

of scientific work to reduce their cost of production or to protect their crops and animals from destruction. They pass on the advantage to the consumers. If wheat growers could be shown how to cut the production cost of wheat five cents a bushel, then the consumers would get their wheat that much cheaper. Farmers may have their faults. Who does not? But they never have been accused of hoarding, nor of monopolizing. Those practices are not possible in American agriculture.

Summarizing, then, in closing: Research in agriculture is necessary, not

only to improve standard agricultural methods but especially to enable farmers to contend with new diseases and pests that have a way of appearing unexpectedly and that may become highly destructive to our food supply. Because of the wide interest in agricultural problems and the dependence of everybody upon their successful solution, the Federal and State Governments have seen fit to support research work. And lastly, the benefits which come from the application of science to food production are passed along promptly to the ultimate consumers.

THE MEDICAL CARE OF ANIMALS IN THE ZOO

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IN order to maintain a large collection of wild animals in a state of good health it is necessary to provide suitable sanitary buildings, a wholesome and hygienic food supply and expert medical supervision. In order to successfully combat diseases, especially those of a contagious nature, a most complete and efficient quarantine system is absolutely necessary. A grave form of disease may be introduced by apparently mild or trivial cases. With animals arriving almost daily from different parts of the globe, great care must be constantly exercised in guarding against the introduction of a possibly diseased animal into a collection known to be healthy.

Prevention of disease is the constant aim of the medical department. All sanitary measures contribute to the healthfulness of our animal collections. Disinfection as a preventive of disease plays no insignificant part in the medical work of the Zoological Park. Among the Zoo's charges are some of

the rarest and most valuable specimens in the world, and it goes without saying that the death of any one of them would be a great blow to the scientific world, not to mention the serious financial loss entailed, even if it were possible to replace them.

In a zoological park with collections as large as ours, sickness, accidents and death must inevitably occur. Animals are subject to almost as many of the ordinary ills as is man, and in captivity these ills are frequently intensified. The difficulty in arriving at a true diagnosis is greater in wild animals than in the domestic species. Where docility is a pronounced factor, one arrives at a diagnosis by a process of elimination, by the use of the thermometer, the pulse, tapping and listening to the chest cavity, and otherwise handling the patient without undue excitement. While the human patient can tell you his feelings in their regular order we can only infer most of these in the animal through external manifestation of pain and dis-

comfort. The wild animal physician must carefully watch for and accurately observe all such symptoms, and then endeavor to rightly interpret them.

If, in addition to all the obstacles in the way of treating these patients, it is realized that wild animals in captivity are subject to nearly all the diseases common to man and the domestic animals, and that every wild animal is well equipped with claws, horns, sharp teeth or tusks, and with a strength and agility far beyond that of a human being, you may get some idea of the difficulties with which the wild animal physician must contend.

One advantage the animal doctor has over the human practitioner is that he does not have to listen to long tales of imaginary ailments from his patients, nor do they just fill themselves up with patent medicines before coming to the doctor as a last resort. Unfortunately, the "patent medicine man" has not yet appeared with a panacea for all ailments to which wild animals are heir.

When an animal is ill it is, if practicable, removed from its fellows, whether its disease is contagious or not. In the former case the reason is obvious, but in all cases quietness and extra comfort are needed. The patient can be better observed, the symptoms more closely noted, and the disease from which it suffers more clearly defined when the animal is alone and left to the exercise of its own undisturbed will.

To provide for the treatment of diseases and for the operations which are necessary where a large number of animals are kept in captivity, it is essential that hospital accommodations be provided. The New York Zoological Park has a well-equipped hospital. There is probably no other hospital where such a varied list of patients might be seen. The hospital is conveniently located near the center of the park and well isolated within a walled enclosure, which

insures quiet. It is a large, single-story brick building, containing medical and surgical wards, operating room, pharmacy, diet kitchen, quarantine room, research laboratory and the doctor's office and study. All the wards are equipped with sanitary cages. Electric exhaust fans, which can be regulated to insure a perfect system of heating and ventilation, are installed here.

In giving medicine to wild animals it is necessary to concentrate the drugs as much as possible. It is best that the animal should not know that it is getting medicine at all, so that it becomes necessary to disguise the drug in some way. For the practitioner of human medicine modern pharmacy has provided a large number of preparations, which in some respects are even more necessary to the animal physician who ministers to sick animals which can not understand the object of what must seem to them ill usage.

Again, there is every reason why the animals should get their medicine in the way that will cause the least disturbance to their feelings and without that excitement which may follow a struggle to give medicines. Small pills, gelatine or sugar-coated, sweet lozenges, tablets or capsules, carefully concealed in an innocent-looking banana, may be administered to an unsuspecting ape, without the slightest difficulty. Occasionally, however, he may suspect, and great is your dismay at seeing him minutely pick the banana apart, find the offending pill, test it with his teeth, smell of it, and finally with a wry face cast it through the bars of his cage at his keeper.

The nursing of sick animals is of the greatest importance. The essentials are pure air, sunlight, cleanliness, warmth and nourishing and sustaining diet. During convalescence all kinds of delicacies are offered to tempt the appetite, first one thing and then another; but no

food is allowed to remain long before the animal, because the very fact of its being constantly present will cause him to loathe it. When the animal has no appetite it may indicate that the stomach is not in a proper condition to digest food; consequently, if forced upon him it will cause indigestion and aggravate the case.

While digestive and pulmonary diseases are the more common ailments requiring medical attention, yet the doctor is frequently called upon to perform major and minor surgical operations. If the operation is painful, a general anesthetic is administered, because in addition to the humane sentiment involved perfect control of the animal is necessary for the safety of the operators and also for the successful handling of the patient. Chloroform and ether are used for general anesthesia, with local injections of cocaine or morphine in minor operations.

Some of the surgical operations that are performed from time to time are unique. Once our African rhinoceros, "Victoria," required a surgical operation for a deep-seated abscess which affected the lower jaw-bone. The rhinoceros was hobbled with ropes, cast upon a grass mattress and put to sleep with chloroform. While less than an ounce of chloroform will send a human being to sleep, it took two pounds of chloroform and three quarters of a pound of ether to put this animal in a state of pleasant slumberland and render the operation entirely painless.

It is not a simple matter to prepare a big alligator for an operation, and when "Big Mose" had to be operated on for a large tumor on his foot, it was like handling a well-lubricated pig. In preparing Mose for the operating table his head was covered with a gunny-sack, then his jaws were muzzled, and he was securely fastened with strong ropes to a thick plank eighteen inches wide and twelve feet long. Local anes-

thetics rendered the removal of the tumor a painless procedure.

Some of the most difficult animals to control are the larger lions and tigers. A full-grown lioness, captured by the late "Buffalo" Jones, was noted upon her arrival to have some injury to her front feet. While she sulked and would not permit any examination, close observation detected the trouble to be that the claws had grown into the pads of her feet, making it necessary to destroy the nails. Getting this ferocious animal to an operating table was a real problem. However, the Lion House is very well equipped for all sorts of emergencies, and one of its modern improvements is an elevator with a fixed cage six feet long and two feet wide. Meat was placed in this cage, and the lioness was enticed into it. Once the lioness was trapped, a tarpaulin was placed over the cage, making it airtight. She was quickly chloroformed by means of an atomizer pump, roped and securely tied. The operation of removing the irritating claws was a matter of but a few minutes' work. The lioness' cage was then wheeled out of doors and she promptly came to. And what a racket she made! She roared and howled! The whole park resounded with her rage and anger. Visitors ran up, but one look was enough. The lioness plunged to the front of the cage, and though she had no chance to get loose, that crowd made for the exits without delay. The animal was well in about ten days and lived in the park for more than fifteen years, a good age for a lioness in captivity.

Bears also need plenty of surgical attention. Once one of our huge Alaska brown bears, while engaged in a fight, drove one of his canine teeth (two inches long) completely through his upper lip. The animal was wild with pain until he was chloroformed and the lip released by means of strong forceps.

It would make a charming commentary on our work if we could note any gratitude on the part of our patients for what we do for them. As a matter of fact, we rarely see any notable response of appreciation. I recall an orang-utan that was once treated for pneumonia and later became a thorough hospital addict. He was constantly looking for attention and was very agreeable about being treated for any ailment.

An unusual operation on animals, though it is not uncommon on humans, was performed on the eye of our Indian rhinoceros "Mogul." This rare animal, a splendid physical specimen, came to the Zoological Park with a cataract in each eye, causing blindness. It was necessary to perform the delicate needling

operation in which a knife is inserted in the eyeball and the capsule of the lens is ruptured in order to dilute and permit the absorption of the opacity.

The operation is absolutely painless and is often performed on human patients without a general anesthetic, but with the rhinoceros it was necessary to place the animal under chloroform as well as to use cocaine on the eyeballs. The surgery was the easiest part. Preparing the patient for the operation was far harder. The animal weighed nearly two tons and had such big feet and short legs that it was a difficult matter to get him on the operating mattress. It required the united efforts of ten keepers to hobble and cast him. After two operations the animal was able to see.