

Scientists to Explore Dog's World

Psychology

By EMILY C. DAVIS

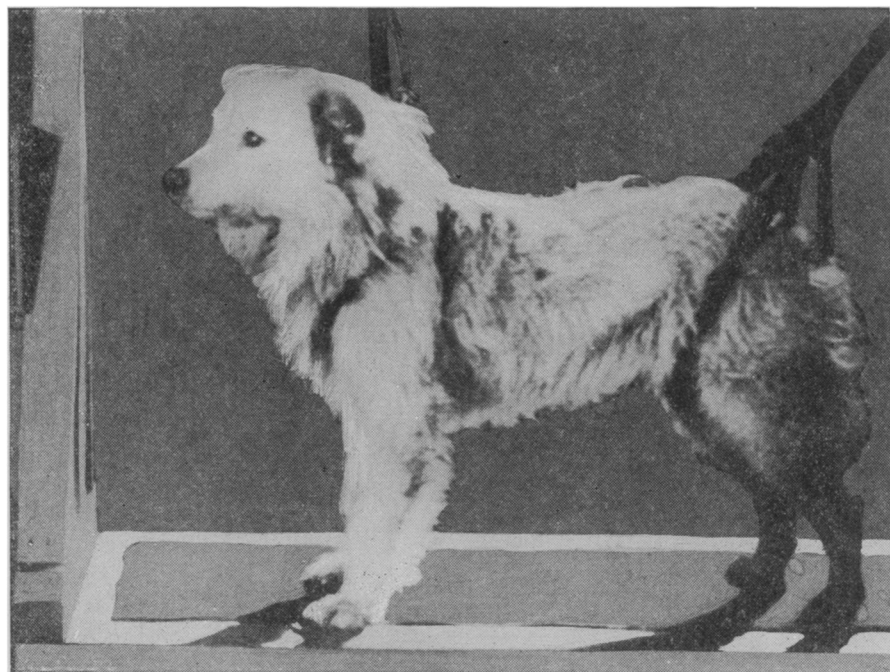
Fame pursues dogs that make good as well as men. Fellow, the German shepherd dog that demonstrated super-dog intelligence before Columbia University psychologists, has been given the new honor of having a scientific fund named after him, the Fellow Fund.

Since this dog came up to Columbia and displayed his ability to respond to 400 different words used in commands, Dr. C. J. Warden, who conducted the college examination, has been fairly besieged by dog owners. Every one is sure that his pet is just as bright as the dog that took the tests. Every one wants to talk "dog". When would Dr. Warden like to make a test of a really remarkable Airedale? Would he please explain how the family collie found her way home after being left 300 miles away in the country? And how can it be possible that dogs do not see the world in colors, when Jiggs, a Skye terrier, always knows his own blue plate that is just the same size as a set of white ones?

To all of this gratifying interest in one of his own pet subjects, Dr. Warden has had to answer that he could test no more dogs, and that scientists have scarcely ventured over the threshold of the strange world that a dog lives in. Finally, the idea of raising a fund with which psychologists could make a comprehensive study of dogs at Columbia University sprouted, with Fellow as its mascot, Dr. Warden as its chairman, and Dr. John B. Watson, exponent of behaviorism, as its treasurer. If the fund flourishes there will be a systematic program of experiments with dogs, perhaps a building devoted to the study of animals.

What is needed, Dr. Warden says, is exact knowledge about dogs, determined by careful experiments, to replace the great mass of contradictory lore about pets that have gone down in family history. Almost any dog owner can talk indefinitely about the cleverness of his dog. But much of what the average man "knows" about the dog and about dogs in general is quite "unknown" to the animal psychologist, Dr. Warden points out.

To take one angle, a woman says that her Scotch terrier, Lassie, recognizes colors. This is perfectly obvious, because Lassie always lies on a red cushion. Once the family mixed



HANDLING A DOG in the Pavlov laboratories during an experiment to learn more of the world of dogs

up the cushions and put a blue cushion on the chair that was ordinarily adorned by the red one. But Lassie wisely looked about and climbed up on her own red cushion.

Interesting, comments the psychologist, but— Did you have the cushions cleaned before the test, to make sure that Lassie did not know her own cushion by the associated smell? How do you know that Lassie did not recognize her cushion by sight without seeing colors? If dogs are color blind, as most psychologists think they are, they see the world in shades of gray—gray meat, gray trees, gray rabbits and gray cushions. A red cushion would appear much darker gray than a light blue one, and it is possible that a dog might detect this difference in brightness, even though a dog's sight is not nearly so good as a human being's. And, a third point, are you sure that you did not carelessly talk about the test while Lassie was looking for the red cushion, and that you did not give added clues by indicating the location of the red one, or by laughing to show that the situation was unusual?

Many dog stories will not stand up under cross questioning. It is not that the dog is less remarkable than its

owner thinks. On the contrary, a dog will probably seem much more remarkable when human beings understand how it really does respond to slight cues and confusing commands.

You can get a vague idea of what a dog's world is like merely by imagining yourself without the power of speech. You can imagine a man calling, saying, "Here, Rex, come get your dinner." You have heard those sounds, spoken in that tone many times, and they suggest eating, just as much as the smell of food suggests eating. But you have no complex filing cabinet in your brain where you analyze those sounds into words made of alphabet letters, or where you differentiate between nouns and verbs. Probably, if the man's tongue got twisted and he said thinner, or winner, in the proper tone, you would come up expecting to be fed, if you grasped the situation at all.

If you failed to understand, the man would probably elaborate, saying, "Come, Rex, nice bones," meanwhile leading the way toward the back porch or holding out a plate with the meat. And, so, by the various associations of hearing, sight, and smell, you, being a bright (*Turn to next page*)

Exploring a Dog's World—*Continued*

dog, would grasp the "idea" of dinner, much more quickly than this can be written or read. But as for understanding the words, a dog's understanding might be compared perhaps to that of a baby when he answers to "go" and a few other words by fitting an accustomed response to the sound.

Dr. Warden, who recently surveyed the present state of scientific knowledge about dogs, found it necessary in his report to say over and over, "experiments indicate", or "it seems likely". Experiments have never been carried through to prove how good or how poor a dog's senses may be, or how much the keenest of dogs may differ from the dog who lacks the "it" of canine personality. Nobody knows very much about the intelligence of dogs, let alone whether an Airedale is brighter than a poodle. The bulldog has been called the most stupid of dog breeds, but there is no way at present of distinguishing between a moron bulldog and an occasional super-intelligent bulldog.

Summing up what science has learned so far, Dr. Warden declared: "It seems probable that the average dog is far more sensitive to odors than is man; that he is not strikingly unlike man with respect to sensitivity to sounds; that his vision for still objects is decidedly inferior to that of man, while his acuity with respect to moving objects is great, although there is not sufficient data to warrant a comparison with man in this respect."

Pronouncing upon the learning ability of a dog, which is an indicator of its intelligence, Dr. Warden said: "The dog appears to be superior to the cat, slightly inferior, perhaps, to the raccoon, and probably inferior to monkeys and apes."

This line-up of the animals, however, Dr. Warden hastens to explain, is based on experiments which may not be equally fair to the different animals. A dog's paws are notably clumsy as compared with a monkey's hands, or even with a raccoon's forepaws.

Dr. John Watson, in an interview, deplored the dearth of knowledge about dogs.

There has never been a single piece of research to show conclusively what a dog's sense of smell is able to do for him, the psychologist stated. This is particularly surprising, in view of the fact that the sense of smell is the dog's most important sense.

Thinking back to the time when he studied dogs, before he worked up in the scale to investigating the emotions of babies, Dr. Watson described a simple experiment with the dog's ability to follow a trail, which he himself planned but never carried out.

"I was going to set out and wander in devious ways for two miles or so," he said. "At a set time, the dog would be turned loose, and I would time him until he found me. The route would lead partly through swampy land, so that the dog's backtracking could be followed and recorded, showing where the trail presented difficulties and what the pattern of the route was like.

"Such a piece of experimental work on backtracking and trial and error in picking up a trail has never been done. I never go hunting that the dog does not overrun the game, and yet the processes that the dog follows have never been investigated."

Fifty years ago, when exact experimenting with dogs was a very young science, Romanes set an example of this sort of experiment, Dr. Watson pointed out. Romanes had six people walk along, each stepping in the others' tracks. Romanes' setter was turned loose to follow at a distance. After a time, Romanes himself stepped aside and went in another direction. The dog quickly left the main trail, where the others were still walking, and followed the psychologist.

Most dog owners would jump to the conclusion that the setter was faithfully following its master. But Romanes continued the experiment. He found that the dog would not trail him if he wore a new pair of shoes, and it did trustfully follow a stranger in a pair of Romanes' old shoes. When paper was pasted all over Romanes' old boots the dog was at a loss to find the trail, but when a bit of the paper had worn off, the setter picked up the trail and came tearing after him.

But, like so many experiments with dogs, even this one started fifty years ago has never been carried through to a satisfactory conclusion. How would other setters compare with this one on the same test? Would a different breed of dog act in the same way? What influence does the wind have in helping or hindering the dog?

A series of tests several years ago in Germany showed that dogs are not to be depended upon in tracking criminals, Dr. Watson pointed out, at

least not until the dog's sense of smell is better understood. The tests showed that the police dogs and prize winners in other breeds could not reliably follow a fresh human trail among other recently made trails. In another of the tests a dog was given the glove of a person and told to select the owner who stood with nine other men in a line. If this worked, hats and other possessions carelessly left by a criminal at the scene of a crime could be used in identifying the guilty suspect. But the dog failed entirely to fit the glove to its owner. As a result of the investigation the Prussian government forbade use of dogs in criminal detection.

Some day dogs may be useful for this purpose—when communication between man and dog is clearer, when it is certain that the dog understands what is expected of him, and when the man knows what the dog is trying to do.

Just when the dog's detective career seems likely to be suspended pending further developments, new evidence about the dog's hearing ability shows how useful it may be in this field. At the laboratories of Ivan Pavlov in Moscow, it was shown that dogs can detect notes pitched so high that human beings cannot hear them. This sensitiveness to "invisible" sounds may account for a dog's uneasiness when burglars are quietly at work gathering up the silver. Some of the dog's keenness is due to its ability to hear fainter sounds than a man ordinarily notices. It is also possible that burglars at a safe make noiseless noises too high in the scale for their own cautious ears. But these tests need to be corroborated by further studies since other cues than sound may have operated.

A use has been found for the dog's ability to catch high notes. In some German cities where dogs are still part of the police force, ultra-high whistles have enabled the policemen to call a dog without at the same time calling a thug or bandit away from his job.

Men will probably depend less upon a dog's sight in the future, when they realize that a dog cannot necessarily see what a man can. The evidence that dogs are probably color blind suggests that a dog's surroundings appear to him somewhat as the world looks in the evening, just as dusk is beginning to gather. At that time we can still see with fair distinctness, but colored objects are (*Turn to page 227*)

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fading to gray. At such a time a moving object against the gray would catch the eye sharply, which may account for the dog's quick alertness at any moving object.

Studying dogs will not only reveal the facts about a dog's behavior. There are a tremendous number of human problems that can be worked out with dogs, Dr. Watson believes.

"I think we can produce psychopathic dogs and thus shed light on nervous diseases," he declared.

At the Pavlov laboratories, Anrep produced a nervous state in a dog, Dr. Watson pointed out. The dog learned that food appeared at the sight of a luminous circle, but not when an ellipse was shown to him. Then the physiologist began to make the test harder by showing the dog ellipses that were more and more rounded, like the circle. When the problem became too hard, the dog could not make decisions and began to be nervous. It wriggled and squealed, and tore off the apparatus that was attached to it, and in general suffered from what a human being might call a nervous breakdown, if he were placed in a situation where the problem was too much for him.

"Society will not let scientists produce nervous diseases in men," said Dr. Watson, "but when we know how these conditions become established, we can more surely proceed to remove them. It can be done with dogs, and the field is all new. It opens up a world of possibilities in establishing fears and removing them. We can make a dog that would fight another dog of any class or type, and we can make a coward of another dog."

Children's feeding habits are another problem that can be tried out on the dog, with enlightening results, Dr. Watson believes. In some of the polar expeditions, dogs developed an abnormal feeding condition because they could get nothing to eat except rotten meat. When the dogs returned to civilization, they were so accustomed to this food that they could eat nothing else, and the problem of building up new habits of normal eating was a difficult one. When a condition of this sort is understood in a dog, and when the dog can be reconditioned, it may be easier, Dr. Watson says, to cure a child's unreasonable aversion for spinach or an abnormal habit of licking paint off a chair.

Science News-Letter, October 13, 1928

Radio Produces Artificial Fever

Physiology

A brand new method of experimentation in physiology that may very likely prove a new method of cure for certain diseases is opened up by recent work at the Albany Medical College by Dr. Helen R. Hosmer. She has been making a careful study of the effects on animals of short radio waves of from 25,000 to 10,000 kilocycles (12 to 30 meters), and will make a preliminary report of her work in the forthcoming issue of *Science*. The effect was noticed when bystanders around a 20-kilowatt, 5-meter transmitter found that their temperature was raised. The mouth temperature of one person rose 2.2 degrees in fifteen minutes, while others showed a somewhat smaller rise, or fever.

Dr. Hosmer has measured the effect of the waves from a special 750-watt transmitter, furnished for the purpose by the Research Laboratory of the General Electric Co., in heating a weak solution of ordinary salt. Such a salt solution is very similar to the fluids of the body in its behavior. The rate at which the temperature of the solution rose depended on the wavelength and the strength of the solution. With a frequency of 25,000 kilocycles, corresponding to 12 meters, a strength of one part of salt to 2000 of water was heated most rapidly, while with 10,000 kilocycles (or 30 meters) a solution of only half this

strength was heated at the fastest rate. The liquid was placed in a tube between two parallel metal plates connected with the transmitter.

When a tadpole was placed between the plates, its temperature rose three degrees in 31 seconds while it was alive and 12 degrees in 2 minutes after it was dead. This was with a single tadpole, when there were a number together the rate of heating was higher. Experiments were also made with rats.

Though Dr. Hosmer points out the extreme danger of exposing human beings to these waves until much more is known about them, she states that it affords a new and important field for the experimental physiologist. Now he can induce fever at will without introducing poisons, bacteria, or other foreign bodies into the blood. As malaria has been found useful in the cure of progressive paralysis, an effect believed to be due to the heating of the body by the malarial fever and consequent killing of the germs, fever caused electrically may prove useful instead. This would eliminate the bad effects of the malaria.

Similar experiments along this same line, but without such powerful apparatus, have been made by Dr. W. T. Richards of Princeton University, and Alfred L. Loomis of the latter's private laboratory at Tuxedo Park, N. Y.

Science News-Letter, October 13, 1928

Indians Neglected Jewels

Anthropology

Native Americans, who preceded the white man in the possession of this continent, seem to have made little effort to mine the treasures in their reach, according to Dr. George F. Kunz, well known authority on precious stones. Although diamonds have been found in thirty-five localities in the United States, they were never worked by prehistoric Americans. With all the gold in California, there was no gold mined or worked by Indians of that particular region. It was the Spaniards who really set the Indians to hard labor in the search for precious stones and metals.

How public opinion can help or hinder the progress of American archaeology is pointed out by Dr. Carl Guthe, of the committee on state archaeological surveys of the National Research Council. There is considerable digging among Amer-

ican antiquities by amateurs and traders who do not realize that the old pottery, beads, and other relics are really parts of important historic documents, Dr. Guthe said. Removing such things from the soil without first carefully recording all evidence as to their age and significance, and then making collections out of these isolated specimens is about as useful as cutting the "ands" out of valuable old manuscripts and marveling at the different penmanship of the old writers. The great importance of archaeological expeditions is not the collections they can make but what new things they can learn about the past civilizations of the world. Public opinion condemning the practice of spoiling American antiquities for science would be more powerful than legislation, he said.

Science News-Letter, October 13, 1928