*Bahama Pintail*

WATERFOWL COLLECTION

As the number of species in the collection increases, so the pens are becoming somewhat overcrowded and more space is urgently needed. It is the Trust's policy to keep three pairs of each species and subspecies, and to have larger flocks of a few selected kinds which are either particularly rare or particularly decorative. Already the Trust has nearly three quarters of the world's forms of this group of birds. Their diet consists of some grain (mainly wheat), pellets of Blue Cross Poultry Food supplied by Messrs J. V. Rank, duck weed, grass, and (for those which require fish) fresh eels supplied by the Mac Fisheries.

ADDITIONS TO THE COLLECTION

A list is given in Table VIII of the birds added to the collection between May 1952 and August 1953. Those forms marked † had not previously been represented. The brevity of this list, as compared with those in earlier reports, shows that the collection has now reached a stage in which it is difficult to make rapid progress towards the goal of complete representation of all forms of *Anatidae*. Most of the outstanding 'wants' are species which have never been brought into captivity because of their rarity or inaccessibility (like Torrent Ducks, Salvador's Duck, etc.), those which have proved very difficult to keep (like Kelp Geese and the Scoters), or alternatively the difficulties of transporting them alive (like the Stiff-tails).

*Smew*

The Trust is very grateful not only to those who sent the birds, but also to the many persons who have helped in transporting them with the greatest possible speed.

TABLE VIII

†Spotted Whistling Duck	(<i>Dendrocygna guttata</i>) 3
Javan Whistling Duck	(<i>D. javanica</i>) 2
Red-breasted Goose	(<i>Branta ruficollis</i>) 8
†Sushkin's Goose	(<i>Anser arvensis neglectus</i> *) 1
†Sharp-winged Teal	(<i>Anas flavirostris oxypterus</i>) 3
Baikal Teal	(<i>A. formosa</i>) 10
Indian Spotbill	(<i>A. p. poecilorhyncha</i>) 4
†Abyssinian Black Duck	(<i>A. sparsa leucostigma</i>) 2
†New Zealand Scaup	(<i>Aythya novae-seelandiae</i>) 2
Indian Pygmy Goose or Cotton Teal	(<i>Nettapus c. coromandelianus</i>) 3
European Eider	(<i>Somateria m. mollissima</i>) 5
Smew	(<i>Mergus albellus</i>) 3

*Some doubt surrounds the validity of this race which only differs from *A. a. arvensis* in the pink coloration of the bill and legs, and may ultimately be shown to be a colour variation occurring in various races of *Anser arvensis*.

Goosander
Ducklings

THE BREEDING SEASONS, 1952 and 1953

(In order to make the report as up to date as possible it has been decided to include the 1953 results, and to discuss the two seasons together.—ED.)

By S. T. Johnstone, Curator

APART from the fact that some nests were flooded in early May, the 1952 season showed every sign of being a record one. Seventy-four forms of Waterfowl laid and representatives of fifty-nine species and subspecies were reared, eleven for the first time at the New Grounds.

Although better than any previous season, the 1952 results were disappointing in view of the number of eggs which were laid. In early June, when the first young birds were feathering, a large number of Carolina were lost from a heavy infection of Tape Worm (*Hymenolepis* spp.). There followed another infestation—by the parasite *Acuaria uncinata*. Unfortunately no cure could be found and large numbers of ducklings, of twenty-four species, became infected and were lost. When the infection was detected, the remaining ducklings were reared in

coops provided with trays of fresh water and no case of *Acuaria* was recorded in these birds.

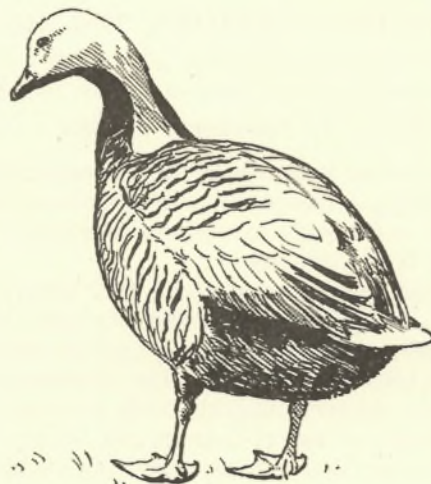
In spite of these setbacks, some 460 birds were reared—the goslings, on the whole, being particularly good. The highlight was the successful rearing of nine Hawaiian Geese (described in the Fifth Annual Report) and a Coscoroba Swan—the first to be bred in this country for half a century.

Among the ducklings, it was unfortunate that all the Silver Teal *Anas v. versicolor* died, but other interesting species which were successfully bred were African Red-billed Pintail *Anas erythrorhyncha*, Cape Shoveler *Anas smithi* and Brazilian Teal *Amazonetta braziliensis*. The amount of live food available was increased by the cultivation of mosquito larvae and through the kind offices of Dr C. Vaisey who brought a weekly supply of fresh-water shrimp from Freshford.

In 1953, seventy forms of Waterfowl laid and representatives of fifty-one species and subspecies were reared. The total number of birds reared in 1952 and 1953 may be compared with the results of previous years in the accompanying table.

TABLE IX

Year	No. of Species and Subspecies Reared	No. of Cygnets and Goslings	No. of Ducklings	Total No. Reared
1947	14	18	31	49
1948	17	20	127	147
1949	37	41	269	310
1950	39	61	221	282
1951	44	72	338	410
1952	59	111	350	461
1953	51	137	248	385

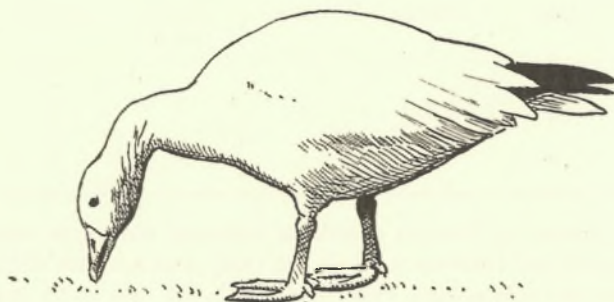
Emperor
Goose

With the exception of the Red-breasted, the geese laid well in 1953 and there were no serious losses among the young. The figure of 137 shows a 20% increase on the previous best year and is equivalent to the total number of goslings reared from 1947 to 1950 inclusive. Four more Ne-nes were successfully reared. Apart from these, the most interesting species were the Swan Goose *Anser cygnoides* and Bean Goose *A. a. arvensis*.

Large numbers of ducklings were again lost from *Acuaria* infection and nearly all species were affected. As a preventative measure, most ducklings were reared in coops with trays of tap water and they escaped infection until the feathering stage when they were turned out into the main breeding pen. We are indebted to Mr J. A. J. Venn for the amount of time and patience which he has devoted to helping us with this problem ; a solution of it seems near.

The most interesting species which laid for the first time in 1953 was the Southern Pochard *Netta erythrophthalma*. Among the species which were reared for the first time were Silver Teal *Anas v. versicolor*, African Black Duck *Anas s. sparsa* and the Philippine Duck *Anas luzonica*.

During 1952 and 1953 some experiments were made with the addition of antibiotics to the food of ducklings. The results of these preliminary experiments are shown on pp. 33-35.



Greater Snow Goose

HAWAIIAN GEESE

After the successful breeding season of 1951 (the rearing of nine goslings was reported in the Fifth Annual Report) it was noticed that Emma (one of the two adult females) did not complete her moult satisfactorily. When she was examined, it was found that the preen gland was much enlarged and the orifice was blocked by a large concretion. Dr Wynn Jones of Bristol kindly came over to the Trust and removed the obstruction. The condition of the bird's feathers continued to deteriorate, however, and the back and belly became almost bare. The bird was moved to a separate pen and was given a high vitamin diet but her condition did not improve.

The other female, Kaiulani, laid her first egg on February 13 and her first clutch of five eggs produced one gosling. On laying the first egg of her second clutch, however, she suffered a severe prolapse of the cloaca and our hopes of a second successful season were dashed. We offer our grateful thanks to



Professor A. Messervy and Dr Wynn Jones of Bristol University who came out within the hour and carried out a skilful repair. Kaiulani was taken for further treatment to the Veterinary Department of Bristol University, where she recovered rapidly and incidentally during her confinement she laid another egg. Subsequently she laid a third clutch of five eggs from which two goslings were hatched. One of these goslings proved to be blind and deformed and had to be destroyed.

Meanwhile Emma, after treatment with luteinising hormone, produced four eggs from which two healthy goslings were hatched.

The total of four goslings reared does not compare very favourably with the 1952 results, but in view of the various setbacks, it was not so disappointing as might have been expected.

TABLE X

		Laid	Infertile	Addled	Dead in Shell	Hatched	Reared
Kaiulani	..	13	8	1	1	3	2
Emma	..	4	2	—	—	2	2

Some improvement in Emma's condition followed treatment with Tetmasol, and new body and tail feathers grew in the early autumn, but the areas of the face which had previously been only mildly affected now grew rapidly worse. The preen gland atrophied and she continued to lose feathers. It was thought that she might be suffering from a fungal condition of the skin, but she did not respond to any of the treatments which were tried. In January 1954 she died. Post-mortem examination revealed that the adrenal glands were diseased. No sign of similar symptoms has been detected in any of the other 15 Ne-nes, and it seems that the disease cannot be infectious or contagious.

Nevertheless, as a precaution, a pair of young birds (the female of which had previously recovered from a fractured femur) have been placed under the care of Mr Terry Jones at Leckford in Hampshire.



EFFECTS OF AUREOMYCIN ON THE GROWTH OF DUCKLINGS

By Hugh Boyd

DURING the last few years the addition of small quantities of antibiotics (notably penicillin and aureomycin) to the food of young poultry, in order to increase the rate of growth, has become a standard practice. It seemed important to discover whether the use of such materials was of advantage in rearing ducklings in the collection. So in 1953 aureomycin was used in the mash fed to the great majority of the ducklings. To check its effects a number of birds were fed a similar mash lacking the aureomycin.

The controlled experiments were carried out with broods of Common Pintail (8 birds), African Yellowbill (14 birds, of 2 broods), Australian Grey Duck (7 birds) and Carolina (24 birds, of 2 broods), hatched from eggs incubated by bantams. As soon as the ducklings were old enough to be transferred from the incubation boxes to the rearing-runs (and before they had fed) the members of each brood were assigned at random to receive either the mash with aureomycin or the aureomycin-free diet. Each duckling was weighed and marked after being allocated. All the broods were reared with bantams, in similar runs. Each duckling was weighed at weekly intervals until the end of the experiment, when the birds were large enough to be independent of their foster-parents. Only 33 of the 52 ducklings reached this stage, many of them falling victim to the outbreak of the parasite *Acuaria*.

The differences in rate of growth between the ducklings fed on the two diets are shown by the curves in Figure 2, where the points plotted are the mean weights (in grams) of each group at weekly intervals. The means are for the survivors only, the weights of casualties being omitted, whether they died early or late. It is clear that for each of the four species the addition of aureomycin to the food produced a marked increase in the rate of growth, effective throughout the period of the experiment. Thus, after 7 weeks the Grey Ducks receiving aureomycin weighed 64% more than those which had not had it, the Yellowbills 61%, the Pintails 41% and the Carolinas 18% more. These results are sufficiently encouraging to justify continuing the trials in 1954, when it is hoped to compare the effectiveness of penicillin with that of aureomycin, as well as to carry on the comparisons until the birds reach sexual maturity, in order to discover whether the increased growth in early life results in differences in mature weight and, perhaps, productivity.

The loss from disease of two-fifths of the ducklings used in the experiment not only resulted in rather unsatisfactory mean values for the weights (e.g. there were only 2 survivors in the class of Pintails fed with aureomycin), but also had more disquieting implications. Table XI records the distribution of the casualties. There were significantly more casualties amongst the birds fed with aureomycin (54%) than amongst the controls (22%). This is especially marked in the Pintails and Yellowbills. The possibility that the use of aureomycin increased the vulnerability of the ducklings to parasites is important enough to suggest that the general use of antibiotics as an aid in the rearing of waterfowl cannot yet be recommended.

The aureomycin used was supplied by Dr R. H. Mackay, of Messrs Spillers Ltd, for whose co-operation we are very grateful. The material supplied ('Aurofac') was incorporated into the mash prepared for the ducklings, in the concentration of 0.5% w/w.

TABLE XI
MORTALITY AMONGST DUCKLINGS IN GROWTH-RATE
EXPERIMENTS

Species	Diet With Aureomycin			Diet Without Aureomycin		
	Reared	Died	Total	Reared	Died	Total
Common Pintail ..	2	2	4	4	0	4
Yellowbill ..	3	4	7	7	0	7
Grey Duck ..	3	0	3	4	0	4
Carolina ..	4	8	12	6	6	12
	12	14	26	21	6	27



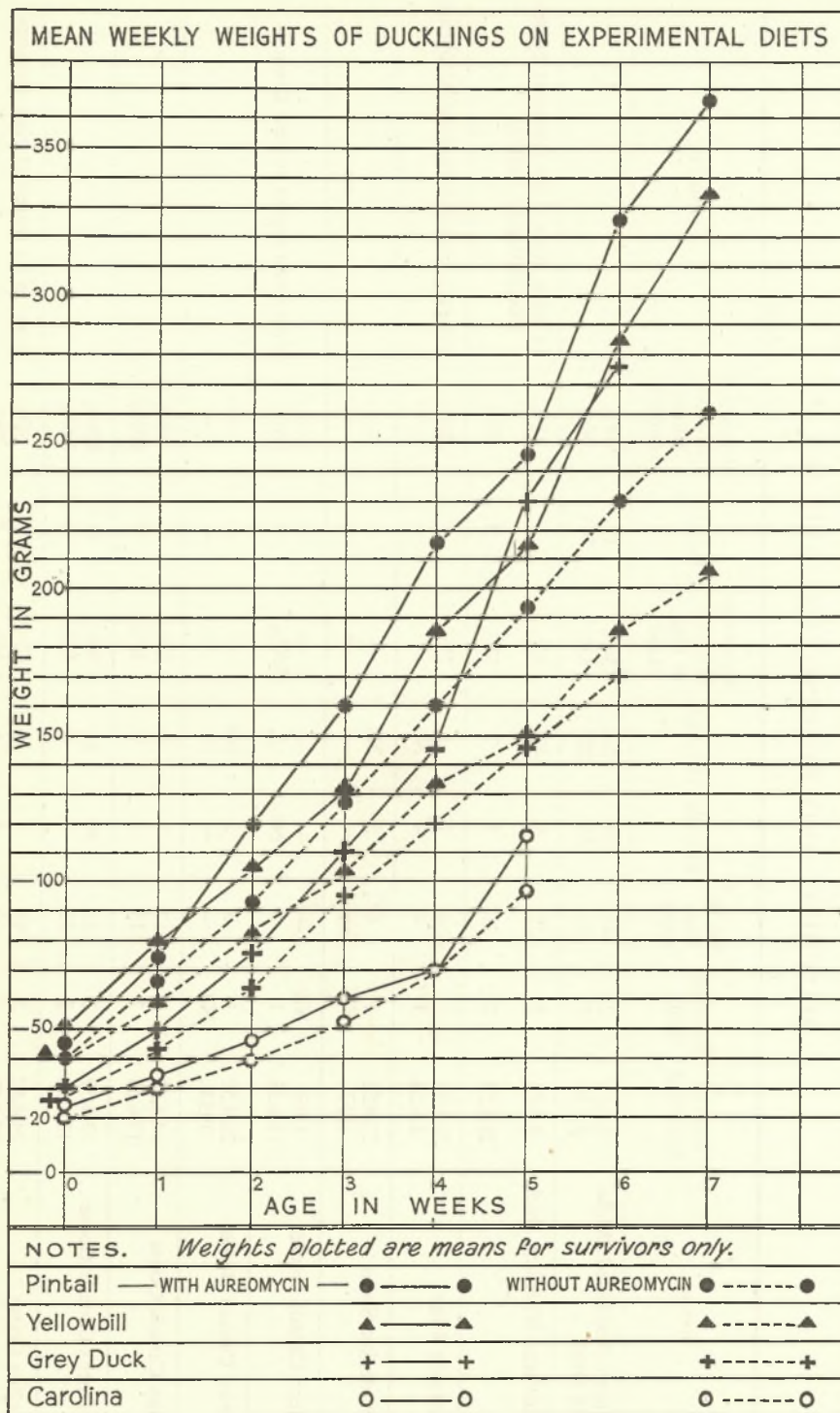


Figure 2

TABLE XII
HATCHING AND REARING, 1952 AND 1953

Species	Date of First Egg	Breeding Pairs	No. of Eggs Laid	Infertile	Hatched	Percentage Hatched of Eggs Laid	Reared	Percentage Reared of Young Hatched	Remarks
Southern Red-billed Whistling Duck	9.4.52	2	48	14	26	54%	13	50%	—
	9.4.53	3	61	35	20	33%	14	70%	—
White-faced Whistling Duck	8.5.52	3	52	5	47	90%	5	11%	14 birds were fully feathered before succumbing to <i>Acuaria</i>
	28.4.53	2	21	7	7	33%	2	28%	—
Coscoroba Swan	16.3.52	1	4	1	1	25%	1	100%	First to be reared in England for 50 years
	8.4.53	1	4	4	Nil	—	—	—	—
Black-necked Swan ..	22.4.52	1	6	5	Nil	—	—	—	—
	1953	Nil	—	—	—	—	—	—	—
Eastern Canada Goose ..	1952	Nil	—	—	—	—	—	—	—
	11.4.53	1	5	Nil	5	100%	5	100%	First to be reared at New Grounds
Interior Canada Goose ..	28.4.52	1	3	3	Nil	—	—	—	—
	1953	Nil	—	—	—	—	—	—	—
Dusky Canada Goose ..	14.4.52	2	17	7	9	53%	7	77%	—
	13.4.53	2	15	3	5	33%	5	100%	—
Taverner's Canada Goose ..	13.4.52	3	22	10	11	50%	11	100%	—
	12.4.53	3	13	7	6	46%	6	100%	—
Cackling Goose	24.4.52	2	14	7	6	42%	3	50%	First to be reared at New Grounds
	20.4.53	2	9	4	4	44%	3	75%	—

Hawaiian Goose	18.2.52 13.2.53	1½ 1½	19 17	7 10	9 5	47% 29%	9 4	100% 80%	First to be reared in England for 50 years 1 deformed gosling destroyed
Barnacle Goose	1.6.52 4.5.53	3 3	18 16	15 5	2 10	11% 63%	2 8	100% 80%	— —
Red-breasted Goose ..	5.6.52 1953	1 Nil	5 —	Nil —	5 —	100% —	5 —	100% —	— —
Swan Goose	1952 9.4.53	Nil 1	— 6	— 1	— 5	— 83%	— 4	— 80%	— First to be reared at New Grounds
Bean Goose	1952 26.4.53	Nil 1	— 4	— 3	— 1	— 25%	— 1	— 100%	— First to be reared at New Grounds
Greenland White-fronted Goose	1952 21.5.53	Nil 1	— 4	— 4	— Nil	— —	— —	— —	— —
Lesser White-fronted Goose	27.5.52 11.5.53	1 2	4 9	Nil 2	4 7	100% 78%	4 7	100% 100%	— —
Greylag Goose	2.5.52 6.4.53	2 2	9 12	7 Nil	2 8	22% 67%	1 8	50% 100%	— —
Eastern Greylag Goose ..	23.3.52 23.3.53	1 1	4 4	2 Nil	2 3	50% 75%	2 3	100% 100%	— —
Bar-headed Goose	21.4.52 23.4.53	3 3	16 26	6 15	8 10	50% 38%	3 6	37% 60%	3 adolescent birds lost from visceral gout syndrome —
Emperor Goose	30.4.52 2.5.53	1 1	11 10	3 3	8 5	72% 50%	2 4	25% 80%	— —
Lesser Snow Goose ..	28.4.52 1.5.53	1 1	5 6	1 1	2 2	40% 33%	2 2	100% 100%	— —

[continued]

TABLE XII—continued

Species	Date of First Egg	Breeding Pairs	No. of Eggs Laid	Infertile	Hatched	Percentage Hatched of Eggs Laid	Reared	Percentage Reared of Young Hatched	Remarks
Blue Snow Goose	25.4.52	1	5	2	3	60%	3	100%	—
	6.5.53	2	14	6	8	57%	8	100%	—
Greater Snow Goose ..	2.5.52	3	25	19	6	24%	4	67%	2 goslings died of aspergillosis
	5.5.53	3	29	21	6	21%	6	100%	—
Ross's Snow Goose ..	3.5.52	3	21	5	13	61%	11	84%	7 of those reared were offspring of a pair caught at Perry River
	5.5.53	4	25	6	17	68%	16	94%	—
Cape Shelduck	4.3.52	1	14	3	10	71%	7	70%	4 reared by parents
	5.4.53	2	16	2	13	81%	7	54%	—
Common Shelduck	9.4.52	1	15	8	6	40%	3	50%	—
	14.4.53	1	11	3	6	54%	4	67%	—
Egyptian Goose	11.1.52	2	32	16	16	50%	14	88%	—
	19.3.53	2	32	26	6	19%	6	100%	—
Orinoco Goose	28.3.52	1	19	5	13	68%	13	100%	First to be reared at New Grounds
	9.3.53	2	34	17	12	35%	10	83%	—
Abyssinian Blue - winged Goose	23.5.52	1	13	4	7	54%	3	42%	First to be reared at New Grounds
	26.5.53	1	9	3	5	55%	5	100%	—
Ashy-headed Goose ..	25.3.52	2	16	2	13	81%	10	77%	—
	4.4.53	2	15	2	11	73%	9	82%	2 goslings killed by weasels

Ruddy-headed Goose ..	22.4.52 27.4.53	1 2	9 10	3 4	6 5	67% 50%	Nil 2	— 40%	— —	First to be reared at New Grounds
Cereopsis Goose	26.12.51 1.1.53	1 1	9 10	3 7	6 3	67% 33%	1 1	17% 33%	— —	
Andean Crested Duck ..	3.6.52 24.4.53	1 2	2 8	Nil 4	Nil 2	— 25%	— 1	— 50%	— —	
Marbled Teal	15.5.52 2.5.53	2 3	21 31	2 3	19 28	90% 93%	Nil 9	— 33%	— —	
Cape Teal	13.4.52 1953	2 Nil	14 —	5 —	7 —	50% —	1 —	14% —	— —	First to be reared at New Grounds
Versicolor Teal	12.5.52 27.3.53	1 1	7 16	1 1	6 13	85% 80%	Nil 8	— 60%	— —	First to be reared at New Grounds
Puna Teal	9.3.52 14.3.53	1½ 1½	20 28	6 12	7 4	30% 14%	Nil Nil	— —	— —	
African Red-billed Pintail..	1.7.52 27.5.53	1 1	8 8	Nil 8	8 Nil	100% —	3 —	36% —	— —	First to be reared at New Grounds
Bahama Pintail	21.4.52 6.5.53	5 3	36 15	12 8	20 7	55% 46%	15 4	75% 57%	— —	
Chilean Pintail	12.4.52 29.5.53	2 1	12 3	9 3	3 Nil	25% —	3 —	100% —	— —	
Common Pintail	29.3.52 25.3.53	6 5	48 40	5 6	32 29	67% 72%	3 15	9% 52%	— —	
Green-winged Teal	1952 1953	Nil 1	— ?	— ?	— 5	— ?	— —	— —	— —	

[continued]

TABLE XII—continued

40

Species	Date of First Egg	Breeding Pairs	No. of Eggs Laid	Infertile	Hatched	Percentage Hatched of Eggs Laid	Reared	Percentage Reared of Young Hatched	Remarks
Falcated Duck	20.5.52 1.6.53	1 1	10 8	6 8	Nil Nil	— —	— —	— —	— —
Chestnut-breasted Teal ..	13.5.52 5.4.53	1 1	6 4	Nil Nil	6 4	100% 100%	Nil 4	— 100%	— First to be reared at New Grounds
Hawaiian Duck	13.4.52 1953	2 Nil	17	9	6	35%	3	50%	— —
Florida Duck	1952 20.4.53	Nil Nil	8 8	8 8	— —	— —	— —	— —	No male bird No male bird
Mottled Duck	25.5.52 1953	1 Nil	5 —	Nil —	5 —	100% —	3 —	60% —	— —
N. American Black Duck ..	1952 10.5.53	2 1	18 2	? 2	Nil Nil	— —	— —	— —	Both females left to incubate. 1 deserted, 2nd killed by vermin —
Indian Spotbill	14.5.52 1953	1 Nil	7 —	3 —	3 —	42% —	Nil —	— —	— —
Australian Grey Duck ..	10.3.52 18.3.52	2 2	16 22	Nil 6	14 14	87% 66%	3 9	21% 64%	3 reared by Silkie bantam. Others left with parents, all died —
Philippine Duck	1952 17.5.53	Nil 2	— 21	— 5	— 16	— 76%	— —	— —	— —

Wildfowl Trust

African Yellow-billed Duck	2.3.52 1953	2 Nil	21 —	6 —	12 —	57% —	7 —	68% —	2 reared by parents All 24 eggs hatched proved to be of hybrid origin
African Black Duck ..	9.3.52 1.3.53	1 1	3 4	1 1	2 3	67% 75%	Nil 2	— 67%	— First to be reared at New Grounds
Gadwall	12.5.52 6.5.53	5 ?	33 20	6 5	26 15	78% 75%	26 12	100% 80%	— —
European Wigeon	16.4.52 21.4.53	5 4	77 50	8 5	65 42	85% 84%	33 19	50% 45%	— —
American Wigeon	21.5.52 25.5.53	3 1	16 7	7 6	6 1	38% 14%	5 Nil	83% —	— —
Chiloe Wigeon	19.4.52 8.5.53	2 3	30 36	2 22	26 14	87% 38%	22 7	84% 18%	— —
Blue-winged Teal	22.5.52 31.5.53	2 2	14 13	3 1	10 12	71% 92%	2 5	20% 42%	— —
N. American Cinnamon Teal	13.4.52 17.4.53	5 5	76 85	19 21	55 60	72% 70%	26 19	47% 32%	— —
S. American Cinnamon Teal	21.5.52 1.5.53	1 1	5 8	Nil 4	5 3	100% 38%	3 Nil	60% —	First to be reared at New Grounds —
Garganey	18.4.52 7.5.53	3 1	20 4	2 Nil	17 3	85% 75%	5 2	29% 67%	2 eggs found in pond duly hatched —
Red Shoveler	31.3.52 2.4.53	1 1	8 5	1 2	7 3	87% 60%	6 2	85% 67%	— —
South African Shoveler ..	23.4.52 24.5.53	1 1	12 10	5 Nil	7 10	60% 100%	2 Nil	30% —	First to be reared at New Grounds —

[continued]

TABLE XII—continued

42

Species	Date of First Egg	Breeding Pairs	No. of Eggs Laid	Infertile	Hatched	Percentage Hatched of Eggs Laid	Reared	Percentage Reared of Young Hatched	Remarks
Common Shoveler	16.4.52	3	45	3	42	93%	24	57%	—
	16.4.53	3	70	10	53	76%	7	13%	—
Red-crested Pochard ..	14.3.52	3	55	3	45	81%	13	29%	—
	26.3.53	3	20	2	28	96%	7	25%	—
Rosy-billed Pochard ..	1.5.52	3	30	10	17	56%	8	47%	—
	18.5.53	3	36	13	16	44%	10	62%	—
Southern Pochard	1952	Nil	—	—	—	—	—	—	—
	30.9.53	1	4	4	Nil	—	—	—	First eggs to be laid at New Grounds
European Pochard	16.4.52	3	15	2	13	86%	7	54%	—
	24.5.53	1	6	Nil	6	100%	1	17%	—
Redhead	24.4.52	3	27	2	17	62%	8	47%	—
	18.4.53	3	42	12	27	64%	10	37%	—
Ring-necked Duck	19.5.52	Nil	6	6	Nil	—	—	—	Only females in collection at that time
	1953	Nil	—	—	—	—	—	—	—
Tufted Duck	19.6.52	1	7	Nil	7	100%	4	57%	—
	19.5.53	1	7	7	Nil	—	—	—	—
Scaup	28.5.52	3	28	2	22	77%	1	5%	Large losses from aspergillosis and visceral gout syndrome
	11.6.53	3	13	2	10	78%	4	40%	—

Wildfowl Trust

Brazilian Teal		30.6.52 1953	1 Nil	7 —	1 —	6 —	85% —	5 —	83% —	First to be reared in England since war —
Carolina		17.3.52 23.4.53	7 7	190 148	32 48	138 80	72% 54%	16 7	11% 9%	— —
Mandarin		15.4.52 18.4.53	6 4	58 43	22 20	26 9	45% 21%	5 5	20% 56%	— —
Eider		14.4.52 2.5.53	3 2	8 11	4 5	4 6	50% 55%	2 1	50% 17%	— —
Barrow's Goldeneye	..	17.5.52 4.5.53	1 1	4 4	4 4	Nil Nil	— —	— —	— —	— —
Red-breasted Merganser	..	4.6.52 1953	1 Nil	6 —	4 —	1 —	17% —	Nil —	— —	— —
Ruddy Duck		5.5.52 21.5.53	3 3	42 28	1 5	40 20	95% 70%	4 Nil	10% —	4 reared by parents —
EGGS BROUGHT										
Tufted Duck		1952	—	14	7	5	37%	1	20%	—
Eider		1952	—	11	3	8	72%	2	25%	—
Goosander		1952	—	12	2	10	83%	3	30%	First to be reared at New Grounds

PATHOLOGICAL INVESTIGATIONS

By J. A. J. Venn, M.R.C.V.S., D.V.S.M.

Ministry of Agriculture Veterinary Investigation Centre, Langford

IN previous years, attention was given, in the main, to the adult birds in the collection. During the period under review, which includes two breeding seasons, the investigations were directed towards an endeavour to determine whether or not there was any single factor that could be regarded as primarily responsible for the high rate of loss in the young stock.

Before discussing this investigation in detail, the position with regard to the losses in the collection as a whole can be considered briefly.

Aspergillosis

In the previous report, mention was made of the proposed investigation into Aspergillosis. It is regretted that this work is in abeyance, due to the departure from Bristol University of the worker concerned.

The possibility of a test being found that will enable Aspergillosis to be detected in birds during life has been under consideration, but one cannot, as yet, state whether this will be effective.

Nutritional Disorders

These, except in the case of newly hatched Ruddy Ducklings, appear to have been overcome. This fact is very encouraging.

Parasitism

The existence of parasitism in the adult birds continues to decrease. A few deaths in geese, from gizzard worm infestation, were encountered, but these must be regarded as inevitable in view of the concentration of the birds and the ubiquity of the parasite. There is no doubt that losses would be much higher if medication were not employed.

Losses in Young Stock

For the first time since the author has been undertaking the pathological investigations, it was decided to make a determined effort to discover the reason for the high mortality, as is indicated in the Hatching and Rearing Table.

In 1952, casualties examined early in the breeding season suggested that tape worm infestation might account for the losses encountered. Weakly birds were accordingly treated. Some recovery took place, but towards the latter end of the season the mortality rate rose alarmingly and it was found that *Acuaria uncinata* was present. This parasite was detected in the great majority of subsequent post mortems during the remainder of the season.

Here we might interpolate a short note about this parasitic Nematode worm. It is one that invades the proventriculus or stomach, damaging its wall and causing serious interference with the function of the organ. As a result of activity by the tissues of the bird, the worms may become encysted, but the damage to the stomach appears to be permanent. The intermediate host of the parasite is generally accepted as *Daphnia*, the water flea.

For the 1953 season it was hoped that small changes in management, such as having the youngest batches upstream of the older birds and also rearing broods in small units supplied with tap water, would control the infestation.

The results, in brief, were that at the commencement of the season, it appeared that the condition was under control and the rearing was satisfactory. As

the season continued, losses mounted until the end. This implied that there had been a build-up in infected *Daphnia* during the season, since it was unlikely that the intermediate stage could survive through the winter.

For the next season, more heroic measures are planned, which include alterations in the design of the pens and, at the same time, a drug that may prove effective in the control of the parasite is being used, so it is with hopes of a considerable improvement in rearing percentages that the 1954 season is awaited.

The author wishes to record his appreciation of the great help given him in these investigations by Mr S. T. Johnstone and his staff. Also he would mention his gratitude to Dr E. J. L. Soulsby, Lecturer in Parasitology at the University of Bristol Veterinary School, for his advice and active participation in the examinations undertaken during the time under consideration.

There can be no definite guarantee that 1954 will be a more successful rearing season than the previous two, but it appears likely, now we have determined what appears to be the main cause of loss, that the measures envisaged will reduce losses from this parasite to negligible amounts.

TABLE XIII
CAUSES OF DEATHS IN THE COLLECTION, 1952-53

Cause of Death	Species	Young	Adult	Total
Infectious Diseases				
Aspergillosis	Greater Snow Goose	1	—	1
	Ruddy-headed Goose	1	—	1
	Falkland Goose	—	1	1
	Andean Goose	—	1	1
	Abyssinian Blue-winged Goose	—	1	1
	New Zealand Shelduck	—	1	1
	Maned Goose	—	1	1
	Scaup	—	3	3
	African Yellow Bill	—	1	1
	New Zealand Scaup	—	1	1
Avian Tuberculosis				
Parasitic Diseases				
Cestode Infestation (<i>Hymenolepis</i> spp.)	Mandarin	1	—	1
	Red-breasted Merganser	1	—	1
	Wandering Tree Duck	—	—	—
	Rosy-bill	2	—	2
	Carolina	9	—	9
	Abyssinian Black Duck	—	1	1
	Brazilian Teal	1	—	1
	Redhead	1	—	1
Nematode Infestation				
Gizzard Worms (<i>Amidostomum</i> spp.)	Upland Goose	—	2	2
	Barnacle Goose	—	1	1
	Black Brant	—	1	1
Gape Worms (<i>Cyathostoma</i> spp.)	Grey-breasted Whistling Duck	1	—	1
<i>Acuaria uncinata</i>	Carolina	20	—	20
	Bahama Pintail	7	—	7
	Eider Duck	5	—	5
	Orinoco Goose	3	—	3
	Hartlaub's Duck	—	2	2
	Mandarin Duck	2	—	2

TABLE XIII—continued

Cause of Death	Species	Young	Adult	Total
	White-faced Whistling Duck	1	—	1
	Chiloe Wigeon	1	—	1
	Crested Duck	1	—	1
	Gadwall	6	—	6
	African Black Duck	1	—	1
	Abyssinian Black Duck	1	—	1
	Red-crested Pochard	5	—	5
	Garganey Teal	1	—	1
	Cape Teal	1	—	1
	Chestnut-breasted Teal	3	—	3
	Cinnamon Teal	1	—	1
	Shelduck	2	—	2
	Ruddy Duck	1	—	1
	Yellow-bill	1	—	1
Renal Coccidiosis	Greater Snow Goose	1	—	1
	Bar-headed Goose	2	—	2
Nutritional				
Gizzard Erosion	Ruddy Duck	10	—	10
Indefinite Etiology				
Visceral Gout	Carolina	1	—	1
	Barrow's Goldeneye	1	—	1
	White-faced Whistling Duck	9	—	9
Nephritis	Ruddy-headed Goose	1	—	1
	Ross's Goose	1	—	1
	Philippine Duck	1	—	1
	Gadwall	5	—	5
	Indian Pigmy Goose	2	—	2
	Grey-breasted Whistling Duck	1	—	1
	Scaup	4	—	4
Hepatitis	Cereopsis	—	1	1
	Barnacle Goose	—	1	1
Various Causes				
Heart Failure	Brazilian Teal	—	1	1
Pleurisy	Ruddy Shelduck	—	1	1
Impaction of Portions of Digestive Tract	Goosander	1	—	1
	Cinnamon Teal	1	—	1
	Scaup	1	—	1
Sinusitis	Emperor Goose	1	—	1
Congestion of Lungs	Ruddy Duck	4	—	4
	Emperor Goose	1	—	1
Chilling	Chiloe Wigeon	2	—	2
	Rosy-bill	2	—	2
	African Black Duck	—	—	—
Decomposed on Receipt ..	Various Species	—	—	27
Total				181

In many instances, where young birds are under consideration, only sufficient specimens to establish a diagnosis were examined. In the case of goslings and ducklings, therefore, the total death rate was much higher than the post mortem figures imply.