been learned in no other way—his demonstration, for instance, that a certain phase of tropism, response to external stimuli, is the same in both animals and plants. Says Mr. Burroughs:

"His discovery that life can go on without the nervous system, that irritability and conductivity are qualities of protoplasm, and that nature invented and improved the nervous system to secure quicker and better communication between the parts of an organism; the discovery that only 'certain species of animals possess associative memory, and have consciousness, and that it appears in them only after they have reached a certain stage in their ontogenetic development'—that any animal that can be trained, that can learn, possesses this memory; all these things, and many others that Loeb has found out by his laboratory experiments, throw much light on the springs of animal life. It is not an instinct that drives the moth into the flame; it is a tropism—heliotropism. It is not an instinct that makes a bed-bug take refuge in a crack; it is another tropism—stereotropism, the necessity of bringing the body on every side in contact with solid bodies.

"Professor Loeb has shown that neither experience nor volition plays any part in the behavior of bugs and worms; they are machines set going by outward conditions. The warmth of the spring brings about chemical changes in the bodies of caterpillars that set them moving about. Wingless plant-lice, he says, can at any time be made to grow wings by simply lowering the temperature, or by letting the plant upon which they are feeding dry out. The egg-laying mechanism of the blow-fly is set going by certain volatile substances contained in its meat, and this he calls chemotropism.

"Loeb is of the opinion that all so-called instincts will ultimately be explained on purely physiological principles, that is, the physical and chemical qualities of protoplasm. When this is done the difference between reflex and instinctive actions will disappear. The actions of both men and beasts will turn out to be reactions to external stimuli. Probably everything in this world has its physics, has its genesis and explanation somehow in matter, from chemical affinity to human passion, from animal instincts to the poetic frenzy.

"As a scientist, one can not admit anything mystical or transcendental in nature; while, on the other hand, the final explanation of the least fact is beyond us. We know certain things about chemical affinity, for instance; but what makes

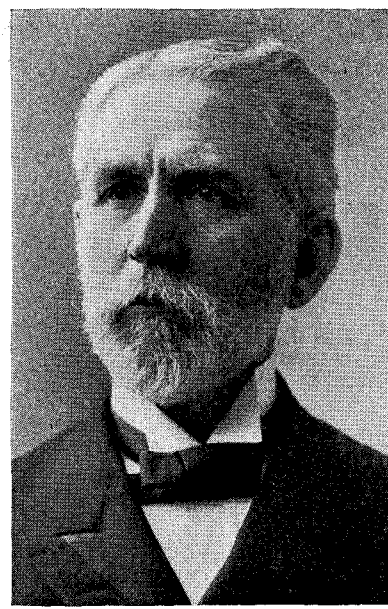
chemical affinity? Why are certain substances so crazy to be locked in each other's embrace? Why, that is chemical affinity. But what is chemical affinity? The instinct of migration in birds doubtless has a physiological basis; but whence this basis? How did it come about? The instinct of the male for the female doubtless has a physiological basis, but whence the basis? All instincts have their physics, but are they on that account less instinctive? . . . The career of every species of animal is determined for it when it is born, or before. The beaver does not have to be taught to cut down trees and to build a dam, nor the muskrat to build its house, nor the woodchuck to dig its hole. They come into the world with the tools and the impulses to do these several things. 'Habit,' indeed! So is the ebb and flow of tide a habit; so is the singing of the wind in the treetops a habit; so is sunrise and sunset a habit. But the habit is as old as time and as new as the day."



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AN ADOPTED SON OF YALE.

John Burroughs hailing a friend on the Yale campus after receiving his degree of Doctor of Letters. He argues that laboratory experiments with animals throw little light on their behavior in field and woods.



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JOHN R. MOTT,

In whose view the economy of energy resulting from unification of missionary effort "would be equivalent to doubling the present missionary force."

LORD BALFOUR OF BURLEIGH,

The President of the Conference, who dwelt on the need of cooperation in missionary labor and of harmony between missionaries and governments.

REV. JAMES L. BARTON,

Chairman of the committee on "Carrying the Gospel to all the World," who estimates the non-Christian world at one billion or more.

THREE PROMINENT FIGURES IN THE RECENT GREAT WORLD MISSIONARY CONFERENCE AT EDINBURGH.

CHRISTIANITY'S COUNCIL OF WAR

"SURELY Jesus Christ is Chinese as truly as he is English," observes a correspondent of *The British Congregationalist* (London), as he surveys the activity of Christians of so many nationalities and races in the World Missionary Conference at Edinburgh. Similarly, the unity of thought and effort manifested in the great council is a favorite theme of religious papers, many of which regret their inability to convey to their readers a tithe of the interesting and momentous proceedings. The important part played by the American delegates is generally noted by the English religious press, and the eloquence of the address of William J. Bryan seems to have made a notable impression on many.

The need in China and elsewhere for missionaries with medical qualifications; the opportunities and the necessity for widespread efforts in India; the necessity for learning the spiritual inclinations of various races through study of their faiths, and the conflict with Mohammedanism in both Africa and Asia were among the subjects receiving special attention.

In reference to the magnitude of the missionary field, *The Christian*, London, reports that Dr. Barton named the colossal figure of from 1,000,000,000 to 1,200,000,000 as the number of the non-Christian world. The entire missionary force for the evangelization of this vast multitude numbers about 20,000 men and women. "What are these among so many?" Of these some 5,500 are ordained men; "a proportion which would not give two ministers to Edinburgh nor more than twenty-seven to the City of London."

While last year about \$25,000,000 was contributed for the work of foreign missions, this sum allots, roughly, about two cents for the conversion of each member of the non-Christian world.

Mr. J. R. Mott, we learn from the same paper, made the statement that unification of missionary effort "would be equivalent to the doubling of the present missionary force."

Following this speaker, Dr. George Robson, reviewing the situation in Africa, said that that continent "is at present becoming Mohammedan much more rapidly than Christian." Further, Dr. Robson claimed "that Mohammedan Africa must be Christianized by medical work, whereas in the pagan regions the great influence must be exercised through education."

In India, said the Rev. George Sherwood Eddy, appealing for workers in that field, there are hundreds of students "turning to the missionaries in these days of unrest—willing to be taught, but in very many cases with none to teach." Another speaker said, of the natives of India, that "50,000,000 of these people are asking to be taught the gospel," while the Rev. Dr. Robert Stewart, from the Punjab, showed that "about 8,000 more missionaries are required in India."

Furthermore we read in *The Christian*:

"Missionaries from the islands of the sea were led by the Rev. J. Nettleton, who remarked at the outset that there are now no heathen remaining to be reached among the Fijian people. At the same time, he presented facts which show how serious questions may arise from immigration. The Orientalizing of Polynesia presents an acute problem—no less than 60 per cent. of the crime in Fiji being committed by coolies from British India. The Rev. W. L. Blamire described the islands of the Pacific, as he knew them, as being in the main marked by Sabbath-keeping more generally than Scotland, and by family virtues more marked than in so-called Christian lands."

The same paper, speaking of evangelical work among the Jews, quotes the Rev. William Ewing as declaring that:

"The Jews in Arabia and other lands are entirely uncared for, while in other countries the ground is very imperfectly covered; and it must be remembered that by many nations the picture of Christianity which is presented to Jewish eyes is a very sad travesty of the truth. At the same time, it is a fact that during the last century no fewer than a quarter of a million of Jews were baptized into various branches of the Christian Church. The Rev. Louis Meyer told us that the present is the great