become partially blind. The remedy is to change the eye at the tube; but this change is rarely made, because of initial difficulties.

If a translucent, but not transparent, screen is placed over the unemployed eye, and the requisite time allowed to get used to it, the following advantages may result: (1) The intensities of the light reaching the two eyes may be roughly balanced by putting a sheet of white paper on the table under the unemployed eye; (2) there is nothing to lead the unemployed eye astray, and prevent it from converging with the other, or to keep their axes from being parallel; (3) the accommodation of the two eyes can change together, since the translucent screen prevents the unemployed eye from fixing on near objects; (4) if it is desired to change the observing eye, the screen may be arranged so that there is a constant reminder as to which eye is to be used. After observing with the right eye for years, it is possible to change to the left eye in a month or two, so that this eye gives images good enough for routine work.

At slight expense one can prepare a screen which affords, after a few weeks of practice, much of the comfort of the binocular, while retaining the simplicity of the monocular. In some of the periscopes used in the late war it was found advantageous to use a blank eyepiece for the unoccupied eye. This gives fair results with the monocular microscope, but it is needlessly elaborate. In half an hour a frame can be cut out of sheet aluminum, with a circular aperture into which the eyepiece of the monocular fits snugly, while a disc of ordinary paraffin waxed paper covers the other circular aperture at the right interocular distance. The upper surface of the metal can be blackened, or a sheet of dark cardboard cemented to it. If an extension is left to serve as a handle, a meniscus, deep sphere, achromatic meniscus, Verant or Steinheil triple lens can be fastened in one aperture, while the other is shielded by the translucent screen. This gives, after practice, an increase of comfort in the use of a hand-lens or reading glass. If such a frame is fitted to a monocular prism field-glass, it gives a sense of ease. Finely ground glass may replace the waxed paper.

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SPECIAL ARTICLES

DISEASES OF THE RUFFED GROUSE

SPORTSMEN and bird students are taking an ever-increasing interest in the conservation of our game birds. They have accomplished much through the passage and strict observance of good game laws and have replenished areas which have been depleted of game by numerous introductions of new stock. Until recently however sportsmen have not coordinated their efforts in conservation with a definite plan of ornithological investigation. A comprehensive study of the ruffed grouse has now been undertaken. The problem is not a simple one and there is needed the cooperation of every one who is interested in the welfare and the future of the grouse. It is probable that disease may kill as many or more birds than do the guns of all the sportsmen in the country, but we can not hope to combat disease until we know more about it and its intricate relations in the life of the birds. During the course of life history studies now being made at Bowdoin College, Brunswick, Maine, and work conducted in southeastern New York during 1924 for the Roosevelt Wild Life Forest Experiment Station of Syracuse, certain diseases of the ruffed grouse have come to my attention. It seems desirable to make a preliminary report of the diseases found, at this time, as they probably have an important bearing on the sudden fluctuations in the numbers of the ruffed grouse. The author also hopes that this report may stimulate the desire of all persons interested to examine birds found dead and all birds killed which present symptoms of disease.

Thus far I have received eighteen birds in the flesh, two from New York, five from Connecticut, one from Rhode Island, two from Massachusetts and eight from Maine. Of these eighteen birds eight were killed and ten were found dead; of the latter, three had met death by violent plunges into buildings and one by flying into telephone wires. Two of the birds found dead died as the result of injuries received in some unknown way and seemed to be normal as far as the presence of any disease was concerned. None of the ten birds found dead had been shot.

The cases of parasites and diseases among the eighteen birds are: *Dispharynx* seven, *Ascaridia* two, pulmonary mycosis two, tuberculosis three and one bird died apparently from the results of a large abnormal growth dorsal to the abdominal viscera. The 44 stomachs examined were free from parasites. Following is a brief statement of the diseases.

DISPHARYNX (DISPHARAGUS; ACUARIA)

Dispharynx is a parasitic nematode worm which usually becomes established in the proventriculus, a glandular swelling at the base of the gullet, and in later stages spreads to the muscular walls of the stomach. The names *Dispharagus* and *Acuaria* have been used by various writers to designate this para-

site, but Dr. B. H. Ransom, of the U. S. Bureau of Animal Industry, the leading authority on this group, prefers to use the generic name *Dispharynx*. This parasite has been noted in the ruffed grouse by Dr. A. A. Allen in specimens which he examined at Cornell University, and according to Dr. Allen it has been the cause of death of some of his birds raised in captivity. Since it has a wide distribution from Michigan to Maine, Dr. Allen thinks it is the most important factor concerned with the present scarcity of the ruffed grouse. In nearly all the cases of *Dispharynx* examined at Bowdoin the infection was in its initial stages and I doubt if in any of the seven cases could the death of the bird be attributed solely to the presence of the worms. The seven cases represent five distinct localities and four different states, emphasizing the fact that the parasite is not local but spread over a very wide area. Two of the birds infested with *Dispharynx* had been shot. Two were found dead; in one *Dispharynx* was combined with pulmonary mycosis and in the other with tuberculosis. In the case of these two birds it is probable that the presence of *Dispharynx* so weakened their resistance that the diseases easily gained a foothoold. Three birds infested with this parasite killed themselves by flying violently against buildings. Every year the newspapers report numerous like cases of accidental death. It would be interesting to examine all birds which have killed themselves in this manner as some relation might be found to exist between the so-called "crazy flight" and the presence of the stomach worms. Others, including Dr. Allen, have examined similar cases. The parasites undoubtedly cause a severe irritation that may be the initial cause of this peculiar behavior.

ASCARIDIA LINEATA (SPECIES?)

This nematode worm is frequently found in the intestinal tract of grouse. It is a very common parasite of wild birds, but so far as I can ascertain has not been proved to be a serious menace to the host. Nevertheless, a thorough investigation should be made of these parasites, of which so little is known concerning their direct pathological effects and their possible bearing on various grouse diseases.

PULMONARY MYCOSIS

Mycosis is a general term applied to infections with Hyphomycetes, and in the cases under consideration it concerns the growth of *Aspergillus* in the lungs and air sacs of the birds. Mycosis is well known to breeders of poultry and ostriches under the name of brooder pneumonia. It also occurs among birds confined in zoological parks, but I know of no case on record where it has occurred in the ruffed grouse in nature.

The author is indebted to Dr. E. E. Tyzzer, of the department of comparative pathology, Harvard Medical School, for the determination of this disease in two specimens of ruffed grouse, one found dead at Stratford, Connecticut, and the other found dead near Union, Maine. These birds found in so widely separated localities indicate that the disease may be common and widespread during certain years when conditions are favorable for infections and for its growth.

AVIAN TUBERCULOSIS

Avian tuberculosis, like mycosis, is a common disease in poultry and in birds confined in zoological parks and gardens but is seldom found in free wild birds. Dr. Morton Grinnell reports finding the disease in three ruffed grouse which were kept in captivity for a period of six weeks before death.

I am indebted to Mr. B. B. Burbank for making microscopical preparations of a large series of tissues and for making the preliminary examinations of my material; and I am further indebted to Dr. F. N. Whittier, late professor of bacteriology of Bowdoin College, for the diagnosis of tuberculosis. Positive determinations were made on three specimens, one from Jackman, Maine, one from Millerton, New York, and the third from Granby, Connecticut.

Tuberculosis from the standpoint of human welfare is a most important disease, and if it is common and widespread among wild birds it should receive the attention of all who are interested in the ruffed grouse.

The few examinations thus far made emphasize the importance of autopsies of the entire bird. Most of the eighteen specimens received at Bowdoin were sent because disease was suspected, but even so there is a surprising number of diseases in this small number of birds. In addition to the diseases mentioned we need to give some attention to external parasites which may be the secondary hosts of some of the internal parasites or may prove to be the carriers of disease which would tend to spread and multiply the number of cases. If this be true certain phases of the life history of these external parasites may be correlated with the periodic decrease in the numbers of the ruffed grouse. It is very desirable to have an abundance of living material of both birds and parasites for extensive experimental work. It will be necessary to examine a large number of specimens, and a complete life history and ecological study extending over a period of several years must be con-

ducted before we can hope to make generalizations concerning the life of the ruffed grouse. I wish to express my appreciation for the splendid cooperation already given me by various sportsmen and by the conservation commissions of Connecticut, Massachusetts and Maine. The primary purpose of this preliminary note is to stimulate interest in the further investigation of all phases of an important ornithological problem.

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A BACTERIOLOGICAL NOTE RELATIVE TO THE FRANKLIN ARCTIC RELIEF EXPEDITION OF 1848

THROUGH the kindness of Mr. O. S. Finnie, director of the Northwest Territories and Yukon Branch of the Department of the Interior, Canada, the writer was given the opportunity of examining bacteriologically a specimen of pemmican found in a cache on Beachy Island, District of Franklin, Canada, by members of the Canadian Arctic Expedition of 1924. The cache was identified as having been established by one of the early Franklin Relief Expeditions, presumably that of 1848.

The pemmican was found hermetically sealed in a tin container, which bore no marks of origin, but in all likelihood was of English manufacture, as it had no resemblance to Canadian-made pemmican of that period. Upon removal from the tin, the pemmican block measured about eight-inch cube, was somewhat rust-incrusted and weighed almost ten pounds. This rusty incrustation being carefully pared off with a knife, the pemmican was found to be of a light brownish-yellow color and in an extremely dry condition. Currants were found embedded in the homogenous mass and were thoroughly desiccated, extremely friable and tasteless.

For bacteriological examination, a portion of the surface of the pemmican block was thoroughly seared with a hot iron, and with the aid of a sterile punch a portion about two and one half cm long was extracted and deposited in a sterile Petri dish. With a sterilized knife the outer four mm of this cylinder were carefully cut away and discarded. The remainder of the plug of pemmican was broken up with a knife into small fragments and the examination proceeded with.

Bacterioscopic examination: A small fragment of the pemmican was transferred to a slide and soaked with a small amount of sterile physiological salt solution. As soon as the material was thoroughly softened it was crushed and smeared over the slide, dried and stained with gentian violet. Under the microscope, examination demonstrated the presence of a moderate number and variety of rod-shaped forms of bacteria, together with two different types of micrococci. These latter organisms were grouped usually, in pairs, with an occasional cluster of four or five. A gram stain showed large and small-sized positively staining rod forms, fairly well impregnated; diplococci, both large and small sizes, were found positive in fair numbers, although some of the larger type were negative. Although sought for, no acid-fast rods could be recognized.

An attempt was also made to demonstrate the presence of spores of bacteria, but on account of the presence of considerable fat in the material, spores could not be identified with any certainty.

Bacteriological examination: 0.2 gm of the pemmican was weighed out, suspended in 10 cc of sterile salt solution and distributed in large fermentation tubes of dextrose broth, containing the usual amount of Andrade's indicator, and of a pH of 7.4. These tubes were incubated at 37° C. anaerobically in an atmosphere of hydrogen for 48 hours and examined. At the end of this period, one tube showed about 50 per cent. of gas, and the surface of the liquid in the bulb was covered with a heavy wrinkled felt-like growth. The contents of both the bulb and closed arm of the tube were strongly acid in reaction. The other three tubes gave no gas, but showed growth in both bulb and closed arm and were slightly acid in reaction. The surface of the bulb and contents of two of the tubes showed a felt-like growth, as in the tube containing gas, whereas the fourth tube, although cloudy, did not show this peculiar surface growth.

Without going into further technical details, it can be stated that the following bacteria were successfully isolated: *Bacterium welchii, Bacillus cereus* (Frankland) and *Bacillus subtilis* (three varieties). It was calculated from special data that the viable spore content per gram of pemmican was about 25 spores of *Bacterium welchii* and 300 spores of the hay bacillus group. These results are in general accord with what might have been anticipated, namely, that if there were any surviving forms of bacterial life, these would in all probability consist of viable spores only. As a check, however, the contents of these fermentation tubes were tested out on Endo's medium in the hope that possibly some non-sporing bacteria of the coli-aerogenes group might have survived, but none was found. The same endeavor was pursued by using a small portion of the pemmican made up into strong suspension in salt solution, but no growth appeared on any of the Endo plates.

Bearing in mind the possible existence of spores of