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# Diseases and Pathological Conditions of the Herring Gull (*Larus argentatus* Pontopp.) Excluding Helminth Infestations

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## INTRODUCTION

Many wild birds are parasitised by organisms that afflict domestic animals particularly poultry, and even man. Perhaps the best examples are the encephalomyelitis viruses which can kill domestic animals and man, but which have little or no effect on the bird natural hosts[3]. Large numbers of birds live in close association with man and his animals and it is perhaps surprising that the part that birds play in the dissemination of disease has not been studied more closely. Keymer[17 18] brought together in 1958 much of the information on bird diseases from numerous scientific journals, as did Halloran[12] in 1955.

The Herring Gull lives in close contact with man, feeding on rubbish tips, inland reservoirs and on sewage farms, and it may be that they act as a reservoir of some of the infectious agents that are of importance to human and veterinary medicine. The following diseases and structural abnormalities were observed when 474 Herring Gulls (first, second and third year birds and adults) and 183 Herring Gull chicks were examined for their helminth burdens, during the years 1962-1964[28] in Anglesey and Northern Caernarvonshire. All the birds examined were shot or killed by a blow on the head if they were unable to fly. Appropriate references to similar pathological conditions found by other workers are included. Diseases due to helminth parasites are recorded elsewhere, though in fact the death of no animal was attributed to helminths[28].

## DISEASES OF UNKNOWN AETIOLOGY

### Nephritis

Nephritis was recorded in 3 Herring Gull chicks which were found dead, the kidneys in all cases being inflamed and greyish in color. Keymer found this syndrome amongst Starlings (*Sturnus vulgaris*) in a roost of approximately 1,000,000 birds in Hertfordshire, where approximately 50 - 100 birds died every night. He found 12 birds which had died of nephritis, probably due to a combination of stresses, though he considered the main cause to be overcrowding[17 18].

### Digestive System

One first winter male gull was found to have fatty degeneration of the liver, which may have been caused by poison.

### Chilling

A pulmonary syndrome, chilling, noted by Jennings and Soulsby[16], was responsible for the death of 36 out of 53 Black-headed Gull chicks examined by them. Chilling is probably caused by extremes of temperature and rain and it is inter-

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esting to note that both Paludan[22] and Paynter[23] mentioned strong sunshine and heavy rain as factors causing the death of chicks. This condition was found quite commonly in the Herring Gull colony at Newborough Warren Nature Reserve, for example, 12 almost fully fledged gulls were found dead the morning after a hot day that had been followed by a great drop in temperature in the evening and heavy thundery rain. The lungs of the dead birds were found to be filled with a dark frothy blood and the gall bladder was found to be enlarged and filled with a pale, viscous bile.

#### Structural Abnormalities

At the end of the breeding season, in the Herring Gull colony at Newborough Warren Nature Reserve, birds were found with structural abnormalities of the wing. In two cases the distal part of the humerus and the proximal end of the radius and ulna were twisted, making it impossible for the birds to fly. There was no evidence of a fracture and in both cases appeared to be a structural abnormality which may have been present at the time of hatching. A further bird was found in which the proximal interphalangeal joint of the middle toe was ankylosed and surrounded by excessive new bone and fibrous tissue. It was probable that the changes were the end result of a fracture, the swelling being associated with a chronic inflammatory reaction.

Five adult birds were found in which the webs of the feet were either very badly damaged or non-existent. Another adult had a large wound on its neck that was healing, whilst the left eye socket of another contained the shrunken remains of the eyeball.

### DISEASES OF KNOWN AETIOLOGY

#### Diseases Caused By Bacteria

Two bacterial diseases have been recorded from the Herring Gull. Christeansen[7] isolated *Erysipelothrix rhusiopathiae* from a White Stork and a Herring Gull in Denmark. Erysipelas is a common disease on many farms, being endemic on some in this area, but was not found in any of the birds examined. Erysipelas is an important disease in many parts of the world not only affecting pigs but also many of man's other domestic animals, and wild animals. Cases have been found of lambs being infected, particularly with liver involvement, in this area. If this disease is found in gulls it may well be that they act as a reservoir of infection.

Avian tuberculosis, the causative agent being *Mycobacterium avium*, has been recorded from a wide range of wild birds that may act as reservoirs of infection for domestic poultry. In the opinion of Wilson[29], however, the presence of the infectious disease in wild birds is suggestive of prior contact with diseased poultry and is not an indication that they are likely to provide a significant or permanent reservoir of infection for domestic fowl.

During the survey one first winter gull, which was shot, was found to have the disease. Typical multiple miliary lesions of necrosis were present in the liver and spleen (see Smith and Jones, 1961) and smears stained by the Ziehl-Neilsen and Gram methods revealed numerous acid-fast, gram positive bacilli. Few cases of avian tuberculosis are recorded in the area of the survey in domestic fowl, and few deaths are attributed to it.

Plum[10, 24] reported in 1942 on the examination for tuberculosis of 816 gulls of 3 different species, namely Herring, Common and Black Headed Gulls which had been shot near Copenhagen. Macroscopic lesions were present in 48, causal organisms, however, were only recovered from 4 of these. Twenty-eight of the other 768 apparently healthy birds yielded tubercule bacilli on culturing.

Plum also quoted a case reported by Galli Vallerio, 'how an otherwise healthy herd of cattle became tuberculin positive because of infection with avian tubercu-

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losis'. The reacting cows were feeding on a meadow which was frequented by a flock of gulls, 2 of which were found to be infected with tuberculosis when shot.

All the above 3 types of gulls are common in Britain and in winter large numbers of Common and Black-headed gulls arrive off the East coast, from their breeding colonies in Northern Europe. It may very well be, therefore, that gulls are occasionally important disseminators of avian tuberculosis.

A third bacterial disease was found in a juvenille gull, which was also suffering from aspergillosis. The Veterinary Investigation Centre, Ministry of Agriculture, Fisheries and Food, at Lasswade, Midlothian, isolated Salmonella organisms from the bird. The organisms were typed as Paratyphi B, Phage type 1, variety 6, which have been endemic in the area for the last 6 years, and are transmissible to man, and cows and are found in milk from infected animals. Sporadic outbreaks of paratyphoid had occurred in Caernarvonshire in the months preceeding the finding of the bird and it is possible that the bird had picked up the disease organisms at a sewage farm or outlet or some other similar place, Paratyphi B organisms having been recovered from the sewers in Caernarvon and Bethesda. A number of pigs and cows that were examined at the Ministry of Agriculture, Fisheries and Food Veterinary Investigation Center, Bryn Adda were found to have Salmonella organisms in their alimentary canals. Records such as the above are interesting in that they show how birds may act as disseminators of diseases to which man and his animals are susceptible.

### Mycotic Diseases

Two mycotic diseases were found in the Herring Gull in North Wales. The oesophagi of many apparently healthy birds were found to be covered with small, white, upraised ulcer - like lesions caused by *Monilia* (*Candida*) *albicans,* the hyphae of which were demonstrated by smearing and/or sectioning the oesophagus and staining in lactophenol cotton blue. The lesions were 1 - 3 mm in diameter, although in one case several lesions 5 - 7 mm in diameter were present. The lesions did not seem to affect the birds execpt in the case of the heavily infected bird which weighed only 550 g instead of the normal 800 g for an adult female.

This condition, often known as 'Thrush', is found quite frequently in other birds and also in man, and occasionally gives rise to serious outbreaks causing loss of birds, particularly young ones. Cases of Thrush or 'sour crop' have been recorded in turkey poults in the area but are not very common.

A second mycotic condition, aspergillosis, was found in one first winter gull and 3 adult gulls. Lesions of varying sizes, caused by *Aspergillus fumigatus,* were found in the lungs and occasionally in the air sacs. These took the form of creamy-white nodules, 1 - 4 mm in diameter, but in the 3 adults large circular, disc-shaped necrotic masses, with a concave surface were found, loosely attached to circular more or less flat or convex plaques (see Biester and Schwarte[5]). The 'first winter' gull that was found to have the disease was extremely emaciated and was having difficulty in breathing. Postmortem examination revealed the presence of large lesions in the lungs and air sacs and the breast muscles had atrophied, a feature noted by Aldous[2], the sternum (keel) being almost devoid of muscle and the ribs being covered only by a thin layer. This disease has previously been found in immature Herring Gulls[9, 25]. It may well be that birds suffering from malnutrition, or some other stress, fall prey to this disease far more readily than healthy birds[11].

Captive wild birds are commonly infected with aspergillosis and it may be that this condition is endemic in wild birds, but is 'unmasked' by the stresses imposed by captivity. Ainsworth and

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Rewell[1] stated that mycosis, in contrast to tuberculosis, is a disease of newly caught birds, especially water birds. Aspergillosis is often associated with tuberculosis and McDiarmid[19] stated that aspergillosis in Herring Gulls is readily mistaken for tuberculosis. Aspergillosis may also be confused in certain cases with B.W.D. (Bacillary White Diarrhoea) disease in poultry.

This condition makes the rearing of Herring Gulls in captivity an extremely difficult job, as the young birds seem to be very susceptible to infection. Domestic fowl chicks in the area occasionally succumb to this disease and a few cases of skin, but no lung, lesions caused by this fungus have been recorded.

**Virus Diseases**

Wilson and Matheson[30] drew attention to gulls as possible disseminators of foot and mouth disease, because not only do gulls roost on pastures, but also commonly scavenge on rubbish tips, where they may gain access to infected garbage. The evidence so far presented is very circumstantial and the case has yet to be proved against the Herring Gull.

A number of diseases are found in poultry that go to form the avian leucosis complex, all forms apparently arising from the infiltration of lymphoid cells into various tissues. Jennings[14] reported visceral lymphamatosis as the probable cause of death of a Shelduck and a little Owl. One adult Herring Gull, which was unable to fly, was found to have visceral lymphamatosis, the bird's spleen being very much enlarged and greyish in colour, whilst the liver, which was also enlarged, was covered in greyish tumors of varying sizes. This disease was confirmed by the Ministry of Agriculture, Fisheries and Food Veterinary Investigation Centre, Bryn Adda, Bangor. At the present time approximately one quarter of the mortality of poultry in Britain may be attributed to the above complex (Ministry of Agriculture, Fisheries and Food Advisory Leaflet, Number 272, 1961).

Jennings[14] also reported neural lymphamatosis in a Partridge, Jenkins[13] reporting 'fowl paralysis' in the same species. Three chicks were found in the Herring Gull colony which were unable to fly, due mainly to a shortening of the web of the left wing which prevented it from being fully opened. The wing also tended to hang and was not held in the normal position against the body. On examination the nerves of the brachial plexus were found to be thickened, the above symptoms characteristic of neural lymphamatosis (fowl paralysis).

Other reports of the avian leucosis complex have been recorded from a number of other birds including one report of a 'leucosis' in a Kittiwake[15]. Until the specific organisms or strains of organism are isolated from Herring Gulls with the above conditions it is not possible to state their importance as disseminators of the disease in relation to domestic poultry.

Miles and Shrivaston[20] isolated an agent of ornithosis (differing from the Parrot and Pigeon strains) from a juvenile Herring Gull, on Skomer Island, Pembrokeshire, and found serological evidence of infection in lesser Black-backed Gulls. No evidence of this disease was found in North Wales birds.

Another disease found particularly amongst juvenile gulls is vesicular dermatitis, first described by Dane[8] in 1948 and shortly after by Miles and Stoker[21], who named it 'puffinosis' since the birds it was found to be infecting were Manx Shearwaters (*Puffinus puffinus*). Miles and Stoker[21] also reported evidence of the infection in juvenile Herring Gulls, and Buxton and Lockley[6] said that it may possibly be responsible for the deaths of young Herring Gulls. Many chicks and occasionally adults were found to be suffering from this disease in the colony at Newborough. From observa-

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tions obtained whilst ringing birds, it would appear that the Lesser Blackback Gull chicks were more frequently infected than Herring Gull chicks.

An adult bird with typical lesions on its feet was found to have a vesicle in the web, between the second and third digits of its right foot. The vesicle contained approximately 0.5 ml of a white milky fluid, a cultural growth of which revealed a heavy growth of coagulase positive *Staphylococcus*. The bacteria probably represented a secondary bacterial infection. Histological examination showed that the vesicle had been formed in the epidermal layer of the skin, although some dermal tissues showed evidence of a fairly severe inflammatory reaction.

### Diseases Caused By Protozoa

During the survey 4 birds were shot which had distended caecae and swollen small intestines. The whole length of the intestine was found to be filled with a yellowish liquid matter, smears of which were found to contain numerous coccidial oocysts. The aetiological agent was not specifically identified. No records of coccidia in Lariformes were found, Becker[4] not noting any occurences. The wall of the intestine showed macroscopic lesions in all cases, which consisted of diffuse haemorrhagic areas. In 2 of the cases the intestine wall was thickened denoting chronicity of infection. The birds having the above condition appeared to be quite healthy and of normal weight. Coccidial diseases cause great loss of domestic poultry and it may be that wild birds, such as Herring Gulls, are reservoirs for the disease. The blood of a number of birds was examined but no protozoa or microfilaria were found in it.

## DISCUSSION

It is not yet possible to assess the importance of disease(s) in the regulation of Herring Gull numbers or the role of the gull in the transmission of diseases of domestic stock and man. Primary epidemics of disease seem to be uncommon, as do reports of birds infecting man and his domestic animals.

Several points can, however, be made as to how Herring Gulls may spread disease. They are familiar birds that associate with domestic stock and man, and frequent rubbish tips, farm yards, pasture land, sewage farms and outlets. They are also gregarious, roosting and breeding in densely populated communities, often in unhygienic conditions. This facilitates the spread of disease such as puffinosis, among members of their own species, and subsequently perhaps to other wild birds and domestic stock.

A further danger lies in the fact that the gulls may act as mechanical carriers of disease organisms. Silverman[26] implicated gulls in the spread of bovine cysticercosis, caused by the cysticeri of *Taenia saginata*. In this case gulls picked up *T. saginata* eggs from untreated sewage and then deposited them on pasture land where they were eaten by cattle. This situation will probably not arise in the area of the survey, where only one or two cases of *Taenia saginata* occur each year. Gulls are birds that may migrate to a certain extent and it is possible that when they fly into Britain from the Continent, especially along the east coast, they may bring with them such diseases as foot and mouth.

Before the Herring Gull can be incriminated in the dissemination of any disease, it is obvious that numerous factors will have to be carefully considered.

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