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Household Pets as Sentinels of Environmental Risks for Humans

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POTOMAC FEVER

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The New Bolton team is investigating blood samples from horses with Potomac Fever in an effort to identify the agent. It is hoped that once the agent is found, a diagnostic test can be developed and perhaps a vaccine. The study has been very expensive. It costs over \$700 a month to follow a pony and do the necessary tests just to be sure that the animal is sick from Potomac Fever. There are additional costs incurred for virology studies, microbiological techniques, electron-microscopy, special stains and other work needed in an effort to recover the new pathogen.

The studies so far have been supported by private funds and recently the Morris Animal Foundation has awarded a grant to the School to determine how the disease is transmitted, to find the agent causing it, and to determine whether animals develop immunity. The foundation also awarded a grant to the Maryland-Virginia Regional College of Veterinary Medicine for the study of Potomac Fever.

Dr. Whitlock is hopeful that a solution to Potomac Fever can be found. "We know that horses which have recovered from the disease do not get it when challenged," he said. "It may be possible to get a serum from these animals and use this as a temporary protection for threatened horses. It will take money to develop the serum and to determine the protocol; as we don't know the cause of the disease, this could be a good interim measure." He feels that horse owners can take some steps to protect their animals from Potomac Fever. "As we feel that it is probably transmitted by an insect, insect control is vital. Barns should be kept as free from insects as possible and insect repellent should be used on horses to minimize the chances of being bitten." He continued by stating that if an animal contracts the disease, supportive care and fluid therapy are vital and should be instituted at once by the veterinarian. He felt the risk is minimal for horse owners who might be attending sporting events in the Maryland area as Potomac Fever does not appear to be transmitted through contact. "Horses can be taken to horse shows," he said. "That's usually only one day." Additionally, over 90 percent of the horses studied are local horses. Some evidence exists to indicate the disease is widespread and similarly affected horses have been reported in New Jersey, Oklahoma, Texas, Wisconsin and Colorado. Thus the Potomac Fever agent may be present throughout the country but not recognized for what it is.

The researchers here at New Bolton Center and at the other institutions hope to have a solution to the Potomac Fever problem before the summer, but a lot of work and money will be required to isolate the, so far, elusive agent. Further studies are planned for the summer in an effort to find the cause and a method of preventing the disease.

The New Bolton Center team includes Dr. Charles E. Benson, microbiology; Dr. Helen Aeland, pathology; Dr. Peter C. Mann, necropsy evaluation; Dr. Jonathan E. Palmer, epidemiology; Dr. Robert H. Whitlock, gastroenterology; Dr. Fern Tahlin, electronmicroscopy; Dr. Jorge F. Ferrer, and Dr. Richard A. McFeely in an advisory capacity, and further supported by five laboratory technicians. The team is assisted by Dr. Gerald Woodle, College of Veterinary Medicine, University of Iowa, Ames, Iowa, and Dr. Allen Jenny from the National Veterinary Services Laboratory, Ames, Iowa. *Helma Weeks*

HOUSEHOLD PETS AS SENTINELS OF ENVIRONMENTAL RISKS FOR HUMANS

Dogs, in their long association with man, have had many roles, ranging from assisting the hunter to being a family pet. It is in the latter role that canines may play a vital part in providing an early clue to environmental risks.

A recent epidemiologic study at the School of Veterinary Medicine, University of Pennsylvania, examined records of eighteen dogs which had been admitted to VHUP with mesothelioma, a rare tumor found in humans who have been exposed to asbestos. "Dogs share man's environment, yet do not indulge in activities such as smoking or working which confound interpretation of epidemiologic studies," said Dr. Lawrence T. Glickman, chief of the section of epidemiology at the School. "Given the relatively short lifespan of these animals, the latent period for tumor development is decreased and accurate information regarding environmental history can be obtained."

It was found that the exposure of the owner to asbestos at work or through a hobby was significantly associated with the mesothelioma cases in the dogs.

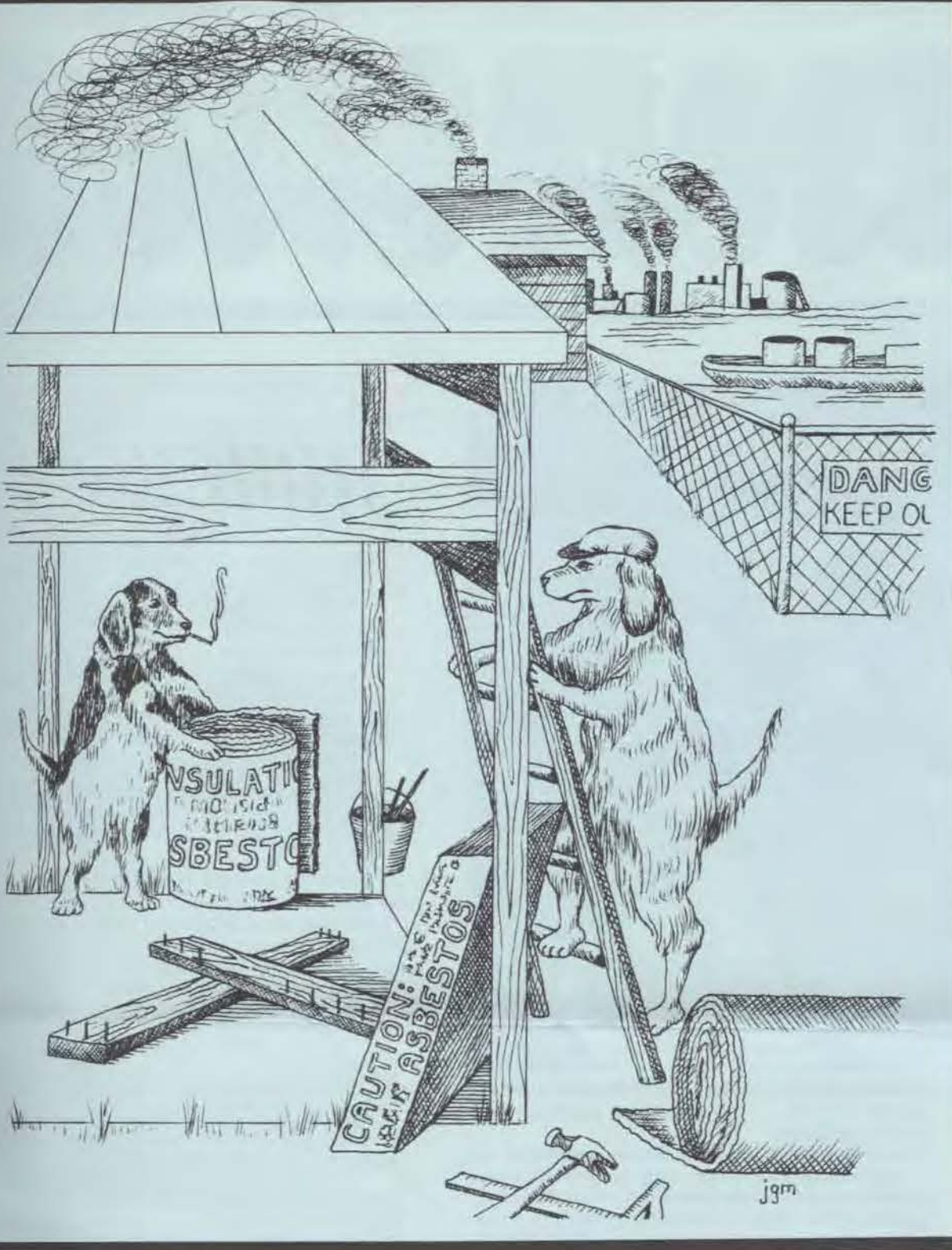
Asbestos, a mineral fiber, is all around. It is found in insulation, brake linings, construction material, fireproof clothing, and is used in ship building. The substance is mined in Canada, Western Australia, and South Africa. The fiber composition of asbestos differs, depending on where it was mined. The primary product used in this country comes from Canada and is chrysotile, a straight fiber. The product from Africa and Australia is crocidolite which is a serpentine fiber. Asbestos fibers are minute, easily inhaled and ingested.

Pathologists found traces of these fibers in human patients who had died from mesothelioma, a rare tumor of the chest cavity. Epidemiologic studies showed that most cases occurred in persons who worked in shipyards or asbestos manufacturing plants. It was also found that peo-

ple exposed to the crocidolite fiber are at a higher risk of developing the tumor than people exposed to the chrysotile fiber. In animal experiments it appeared that the danger rate was about the same. Exposure to asbestos can result in a number of other debilitating and pulmonary diseases. In most cases asbestos-related symptoms and disease are not seen until twenty or thirty years after initial exposure to the mineral.

The Penn study evaluated records of dogs diagnosed with mesothelioma because it was felt that pet animals might be a resource for identifying environmental human carcinogens. The group of dogs consisted of eighteen histologically confirmed mesothelioma cases which had been diagnosed at VHUP between April 1977 and December 1981. Two control groups of cancer and non-cancer patients at the hospital were selected and matched by breed, age, and sex to the mesothelioma group. Information was solicited by telephone from the owners of the dogs in the three groups about the dog's medical history, residences, management, as well as the occupation and medical history of household members. Questions were also asked pertaining to occupations and medical history of household members, as well as about hobbies and occupations which might have exposed owners and their families to asbestos. Residences were classified as urban or rural and analyzed for the first, longest, or residence of diagnosis.





It was found that the exposure of the owner to asbestos at work or through a hobby was significantly associated with the mesothelioma cases in the dogs. It was also found that animals living in an urban environment were at a higher risk than those living in a rural one; this was most evident for the first residence. The researchers were able to positively identify the sources of asbestos in 75 percent of the dogs. They found that these included a household member with an asbestos-related occupation or hobby for nine

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dogs, home remodeling or addition of home insulation for five dogs, and the use of flea powder or sprays for five dogs. Quite a number of the owners worked in auto repair shops, a number worked in construction involving work with gypsum wall board and spackling. Some owners had done extensive home remodeling and others lived near demolition and construction sites. One dog accompanied the owner to work which was adjacent to a shipyard. Three of the dogs had no exposure to asbestos, but they had been treated regularly with flea powder or sprays. The mean age of the animals with mesothelioma was eight years; this corresponds to middle age in humans, when most asbestos-related diseases are first diagnosed. The asbestos fiber level in the lungs of the affected dogs was similar to the level reported in humans with mesothelioma who had had occupational exposure to asbestos.

The flea powders and sprays may represent a yet unidentified health hazard. Twelve products were examined and amounts of quartz, silicates, silica, and small amounts of antigonite, a fiber closely related to asbestos, were found. Dr. Glickman explained that while asbestos fibers were not specifically identified, exposure of humans to other mineral fibers has been associated with pulmonary disease. This should be studied further as flea powders are widely used.

He feels that household pets provide an early indicator of asbestos dangers in the owner's environment. "Because of the short latent period for tumor development in the dogs, the mesothelioma would often precede human disease by many years. Humans frequently develop such tumors twenty to thirty years after exposure to asbestos and household pets could serve as a useful sentinel for human exposure to the mineral."

Once a pet has been diagnosed as having the tumor, the veterinarian should alert the owner, who then should be screened for early signs of asbestos-related disease. Such early warning would give people an opportunity to reduce exposure to the mineral and to change habits, e.g., stop smoking. It has been found that smokers who have been exposed to asbestos have a ten times higher rate of lung cancer than nonsmokers who have been exposed to asbestos.

The study also found that more male dogs than female dogs had the tumor. It is not known why this is so. In humans this pattern is associated with occupational exposure to asbestos.

Dr. Glickman stated that "pet animals with spontaneous tumors provide a valuable resource for epidemiologic studies of environmental and dietary risk factors for cancer. Provided that only histologically verified tumors are included and accepted epidemiologic techniques are used, pet animals may provide insight into the role of environmental and dietary factors in human cancers." It appears that even in illness the dog never ceases to serve its family.

The collaborators in the study were: Lawrence T. Glickman, V.M.D., Dr.P.H., Linda M. Domanski, M.H.S., Tobi G. Maguire, B.A., Richard R. Dubielzig, D.V.M. and Andrew Churg, M.D. *Helma Weeks*