

"I took the following measurements immediately after death:—  
 Extreme length, tip of nose to tip of tail (= vertebræ), 4ft.  $1\frac{1}{2}$  ins.  
 Length of face,  $11\frac{1}{8}$  ins.

" ear,  $5\frac{3}{8}$  ins.  
 " tail (to end of vertebræ), 11 ins.  
 " fore leg (elbow to end of toe),  $22\frac{7}{8}$  ins.  
 " hind leg (hock to end of toe),  $15\frac{1}{4}$  ins."

## PAPERS.

15. Report on the Deaths which occurred in the Zoological Gardens during 1910. By H. G. PLIMMER, F.R.S., F.Z.S., Pres.R.M.S., Pathologist to the Society.

[Received February 6, 1911 : Read February 21, 1911.]

On January 1, 1910, the number of animals in the Zoological Gardens was 3186, and during the year 2354 animals were admitted, making a total of 5540 for the year.

The number of deaths during the year has been 1554, that is a death-rate of 28 per cent.; but if from the above total we deduct 643 animals which did not live for six months after their arrival in the Gardens—that is, roughly, the time at which we find they have either got over their journeys, or died from any disease they brought with them, or have got entirely used to their new environment—the percentage of deaths is reduced to 16·4, which is less than that of the last two years.

The following figures will show the general relations of the last three years :—

	1908.	1909.	1910.
Total number of animals .....	5608	5303	5540
Total deaths .....	1737	1492	1554
Percentage of deaths .....	31	28	28
Percentage of deaths, excluding those which occurred in animals which had <i>not</i> been six months in the Gardens .....	17	17·8	16·4

If we consider the weather conditions of 1910, and compare these figures (bearing in mind the relative number of animals), it will be seen that the percentage of deaths of 1910 is more satisfactory than that of the two preceding years.

The total deaths are divided as follows: Mammals 362, Birds 845, Reptiles 347.

The following tables show the facts ascertained in outline. Table I. sets forth the actual causes of death in each of the three groups specified. Under Reptiles are included Batrachians and Fishes.



TABLE I.—Analysis of the Causes of Death.

Disease.	Mammals.	Birds.	Reptiles.	Reference to Notes following.
<i>1. Microbic or Parasitic Diseases.</i>				
Tuberculosis .....	18	163	9	1
Mycosis .....	13	99	6	2
Pneumonia .....	31	73	82	3
Septicæmia .....	7	...	...	4
Abscess .....	1	2	...	5
Pleuritis .....	1	...	...	
Empyema .....	2	...	...	
Pericarditis .....	6	6	1	6
Peritonitis .....	6	2	...	
Stomatitis .....	...	2	3	
Hydatids .....	3	...	...	
Worms .....	1	9	6	7
Hæmogregarines .....	...	...	16	
Malaria .....	...	8	...	8
Coccidiosis .....	...	...	1	
Leucocytozoon infection .....	...	1	...	9
Cystitis .....	1	...	...	
Pancreatitis .....	...	1	...	
<i>2. Diseases of Respiratory Organs.</i>				
Bronchitis .....	3	...	...	
Broncho-pneumonia .....	50	...	...	10
Congestion of lungs .....	41	112	14	11
Atelectasis .....	2	...	...	
<i>3. Diseases of the Heart.</i>				
Dilatation of heart .....	2	...	...	
Fatty degeneration .....	2	7	...	
<i>4. Diseases of Liver.</i>				
Fatty degeneration .....	3	15	1	
Hepatitis .....	1	4	1	
<i>5. Diseases of Alimentary Tract.</i>				
Over-distension of crop .....	...	2	...	
Gastritis .....	2	...	1	
Gastric ulceration .....	8	1	...	
Gastro-enteritis .....	19	3	10	12
Enteritis .....	32	186	27	13
Intussusception .....	6	...	...	14
Intestinal obstruction .....	...	2	...	
<i>6. Diseases of the Urinary and Reproductive Organs.</i>				
Nephritis .....	22	12	...	
Stone .....	1	...	...	15
Inflammation of oviduct .....	...	3	...	
<i>7. Diseases of Nervous System.</i>				
Myelitis .....	2	1	...	
<i>8. Various.</i>				
Carcinoma .....	5	...	...	16
Sarcoma .....	3	2	...	17
Puerperal eclampsia .....	1	...	...	
Senile decay .....	1	1	...	
Rickets .....	2	1	...	
Leukæmia .....	...	1	...	18
Anæmia without ascertained cause .....	...	1	...	
Injuries discovered <i>post-</i> <i>mortem</i> .....	3	16	2	



Besides those tabulated above,

113 animals were killed by order or by companions,

101 „ died of starvation and malnutrition,

7 „ were not examined,

108 „ were too stale for detailed examination,

these completing the total.

In Table I. the classification is made into those diseases which actually caused the death of the animals, but in a large number of Mammals, Birds, and Reptiles other lesions were present which helped towards the fatal issue, and these are classified in Table II. If taken together with Table I. a much more accurate estimate of the amount of disease in the Gardens will be arrived at.

TABLE II.—Other Diseases found in the Animals tabulated in Table I.

Diseases.	Mammals.	Birds.	Reptiles.	Reference to Notes.
Tuberculosis .....	12	34	8	19
Mycosis .....	1	8	...	
Pneumonia .....	6	15	5	
Stomatitis .....	2	...	...	
Worms .....	8	...	14	
Peritonitis .....	8	2	...	
Pericarditis .....	14	3	3	
Empyema .....	1	...	...	
Trypanosomes .....	...	2	1	
Hæmogregarines .....	...	...	21	
Malaria .....	...	12	...	
Pancreatitis .....	...	7	...	
Pleuritis .....	2	...	...	
Filariae .....	4	36	5	
Cystitis .....	1	...	...	
Bronchitis .....	2	...	...	
Broncho-pneumonia .....	5	...	...	
Congestion of lungs .....	26	51	4	
Collapse of lungs .....	12	...	...	
Œdema of lungs .....	3	48	10	
Hydrothorax .....	4	...	1	20
Dilated heart .....	22	6	...	
Fatty heart .....	1	3	1	
Fatty liver .....	5	48	2	
Hepatitis .....	1	3	...	
Gastritis .....	...	1	3	
Gastric ulceration .....	6	1	...	
Gastro-enteritis .....	...	...	5	
Enteritis .....	12	29	13	
Intestinal obstruction .....	...	3	...	
Nephritis .....	13	14	...	
Ascites .....	...	7	...	
Osteo-arthritis .....	1	...	...	
Rickets .....	23	2	...	



TABLE III.—Shows the Distribution of Diseases causing Death amongst the principal Orders of Mammals.

Diseases.	Primates.	Carnivora.	Rodentia.	Ungulata.	Edentata.	Marsupialia.
Tuberculosis.....	7	7	...	3	...	...
Mycosis .....	...	1	...	5	...	7
Pneumonia .....	8	5	10	4	...	4
Septicæmia .....	1	2	...	3	...	1
Pleuritis .....	1	...	...	...	...	...
Abscess .....	...	1	...	...	...	...
Empyema .....	...	2	...	...	...	...
Pericarditis .....	1	...	2	3	...	...
Peritonitis .....	...	2	...	4	...	...
Hydatids .....	1	...	...	2	...	...
Worms .....	...	1	...	...	...	...
Cystitis .....	1	...	...	...	...	...
Bronchitis .....	...	2	...	1	...	...
Broncho-pneumonia .....	15	6	8	9	6	6
Congestion of lungs .....	16	7	10	1	3	4
Atelectasis .....	...	...	...	2	...	...
Dilatation of heart .....	1	1	...	...	...	...
Fatty heart .....	...	...	1	1	...	...
Fatty liver .....	2	...	...	...	...	1
Hepatitis .....	...	...	1	...	...	...
Gastritis .....	...	...	1	1	...	...
Gastric ulceration .....	4	3	...	...	...	1
Gastro-enteritis .....	1	15	1	1	1	...
Enteritis .....	12	8	3	2	...	7
Intussusception .....	3	...	1	...	...	2
Nephritis .....	7	5	6	2	...	2
Stone .....	...	...	1	...	...	...
Myelitis .....	...	2	...	...	...	...
Carcinoma.....	...	...	...	1	...	4
Sarcoma .....	...	...	1	2	...	...
Eclampsia.....	...	1	...	...	...	...
Senile decay .....	...	...	...	1	...	...
Rickets .....	2	...	...	...	...	...
Injuries .....	1	1	1	...	...	...

As Tuberculosis and Mycosis have again been the cause of a large number of deaths amongst the Birds, the following Table has been drawn up to show the relative incidence in the various Orders.

TABLE IV.—Showing the Comparative Incidence of Tuberculosis and Mycosis in the various Orders of Birds.

Orders.	Tuberculosis.	Mycosis.
Passeres .....	69	22
Picariæ .....	30	17
Psittaci.....	12	6
Anseres.....	2	8
Columbæ .....	16	6
Gallinæ.....	19	16
Striges .....	12	18
Laridæ .....	1	5
Struthiones .....	2	1



*Notes on the foregoing Tables.*

The following Notes refer to some points of special interest which it was not possible to include in the tables :—

1. It will be noticed that there has been about the same percentage of tubercle as last year amongst the Mammals and Reptiles ; that is, it has been found in 10 per cent. of the Mammals and 4·9 per cent. of the Reptiles examined. In the Birds, however, there has been an increase of 107 cases ; that is, it has been found in 24·9 per cent. of those examined. This increase amongst the Birds has been partly due to an epidemic which occurred in the New Bird House in the beginning of the year. This was dealt with by entire disinfection of the house, and some structural alterations which have greatly improved it ; a very definite improvement has taken place, but the arrangement of the cages at the ends of the house, and overcrowding generally amongst the Birds, is a constant source of danger.

Amongst the Mammals 2 cases have been of bovine type, and amongst the Birds there have been 7 cases of this type.

The liver of a *Tantalus* showing this particular type has been sent to the Museum of the Royal College of Surgeons.

2. Mycosis (under which term several distinct mould-diseases are grouped) has also increased among the Birds to a considerable degree—107 cases as against 48 last year.

The Mammals dying from this disease have been principally Wallabies and Gazelles. The disease (formerly grouped under the Septicæmias) has been found to be caused by a mould which enters through the mouth and produces abscesses about the jaws and in the adjacent muscles, and eventually a septicæmia.

It has also been found that a disease of the eye in Birds is due to a mould. It commences as a keratitis, and then pus is formed in the anterior chamber, and secondary abscesses form, from which the bird dies. Of the division headed Reptiles 3 were fishes with a mould-disease of the skin which invaded the muscles.

3. The increase of pneumonia amongst the Reptiles (87 cases as against 64 last year) has been mainly due to the variable temperatures in the Reptile House, owing to alterations in the heating apparatus. Only 3 of these cases were due to the presence of worm-eggs and embryos. There has been a decrease amongst the mammals and birds.

4. Five of these cases followed injuries : the remaining two were in Wild Swine, where it was caused by an organism belonging to the group producing Hæmorrhagic Septicæmia.

5. The one Mammal was a Fox with suppuration in the middle ear and destruction of the semicircular canals.

6. In an Antelope the pericarditis was due to numbers of worm-cysts on the visceral pericardium, which, so far as I know, is unique. In the Birds it was mostly due to the deposition of uric-acid crystals in the pericardium.







Plimmer, H. G. 1911. "Report on the Deaths which occurred in the Zoological Gardens during 1910." *Proceedings of the Zoological Society of London* 1911, 318–323. <https://doi.org/10.1111/j.1096-3642.1911.tb01932.x>.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/97764>

**DOI:** <https://doi.org/10.1111/j.1096-3642.1911.tb01932.x>

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