ART. XXV.—*On Introduced Birds.*

By J. DRUMMOND, F.L.S.

[*Read before the Philosophical Institute of Canterbury, 6th December,* 1905.]

MY excuse for entering the controversy as to whether small birds are man's friends or his enemies lies in the fact that I have lately collected a great deal of information dealing with the position that has arisen in New Zealand since acclimatisation was commenced in this colony, over forty years ago.

The introduction of old birds to a new country cannot fail to interest naturalists, who will welcome all additions to their knowledge of the subject. Besides that, the small English birds have brought about a serious problem in this country, as in all other countries where they thrive, and I feel sure that agriculturists in New Zealand, as well as in other countries where acclimatisation is contemplated, will be glad of some means of ascertaining the results brought about here.

The best plan of collecting the information is to pass from district to district, interviewing farmers and old settlers, and making observations. To do that, however, both time and money are necessary. The next best plan is to send throughout the colony a large number of circulars containing questions bearing on the subject. This was the plan I adopted, and, through the kindness of the Biological Branch of the Agricultural Department, which undertook to print the circulars and send them out to farmers, observers, and others who would be likely to give intelligent replies to the twenty-nine questions contained in the circulars, I have collected a great deal of evidence.

HOW ACCLIMATISATION BEGAN.

Acclimatisation began in New Zealand when the Maoris brought their dog and their rat from Polynesia. The rat, which is a rather engaging little animal—for a rodent—is not plentiful now, except in some densely wooded districts; and the dog, which was a sorry specimen of his order, is quite extinct; but for five or six hundred years both thrived exceedingly well, and they stand first on a long list of animals that have been introduced into this country with a success which, in several cases, is far too marked.

The first European animals were introduced by Captain Cook. He let three pigs loose in Queen Charlotte Sound in 1773. He extracted from the Maori to whom he gave them a promise that they would not be killed. He believed that in

time the pigs would stock the whole island. The Maori kept his word, and the navigator's belief was fulfilled. In later years the "Captain-Cooks," as they were called, afforded splendid diet for the Maoris and the early European visitors. It was these "Captain-Cooks," by the way, that began the disastrous attack on the native fauna. To them is attributed the work of banishing the tuatara from the mainland to a few small islands on the sea-coast.

By the time civilisation had sent out its advance guards of pioneers the pigs had increased so largely as to become a nuisance. They multiplied astonishingly, and enormous numbers assembled in the uninhabited valleys far from the settlements. At Wangapeka Valley, in the Nelson Province, Dr. Hochstetter, in 1860, saw several miles ploughed up by the pigs. Their extermination was sometimes contracted for by experienced hunters, and Dr. Hochstetter states that three men in twenty months, on an area of 250,000 acres, killed no fewer than twenty-five thousand pigs, and pledged themselves to kill fifteen thousand more.

When civilisation had fairly established itself, bringing many species of its domestic animals and several species of its domestic pests and vermin, there began a short, sharp, but bitter struggle between the new fauna and the old one which had possessed this country for ages. The result was never in doubt. The old fauna, which may be regarded as aristocrats of the animal kingdom, had absolutely no chance against the shrewd, vulgar, hard-headed, cunning, practical, greedy, and ferocious invaders, who were inured to hardship and had walked hand in hand with adversity through many generations. The incident was a specially dramatic one in respect to the avifauna. The native birds were driven completely away—not altogether, or even chiefly, by the newcomers, but by influences that the latter had been taught by experience to combat.

Sentiment, necessity, and utility played parts in connection with the acclimatisation of birds, and it was necessity and utility, not sentiment, that carried most weight. About forty years ago the country was smitten with a blasting plague of insects, which crawled over the country in vast hordes. The gathering of the caterpillars was a sight that caused consternation to agriculturists. They came not in regiments and battalions, but in mighty armies, devouring crops as they passed along, and leaving fields as bare as if the seed had not been sown.

In the Auckland District one settler kept a paddock closed up for a short time in order to place some young stock in it, but when he completed his purchases he was astonished to find that the grass in the paddock had disappeared. It had been

devoured by caterpillars. In the same province a settler who was driving his dray along a road drove through a colony of caterpillars which happened to be crossing the road at the time. They were present in such countless numbers that the wheels of his dray were in a puddle, caused by the crushing of the insects. A Press Association telegram published in the leading New Zealand newspapers about that time stated that the morning and evening trains between Waverley and Nukumaru, on their way to Wanganui, were brought to a standstill owing to countless thousands of caterpillars being on the rails, which had to be swept and sanded before the trains could continue their journeys. In the neighbourhood of Turakina, in the Rangitikei District, an army of caterpillars, hundreds of thousands strong, was overtaken by a train as the insects were crossing the rails to reach a field of oats. Thousands of them were crushed under the wheels of the engine, and the train suddenly stopped. It was found that the wheels had become so greasy that they revolved without advancing, as they could not grip the rails. The guard and the engine-driver placed sand on the rails, and a start was made. It was found, however, that during the stoppage the caterpillars had crawled in thousands over the engine and all over the carriages, inside and outside.

A Hawke's Bay gentleman who filled in one of the circulars states that caterpillars have covered his paddocks so thickly as to give colour to the pasture, even from a distance, and it was considered worth while to drive a mob of sheep backwards and forwards over the insects in order to destroy them. At Dunsandel, in North Canterbury, crops of oats of 60 or 70 bushels were completely threshed by the caterpillars. Their numbers increased in proportion to the quantities of food they consumed. They marched from field to field in grand processions, leaving behind them the abomination of desolation.

A Dunsandel farmer says: "I have been forty years in Canterbury. I have seen some bad work by the small birds, but I have also seen some bad work by the caterpillars. I once saw the caterpillars coming out of one man's paddock and crossing the road into another man's paddock. I made all haste to tell the man, and we got about sixteen hundred sheep on the road and killed the insects. The road was black with them, and as warm weather came on the smell was something awful."

Dr. C. Morton Anderson, of Christchurch, also gives his testimony. He states that twenty-five years ago an old farmer in the Amberley district, North Canterbury, showed him a splendid crop of wheat and said that he had seen just as fine a crop, twenty years previously, destroyed by caterpillars.

It was clear to the settlers that if this disastrous condition of affairs continued it would be useless to attempt to carry on agriculture and horticulture, as operations in that direction would mean that insects, not men and women, would be fed. The armies of the insects had to be fought back. In places large ditches were dug to stop the creatures' progress.

Some of the native birds performed good service by eating the insects. Prominent among these birds were gulls, terns, kingfishers, oyster-catchers, native larks, white-eyes, fantails, bell-birds, and grey warblers. At first the kingfishers seemed to increase rapidly with agriculture, and were regarded for a time as the agriculturist's best friends. The native birds, however, will not dwell with men, and when the native bush was felled in the vicinity of settlement they retreated further back, and only visited the insect-laden fields occasionally. As a means of adequately dealing with the insect pests they are not worth considering.

The settlers then turned their attention to the insect-eating birds they had known in the Old Country. Acclimatisation societies were formed, and steps were taken to introduce English birds. In Europe the insect-eaters have their retreats in the winter, when insects are absent; in New Zealand there are no winter retreats. It was therefore concluded that the introduced birds would have to possess three qualifications: they would have to be able to eat both insects and seeds, otherwise they would not be able to live in the winter, when the "children of the summer" were absent; they would have to be non-migratory, otherwise the time and money spent on their acclimatisation would be wasted; and they would have to be prolific breeders, so that they should multiply rapidly and soon overcome the insect pests.

In weighing the evidence against the small birds it must never be forgotten that that rapid increase was one of the principal qualifications set down by the early colonists as necessary for success. The sparrow fills all these requirements, and it is not surprising to learn that this little bird, which is now heartily cursed in many countries, and outlawed in several, with a price upon its head, should be among the first to be introduced to the new land of insects and trouble.

As far as I have been able to learn, it was to Canterbury that the first sparrows came, but their advent, it is stated, was purely accidental, and their introduction was not contemplated on that occasion. The story is that the acclimatisation society ordered twelve dozen hedge-sparrows from England. The order was placed with Captain Stevens, of the "Matoaka," who submitted it to a bird-fancier at Knightsbridge. Either the fancier

or the captain blundered, and the latter took on board thirteen dozen house-sparrows, which are generally known by the common name of "sparrow." He was very attentive to them on the voyage out, believing that they were the valuable hedge-sparrows which the colonists were anxious to secure. Most of them died, however, and when he reached Lyttelton, in February, 1867, only five were left. The officers of the society, realising that a mistake had been made, refused to accept the strangers. The captain then took them out of their cage, and, remarking that the poor little beggars had had a bad time, set them at liberty. They flew up into the rigging and remained twittering there for some time. The members of the society had gone down below to look at other birds. When they reached the deck again the sparrows had flown. The birds stayed about Lyttelton for three weeks; then they disappeared, and when next heard of had been seen at Kaiapoi, about twenty miles distant, where, at the end of 1869, they were reported as being "particularly numerous." The Otago society liberated three sparrows in 1868 and eleven in 1869. Other consignments were brought out later on, until the colony was well stocked. Sir Walter Buller frankly pleads guilty to having been accessory to the importation of sparrows to Wanganui. He, on behalf of the acclimatisation society there, advertised in the London newspapers offering a reward of £100 for a hundred pairs of sparrows delivered alive. Both advertisements and importations were successful.

Previous to that, in 1868, the Canterbury society introduced small numbers of birds, including skylarks and goldfinches. In shipping offices in London the society circulated lists of the sums of money it was willing to give for different species of birds, which it was intended should be brought out by emigrants from England; but that system was not successful, and it was not until definite arrangements were made with agents and captains of vessels that any satisfactory results were achieved. It was Captain Stevens who brought the first hedge-sparrow to the colony, and, it is claimed, to the Southern Hemisphere. It came in the "Matoaka," together with the first house-sparrows. It was the only survivor of a consignment. For a long time it was an object of interest in the society's grounds in Christchurch, many people journeying to the gardens to see the stranger.

The sight of the introduced birds seemed to fall in with the early colonists' desire to make Canterbury as like England as possible. Their minds were full of the place they had left. The Old Country was their Holy Land, and anything that reminded them of it and its associations was given a hearty welcome.

The blackbird, the skylark, and the song-thrush were introduced for sentimental reasons. The song of the skylark was listened to with a delight that can hardly be expressed in words. It sent a thrill of pleasure through the whole settlement. The bird was a "blithe spirit," which poured out the fullness of its joy "in profuse strains of unpremeditated art." It showered a "rain of melody" on the toiling colonists, and awakened the sweetest thoughts of home and of childhood's happy hours. The colonists had absolutely no suspicion that their charming little feathered friend, the gay and debonnair "embodiment of joy," the gentle singer of the field, who had come to sing to them the old songs of Merry England, would soon be ranked as a feathered pest, second to none but the sparrow.

The blackbird was another treasured reminder of the Old Country; and it is now another "feathered friend" that is heartily cursed up hill and down dale. There is some doubt as to when it was first introduced into New Zealand. Old settlers in Otago have an impression that it is indigenous, and was in the colony before civilisation came. It is probable, however, that early settlers in Otago mistook some of our own dark-plumaged birds for the English blackbird, and were led into a misapprehension. A statement has been made that the blackbird came up into Canterbury from Otago, making its first appearance in the former province in 1856. No Canterbury settler with whom I have spoken on the subject has been able to confirm that statement. The first record in regard to Canterbury is in 1865, when Captain Rose brought a pair to Lyttelton in the "Mermaid." In the same year the Otago Acclimatisation Society liberated a pair in Dunedin. In 1867 Captain Stevens brought forty-six to Lyttelton in the "Matoaka," and six more were liberated in Dunedin. Others followed, a few being acclimatised every year for a considerable time, Messrs. R. and C. Bills bringing out quite a large number. There was a great rage for blackbirds in Christchurch at one time. A single bird kept in a cage by Mr. T. H. Potts, at Governor's Bay, in Lyttelton Harbour, was the subject of much attention, and extortionate prices were paid for a mate for an odd bird.

The blackbird soon became naturalised. Colonists only smiled when it took a little fruit. There was plenty of fruit, they said, but there were only a few blackbirds; and they looked upon the bird's depredations as they would look upon the little failings of a favourite child. As the years went by, and the blackbird increased in numbers, it began to take the lion's share of cherries, strawberries, pears, apples, and other fruit. Gardeners then began to look upon it as an ugly, sooty

intruder and a greedy nuisance, and its company was found to be not half as desirable as had been anticipated.

The acclimatisation of nearly all the other small birds was the object of the same keen interest. The fact that the familiar shrill note of the robin redbreast was heard in Hagley Park, Christchurch, in 1880 was carefully recorded; and when a single nightingale, which had come out with the robins, died through an unnatural moult, deep regret was felt far and wide. The acclimatisation of both robin redbreast and the nightingale was unsuccessful in Canterbury, but the failure may be attributed to the fact that they were not given a good chance. An attempt to introduce the robin at West Taieri also failed.

Some of the birds spread from one district to another. In that way, Canterbury got from Otago its cirl-buntings and goldfinches, and some of its starlings, which were rather rare in Canterbury in 1880, but were very abundant there ten years later. The first were liberated in Dunedin in 1867, and in both Otago and Southland they are present in great numbers. The blackbirds and the goldfinches have covered an extraordinarily wide area, having taken up their residence on the lonely Auckland Islands, three hundred miles south of the mainland. The redpoll, on the other hand, is almost confined to North Canterbury and the country along the sea-coast of Otago, but it is found in a few northern districts. At first the song-thrush did not succeed anywhere except at Cheviot, between Christchurch and Kaikoura, but it is now found all over the colony. I have been able to obtain absolutely no trace of the Java sparrow, which was introduced into Nelson and Auckland, or of the grass-parrakeet, introduced into Canterbury. The bullfinch was liberated in Nelson, but I have heard nothing further about it, except from Mr. H. Guthrie-Smith, of Tutira, Hawke's Bay, who says that he has seen it in his district, while another correspondent says he saw one at Rissington, another district in Hawke's Bay.

THE SPARROW.

The case against the sparrow has been made out so often and so strongly that it is not necessary for me to state it in general terms here. The bird's troubles began about 1730, when Frederick the Great of Prussia caught a few sparrows eating some of his favourite fruit. He immediately placed a price on the head of each sparrow in his kingdom, ordered a crusade against the whole finch family, and set about the work of extermination with the same hearty goodwill that he brought to bear upon his troubles with the powers and principalities around him. At the end of two years he found that his trees were bare of either leaves or fruit, but were alive with caterpillars. He retracted

his decree, and was glad to pay large sums of money to import consignments of sparrows from other countries. In England in recent years the sparrow has been condemned by Miss E. A. Ormerod, and by the English Board of Agriculture. Even at the recent Ornithologists' Conference in England it was severely dealt with.

Everybody knows that it does great harm to crops and gardens. There are few farmers in New Zealand or any other country that do not regard it as one of their greatest enemies. The report of its ravages cannot be greatly exaggerated, as plain facts and figures are supplied, and corroborative evidence is not wanting.

In New Zealand, as in England, it refuses to go out into the woods and get an honest living in the straightforward but laborious manner adopted by our own birds. It clings to civilisation and cultivation, and insists on inflicting upon man its most unwelcome company. Whatever change it has made in its habits since it came to this new land have been for the worse. It has become less of an insect-eater than it used to be, and more of a grain-eater. It has swarmed into the gardens and orchards. No vegetable, fruit, or crop of any kind is proof against its enormous appetite. Its sole object in life seems to be to eat, breed, and be merry. Its cunning is unsurpassed. It has a wonderful knowledge how not to fall into a trap. Its impudence knows no bounds. Above all, it has an extraordinarily robust constitution, and it enjoys such continuously good health that no disease, evidently, is strong enough to materially lessen its numbers.

One of the inquiries in the circular was made with the object of ascertaining the number of young a pair of sparrows will breed in a season. I thought that if I could obtain reliable information in that respect from people residing in different parts of the colony, a rough estimate might be formed of the rate of the sparrow's increase in this country. The question was, "Can you state the number of young birds a pair of sparrows will rear in one season?" As might be expected, the replies make a very mixed assortment of statements, observations, conjectures, and guesses. Large numbers of the correspondents admit that they cannot supply the answer. Others put me off with general statements, such as "Their name is legion," "As many as they can," and, "Judging from the visible increase in this district, about a million."

I have been supplied, however, with plenty of good evidence, based on careful observation, to show that the sparrow is astonishingly prolific in this country. The number of eggs that may be taken from a female is almost without limit. At one

place, where an experiment was made, egg after egg was removed until fifty from one bird had been counted.

At Temuka, four broods of young, totalling thirteen birds, have been hatched in one nest, and in quick succession. In the Waikato district, four broods of five birds each are quite common. Mr. W. Hooton, secretary of the Farmers' Union at Rangi-iwi, in the Waikato, states that sparrows there generally breed four times in the season. In North Tauranga, on the east coast of the North Island, three broods of six each are common. At Balcairn, Woodside, and West Taieri, in the South Island, the reports state there are three broods in the season. Mr. W. Harding, chairman of the Ashburton branch of the Farmers' Union, gives the number in his district as thirty-five, which is also the number given by the Ashburton County Council. Mr. A. H. Shury, of Ashburton, says that a pair will rear five broods of five birds each, and the first brood will rear at least one.

Mr. James Smaill, an observer at Inch-Clutha, in Otago, says that breeding goes on all through the season, whole nestfuls being killed off by the cold in the severe weather. From twenty-five to thirty are the figures supplied for West Oxford, and at Riccarton there have been recorded three broods of five each. In a nest under a verandah the unfledged young ones evidently helped in the hatching of the eggs, so that the nest was never empty of unfledged young, while fully fledged birds seemed to rise out of the nest uninterruptedly right through the season.

From the nature of the evidence submitted, I should say that twenty-five young is a fair average for one pair in one season.

If allowance is made for natural decrease, which certainly cannot be very great in the case of the sparrow, the average might safely be put down at twenty. I feel sure that that is well within the mark. If those twenty were equally divided into males and females, and if all of them, together with the original parent birds, lived for five years, the single pair in that time would have increased to no fewer than 322,102. The increase is shown by the following table :—

Year.	Pairs Breeding	Pairs of Young.	Total Pairs.	Total Number of Birds.
First	1	10	11	22
Second	11	110	121	242
Third	121	1,210	1,331	2,662
Fourth	1,331	13,310	14,641	28,882
Fifth	14,641	146,410	161,051	322,102

If the process was continued at the same rate for five more years, and if all the birds lived, the single pair, at the end of ten years, would be represented by 51,874,849,202 sparrows. When figures are placed together in that way, of course, they are absurd. The increase assumed would never be reached, even by rapid breeders like sparrows. I may add that an American ornithologist, on whose system the table has been drawn up, states that it is no unusual thing for a pair in the latitude of New York to rear twenty or thirty young in a year, and, assuming the annual product of a pair to be twenty-four, and that they all lived, he works out the progeny of that pair for ten years at 275,716,983,698. It is only fair to state that he points out that the actual increase must be only a small fraction of that total, which is based on assumptions that are never likely to be realised. His investigations show that it is probable that the large colonies at Galveston (Texas), Salt Lake City, Utah, and San Francisco have resulted wholly, or at any rate to a large extent, from the few pairs originally introduced at those places; but he finds that it is impossible to apply the same remark to most of the other centres of abundance in the United States.

The evidence I have been able to gather seems to point to the fact that the five sparrows liberated by Captain Stevens in Lyttelton in 1867 must have been responsible for large numbers of the sparrows that spread over Canterbury in the following years. If there was only one pair in that little consignment, it must by this time have produced sufficient progeny to stock a large portion of the South Island.

I have endeavoured to ascertain whether the rates of increase are affected by the different climatic conditions in this colony, but these birds seem to have such remarkably strong constitutions that they thrive equally well in the cold of Otago and Southland and the warmth of Auckland. All the information supplied points to the fact that they are more numerous in the southern provinces than in the northern ones, and breed as rapidly in one as in the other. It is true that they are sometimes found dead in large numbers in the severe winters of the south, but this is more likely to be attributed to lack of food than to the severity of the climate. Wherever there is close settlement, in fact, sparrows are found in countless numbers, and in the enjoyment of the very best of health. It is stated that in America they do not increase as rapidly or as steadily in cold climates as in temperate ones, but I certainly cannot say that that is the case in New Zealand.

It is interesting to note that the first sparrows were taken to the United States in 1850, seventeen years before Captain

Stevens liberated the historical five in Lyttelton. The first pairs in America were liberated in Brooklyn, but they did not succeed very well, and a second attempt had to be made, a large shipment being sent from England in 1853. The birds were carefully watched, fed, and protected. Into some districts they were transported; into others they went voluntarily, and formed colonies. By 1875 there were many large colonies in different parts of the country, and a bulletin issued by the United States Department says, "From that time to the present the marvellous rapidity of the sparrow's multiplication, the surpassing swiftness of its extension, and the prodigious size of the area it has overspread, are without parallel in the history of any bird. Like a noxious weed transplanted to a fertile soil, it has taken root and has become disseminated over half a continent before the significance of its presence has come to be understood."

Exaggerated reports of the benefit the bird had conferred upon settlers in the districts in the United States into which it had been first introduced helped largely to foster its increase. Many people in the United States went to the expense of purchasing and shipping sparrows to considerable distances in the belief that they were insectivorous birds and must prove beneficial wherever they could be naturalised. In this way a sparrow "boom" was started, and the price of sparrows in New York went up to such a point that many people desirous of obtaining the birds found it cheaper to club together and import them direct from England.

I directed special inquiries to ascertain if possible the manner in which the sparrow in New Zealand regulates its diet. It would be interesting to know the proportions of grain and insects it consumes, and whether, if a dish of insects and a dish of grain were placed in front of it, it would take the insects before the grain.

Large numbers of farmers in this country have come to the conclusion that the sparrow has entirely lost its insectivorous habits, and has become a grain-eater pure and simple. They say that while there is a speck of grain about or a seed of any kind the sparrow will not trouble about the insects, unless it is to feed the young. Some attempts have been made to put the sparrow's weakness in this respect to an actual test. One correspondent states that when insects were placed round a sparrow's nest the bird left them alone, and flew to an adjacent wheat-field or a garden of sweet young vegetables. So far as the replies to my circular are concerned, there has been only one case of this kind, and against it there are the statements of many correspondents that the sparrow still eats many insects,

although this is often qualified by another statement that it does so only when there is no grain available.

A reliable correspondent at Ashburton estimates that one sparrow will eat 100 grains of wheat in twenty-four hours, and that the progeny of one bird, during the three months of harvest, will consume three-quarters of a bushel of wheat, and will also shake large quantities to the ground. These estimates are not altogether guesses, but are based on intelligent investigations. A Waikato farmer says, "Bother the sparrows! they eat or destroy everything you do not want them to." A farmer in the Wairarapa sums up his views in the following words: "If all the sparrows were dead we would never miss them; they are a tax on the farmer to the extent of an extra bushel of seed per acre." A member of the Farmers' Union at Aponga, Whangarei, declares that he doubts if the sparrows ever touch insects, as he has never seen them doing so.

The fifth question in the circular was, "Do you think that the introduction of any of the small birds was a mistake?" There are very few correspondents who, in replying to this, have not named the sparrow and emphasized his inclusion in the condemned list by strong and harsh words.

Mr. A. Burrows, a dairy farmer, of West Oxford, North Canterbury, says: "I once made a small box for sparrows and placed it in a position where I could watch them. After a week had passed a pair built a nest in the box and reared five young. For the first week they fed them on insects, bringing as many as six moths and 'long-legs' at a time. A short distance away there was a paddock of wheat getting ripe. They started upon that. They made a journey about once in every five minutes, bringing each time a grain of wheat, making, for both birds, 24 grains an hour—that is assuming that they took only one grain at a time. If they worked eight hours a day the total would be 192 grains. I do not know how long they would have continued, as I killed the young ones before they were ready to fly. There was nothing but wheat in the crops of them all. I sowed 4 lb. of timothy seed on half an acre of land, well worked to test its capacity. After sowing I bush-harrowed it well and rolled it hard. I could not keep the sparrows off. They worked it all up again, as though it had never been harrowed, and very little came up. I shot some of the sparrows, and found that they had as much as half a teaspoonful of seed in their crops. I tried poisoned wheat, but they would not touch it. Last winter I raked the snow off the grass and put poisoned wheat down. The sparrows were plentiful, but did not touch it; but in an hour there were five larks, three chaffinches, one grey linnet, and one thrush dead. Dead

gulls, blackbirds, pheasants, and hedge-sparrows, poisoned by wheat, have been brought to me."

Some of the replies give an idea of the intense enmity the sparrow has created for himself in New Zealand. One correspondent refers to him as "that bird brigand, the sparrow." A resident of Mataura, in Southland, says that he is a greater nuisance than the rabbit. Another farmer says that the man who first introduced the sparrow should be smitten with all the plagues of Egypt; and another thinks that hanging is the only punishment that will fit the crime of introducing "this pestiferous little beast, which has done no good to any one, and much harm to everybody."

Of the hundreds of correspondents who have filled in the circular, there are only six who raise their voices in the sparrow's favour. I give their opinions in full. Mr. G. Wilkinson, Chairman of the North Cape County Council, writing from Mangonui, says: "I feel sure that sparrows do a lot of good, and if their numbers were greatly reduced the country would be overrun with insects again." Mr. W. E. Draper, of Waerenga, Waikato, looks upon the sparrow as "the best agricultural scavenger we have." "It is true," he adds, "that he eats a little, but he does not destroy what he won't eat. When I watch him and see what quantities of dirty slugs he eats I am satisfied that I am not paying too high a price for the return made. I am also satisfied that a great deal of the damage attributed to the sparrow is committed by the lark." Mr. G. M. Thomson, F.L.S., a Dunedin naturalist, says that though the sparrow is very destructive to grain-crops when they are ripening, it eats a number of insects throughout the year, as well as the seeds of weeds. He also states that "it is a common sight to see sparrows chasing moths and other insects on the wing, and lighting down on the roads to strip their wings off; in gardens they destroy germinating seeds, especially peas, disbud gooseberries, and pick the primrose-flowers as they open; but here again they do a lot of good in keeping down insect life." Mr. R. H. Shakespear, curator of the bird sanctuary at Little Barrier Island, says that sparrows are destructive to a certain extent, but in the winter they destroy a good many insects. He doubts if they are as destructive as they are thought to be, and says that probably one characteristic balances the other. Mr. Shury, of Ashburton, states that a pair of sparrows have been observed to feed their young thirty-six times an hour in a fourteen-hour spring and summer day, and he has calculated that they feed their young with 3,400 worms and caterpillars in one week. Mr. H. A. Nevins, writing from Tinui, Castle Point, says: "Sparrows do a great deal of good; I have known

them to clear a field of peas of caterpillars, which, before the birds became numerous, would have destroyed all the peas."

In 1878, Mr. T. W. Kirk, F.L.S., Government Biologist in New Zealand, read an interesting paper before the Wellington Philosophical Institute, in which he stated that the balance of a mass of information he had collected was against the sparrow. In 1897, in the "Report of the Department of Agriculture," he stated that he had made more extensive investigations, with the result that the evidence against the bird was overwhelming, "and would crush, as with a weight of shame, any less hardened criminal."

That is the case for and against the sparrow as far as my inquiries have gone. The mass of evidence is entirely against the bird, which stands condemned on the almost unanimous vote of the farming community of the colony. It is proclaimed a public nuisance, and the mitigations of its offence are evidently so slight that they are deemed hardly worth considering.

Whatever the sparrow may do in these times, however, there is no doubt that it did good service to the agriculturist and horticulturist of New Zealand in former days, when the insects were on the war-path and when the people were liable to be eaten out of house and home. A new generation has arisen, and only the sparrow's faults are remembered. We do not know how we would fare if the sparrow was dismissed from the land, and the safest plan seems to be to keep it in check as far as possible.

The Blackbird

The blackbird is a pest of the orchard rather than of the field. It devours all kinds of fruit, from currants and strawberries to apricots, apples, cherries, and plums. Its wholesale depredations in this respect outweigh much of the good it does by eating insects. Its name is generally linked with that of the sparrow and the skylark in answer to the question as to whether the introduction of any English birds was a mistake.

Amongst other things, the blackbird is accused of having been the means of spreading the blackberry throughout the West Oxford (North Canterbury), Mangonui, and other country districts. Mr. J. Speight, of Shirley, near Christchurch, who was a passenger by the "Matoaka" in 1867, and had blackbirds as his shipmates, says that they are almost useless in Canterbury now, and that they seem to have forgotten the art of breaking snails' shells in order to get at the snails, a practice in which they display considerable skill in England.

A large majority of those who replied to my circular are distinctly in favour of banishing the blackbird, if that is possible,

as they look upon it as no friend, but an enemy. One of the correspondents, at Waihou, Piako County, reports that the blackbird, in conjunction with the thrush, has practically put a stop to the growing of grapes, plums, peaches, gooseberries, apples, or pears on a small scale, and this gentleman sees absolutely no good in the bird—a view which is taken by many other people in New Zealand.

OTHER SMALL BIRDS.

I have already classed the skylark, placing it next to the sparrow in respect to destructiveness. It is often seen pulling up springing wheat, and it is specially troublesome in the gardens where early seeds, such as turnips and cabbages, are sown, pulling the young plants out of the ground as they are just shooting above the surface.

Very few of the correspondents have a good word to say for the song-thrush, which is placed fairly high in the list of mistakes. An observer at Rissington, Hawke's Bay, however, sends the following story of the thrush: "For about thirty days in the year, until well into January, a thrush has come to my farm morning after morning. Over an area of about 300 square yards he collects worms, and flies with them to his mate, taking sometimes two or three at a time. I have watched him frequently, and from 7.30 a.m. to 8 a.m. he takes fifty worms. I think I underestimate it in putting it at two hundred worms a day. He also takes slugs and insects."

The greenfinch is described sweepingly as the farmer's greatest enemy when grain is ripening. It is very plentiful in the open country, where it is seen in large numbers. The first greenfinches of which I have been able to secure any information were liberated in Christchurch in 1863, where a pair were purchased at auction for five guineas. They soon nested, but the only occupant at first was one little greenfinch. Before the warm summer days had passed, however, a second family of five was reared, and in the following winter a flock of eight was seen daily. In the next year, late in the autumn, more than twenty were flushed from a little patch of chickweed, and it was not long before the birds had spread so widely that their note became a well-known sound in Canterbury. It is stated that in the Central Otago district the greenfinch is the worst offender of all in the orchards, as it attacks the trees while they are still in flower and just as the fruit is forming. In some orchards in that district, it is reported, the birds have taken nine-tenths of the fruit-crop. The chaffinch and the redpoll have appeared at Tutira, in Hawke's Bay, within the past two years. Mr. Guthrie-

Smith states that both came from the north. The former is now nesting everywhere on the run, but the latter is much rarer.

The goldfinch feeds largely on seeds, and it does not seem to have aroused much enmity. Some farmers say that it does more good than harm, as it destroys large quantities of thistle-seed.

The redpoll is regarded as a harmless bird for the most part, but it has not spread very far. In the North it is reported to be destructive on grass-seed burnings.

The yellowhammer is classed with the sparrow in descriptions of the damage done to seed in the newly-sown bush burns in the North Island. Mr. S. I. Fitch, of Dallington, near Christchurch, who took a keen interest in birds when a boy in Yorkshire, states that the song-thrush, the greenfinch, and the goldfinch are more numerous in New Zealand than he ever knew them to be in England.

The house-mynah attacks fruit as well as insects, being specially fond of cherries.

The chaffinch joins other birds in their attacks upon seeds and berries.

The lapwing seems to have had a hard struggle at first against this climate. It was not tried in the South Island until quite recently, and it was thought that attempts to introduce it into the North Island had failed. The information supplied, however, shows that its acclimatisation has been successful in several northern districts, where it is highly praised, the experiment of its introduction having given great satisfaction. This bird is credited with having killed large numbers of the wireworm and grubs in the spring, and absolutely no charges are made against it. In January, 1904, thirty lapwings were liberated in the Upper Kokotahi district, Westland, but nothing has been heard of them yet.

Praise of the little hedge-sparrow is almost unanimous. It is found in fairly large numbers in Canterbury and in some districts of Otago. It is regarded as a faithful friend of the farmers, who regret that it has not spread as rapidly at its impudent and hardy namesake.

The cirl-bunting has established itself in several districts. It seems to have created neither good impressions nor bad ones.

Rooks have been introduced successfully, but they generally remain in one district, and do not spread far. They are fairly plentiful in Canterbury, and in some districts of the North Island, where it is said they do much good and scarcely any harm. Their acclimatisation has not been very successful in Hawke's Bay, although there are several colonies of them there. This bird, however, is not without its enemies, and colonial

farmers with a Home experience say that its introduction may prove to be one of the mistakes of acclimatisation.

Nothing is said against the Australian magpie, which is sometimes described as a useful immigrant. It has taken up its residence in a number of districts, where it seems to thrive very well. Many years ago a pair of these birds came over to Streamlands, in the Rodney County, from the Island of Kawau, when it was owned by Sir George Grey. They nested in a kauri-tree about a hundred yards from a settler's house, and from that spot they spread throughout the whole county. They have now completely disappeared from Streamlands.

There is hardly any limit to the good words said of the starling. It is frequently described as the only introduced bird worth having. It is found in nearly all parts of the colony, and its arrival in a new district is welcomed by all who are engaged in agriculture. Large numbers of farmers erect nesting-boxes in order to encourage it to come about their farms. Besides eating insects, it does a great deal of good by destroying larks' eggs and eating the ticks on sheep. Many farmers look upon this bird as being the only true insectivorous bird introduced into this colony. Somewhat alarming stories are told by quite a large number of correspondents, however, about the starling having taken to devouring fruit and even grain. Mr. Edgar Stead confirms the report in regard to this bird's fruit-eating proclivities. In a conversation with me he predicted that it will become one of the greatest nuisances orchardists and gardeners have ever known. I have no absolute proof that it has actually taken to eating grain, but this is a phase of the starling's life that is well worth watching. If even the starling turns from insects to fruit and grain, it may be asked if there are any birds that are likely to remain loyal to their reputations as insect-eaters exclusively. It may be pointed out here that the starling has given rise to something more substantial than suspicion in Australia, where the gravest possible charges are made against it, and these charges are evidently based upon evidence that cannot be discounted. According to the report of the American Consul at Melbourne, starlings have increased to myriads in Australia, and they have become very injurious to the fruit-crops, so that the regulations passed for their protection have been repealed, and it is urged that steps should be taken for their systematic destruction. "The fruit destroyed by them," the Consul says, "includes peaches, pears, cherries, apples, figs, apricots, plums, grapes, and strawberries. Both vine- and fruit-growing are seriously threatened if the pest is not suppressed. As many as ten cases of apples have been destroyed by this bird in less than half an hour." Another charge

is made against the starling in Australia. It is stated that valuable native insect-eating birds, such as kingfishers, diamond-birds, tree-swallows, and tree-creepers, are being turned out of their nesting-places in tree-hollows by swarms of starlings, "and before long," the report continues, "these birds, so useful to the farmers, will be driven out of the country." The starling in Australia is supposed to raise five broods in the year, and it multiplies with amazing rapidity—much more rapidly, evidently, than in New Zealand. Before leaving the starlings, I should like to point out that Mr. W. W. Smith, in a letter to the *Lyttelton Times*, a few years ago, reported that they killed off large numbers of humble-bees, which the birds captured in order to give to their young. "Like the native tui," Mr. Smith writes, "the starling now frequents the flax flats and sucks the honey from the richly mellifluous flowers of the plant. It is quite probable that the eating of the bees' honey-sac by the starling developed a taste for honey in these birds. Both the starling and the tui are birds of high intelligence. Their newly acquired habits are important as illustrating how the penchant for fresh food is developed in some species." These facts point to the great need for caution when fresh importations are being considered.

The Small Birds as a Company.

A mass of evidence is brought forward against the company of small birds as a whole, apart from individual species. Most of the information on this point is supplied in reply to the eighteenth question on the circular, which is as follows: "Generally speaking, have the introduced birds done more good than harm or more harm than good?" A typical reply is from Wairere, Wairarapa North: "As with most aliens, it would be better if they had stayed at home." The same sentiment is expressed in other words many times. One correspondent says that the introduction of English birds, taking them together, was "a terrible mistake." Another says, "For goodness' sake don't make it worse by importing any more of them." A fruit-grower at Patutahi, Poverty Bay, declines to give his views, as the space left in the circular for the reply to the question is far too limited to enable him to say all that he wants to say.

The Lower Hutt, in the Wellington District, is a market-gardening centre, and the following catalogue of grievances, together with the general sweeping statement, seems to show that small birds are particularly numerous there: "One acre of cabbage and cauliflower plants destroyed entirely last year; vegetable-garden seeds picked out, necessitating netting; currants entirely eaten up; cannot ripen one gooseberry; rasp-

berries saved with the greatest difficulty by picking twice daily; impossible to grow wheat, quarter-acre picked absolutely clean last year; oats pulled out when about 2 in. high, and have to sow double quantities to allow for destruction; whole treefuls of the best sorts of plums destroyed; the destruction, in short, is so great as to seriously interfere with cropping arrangements, to bar several valuable lines, and to render gardening, both domestic and market, simply heartbreaking."

At Ellesmere (Canterbury) and Fendalton, one of the suburbs of Christchurch, it is impossible to grow barley of good malting sample, as the farmer cannot sow it at the right season, or the birds will take the whole crop.

Farmers in the Lincoln district, North Canterbury, generally agree to sow their wheat at about the same time, so that the birds' attacks will be fairly divided. "If one of us had an early crop," a farmer of that district says, "all the birds would concentrate their efforts upon it, and they would have it eaten up very soon; but when we act in concert the birds bestow their attentions over the whole area, and one farmer does not have to bear the whole of the brunt."

The replies to the eighteenth question, in fact, leave no doubt whatever that a vast majority of the classes of the community most interested in the doings of the birds firmly believe that their introduction was a disastrous mistake, that they do immeasurably more harm than good, and that their banishment, if it was possible, would be exceedingly desirable. The consensus of opinion is expressed in too clear, concise, and emphatic a manner to leave any shadow of doubt as to the strong antagonism felt towards English birds. Many farmers, however, modify their condemnation by expressing an opinion that if the birds could be kept in check they would be converted from enemies to friends. I cannot help thinking that that is the proper attitude to adopt. The birds are far from being altogether bad. A forgetful generation may have a short memory, but great services given in the past cannot be ignored when the birds are on their trial.

Attempts have been made to estimate the damage done by the birds and to place a value on it. At a conference of local bodies held in Christchurch to consider the best means of dealing with the nuisance, the damage was set down at 5s. an acre on cultivated land. If the average throughout the colony was only half that sum the total loss must be enormous, as last year the total area under crops in the colony was 1,494,722 acres, 661,926 acres being in grain-crops. Besides that total, there were 17,176 acres in garden and 27,482 in orchard.

How to Check the Small Birds.

Some of the inquiries were directed towards ascertaining what steps have been taken to keep the birds in check, and what success has been achieved in that direction. The plan most favoured is the laying of poisoned grain and the payment for heads and eggs. This plan seems to have been fairly effective when combined action is taken, but it has often failed where there is lack of combination. The natural increase is checked by this means, but there are few instances of any material diminution in numbers having been made. In the orchard in the North Island the gun is used. At the bird sanctuary on Little Barrier Island, the nests of blackbirds, thrushes, sparrows, and finches are destroyed when opportunities occur, and it is thought that this probably keeps the English birds in check on the island.

In several districts heads and eggs are paid for, and poisoned wheat is distributed free by local authorities. In other districts netting is resorted to. Mr. J. Wolfe, a Lincoln (North Canterbury) farmer, states that the system of purchase has the desired effect to a great extent. He also informed me that he was the first to use strychnine poison in his district, having commenced to do so twenty-six years ago, and he has been poisoning ever since, with good results.

A very miscellaneous lot of suggestions are offered as to the best means of checking the nuisance. A gentleman in Temuka has prepared a scheme providing for legislation to compel all landowners to produce a certain number of sparrows during the winter months. Several farmers suggest that long nets, such as bird-catchers use, could be brought into requisition by capable men with effect. The Government is recommended to give a bonus for the production of a poison that will be readily eaten by the birds, and one correspondent thinks that a bonus should be given for the best trap. There is a strong feeling in favour of the introduction of English owls and other birds of prey, and the introduction of English bats, frogs, and toads is also favoured. A practical observation is that the towns ought to be compelled to do more than at present, as they are breeding-places from which the birds swarm into the country districts. Among the most novel suggestions are the systematic employment of armies of small boys at nesting, and the use of electric wires stretched round fields of crops, the wires to be charged with electricity in order to give the birds severe shocks. The most practical scheme, and the one that is evidently more acceptable than any other, is thorough and systematic poisoning. The whole operation, it is urged, should be controlled by the Agricultural Department, which should

be armed with compulsory powers, so that it could compel all farmers in one district to act in unison. This is the scheme favoured by the officers of the Department, and it is likely that an attempt will be made to bring it into operation.

PHEASANTS AND QUAIL.

The common pheasant (*Phasianus colchicus*) and the ring-necked pheasant (*Phasianus torquatus*) have had a strange and eventful history in this country. At first their acclimatisation was a notable and almost an unqualified success. They succeeded wherever they were introduced, increasing very rapidly and rearing healthy and hardy broods of young. One of the first successes was achieved by Sir Frederick Weld in 1865, when he established the common pheasant in Canterbury. Other importations into that province followed, the acclimatisation society bringing out fairly large numbers. In 1868 it bred forty birds and sold them to members for £2 a pair. In the tussock-covered land of Canterbury they thrived specially well, and the large Cheviot Estate, then held by the Hon. W. Robinson, was soon stocked with them. Mr. Robinson spared no expense in preparing for their reception when he arranged for a consignment, supplied by the society. He erected large commodious aviaries, ordered that all the native cats on the estate should be killed, nearly extirpated the wekas, and had the hawks destroyed at the rate of six a day. The society continued to import pheasants for a considerable time. It bred about a hundred birds in a year, and obtained a fairly good income by selling them to the owners of large estates. It seemed as if pheasants would, in a few years, spread throughout both Islands and become thoroughly naturalised. After this had gone on for some time the birds received a decided check. Their numbers neither increased nor decreased. Then they began to decrease rapidly and, apparently, almost simultaneously in many districts. Their complete failure, taking the colony as a whole, is now beyond doubt. In Canterbury and other provinces where they were once exceedingly plentiful they are never seen at all. "Once plentiful, but decreasing or disappeared," are the words generally written against them in the circulars. This result, which is very regrettable from the sportsman's point of view, is attributed to the laying of poison for rabbits, to the depredations of stoats, weasels, and wild cats, to bush fires, and, in a lesser degree, to the pheasants' food-supplies being eaten by the smaller introduced birds. It is stated that the wekas, as well as the stoats and weasels, eat pheasants' eggs. The birds are decreasing as rapidly in districts where there is plenty of cover as in districts where there is little or none. The destruc-

tion done by bush-fires is shown by the following statement from a farmer at Mangahao, Pahiatua, Wellington District: "When sowing grass-seed after bush-fires seven years ago I came across thousands of nests with the remains of eggs and the charred bones of the pheasants that had been sitting on them. They were very plentiful here once, but now, when one is seen, half the town and country is after it to shoot it."

In large numbers of cases the decrease has been almost simultaneous with the arrival of stoats and weasels, which seem to have set about the work of extirpation without any unnecessary delay. A rather striking remark is made by a farmer at Ruatutiri, who says that there are only a few pheasants in his district now, and those that are there are "only old cock birds."

The reports received show that pheasants now exist in numbers worth counting in only the North Island. The Poverty Bay district, on the east coast of the North Island, is the only district in which they are reported as "numerous," and there they seem to be working towards the interior. In the few districts where they are at all plentiful they are regarded by agriculturists as a thorough nuisance. A farmer at Parua Bay describes them as "the greatest curse settlers have to contend against." At Hokianga they are "ruination to the farmer and the gardener." They destroy young grass, pull up maize and eat it, and attack potatoes, carrots, beans, peas, barley, wheat, and many kinds of fruit. A strong testimony is given against them by Mr. W. E. Draper, of Waerenga, who classes them with both species of introduced quail in the following condemnation: "I am a large grower of fruit, such is strawberries, grapes, peaches, plums, and so on. The ravages committed by the pheasants and quail are a serious matter for me. I cannot offer strawberries for sale with a piece pecked out of one side, nor does it suit me to find the ground between the rows sprinkled with half-ripe berries bitten off. The birds perambulate a row of vines and completely destroy every grape on a row 5 or 6 chains long. When I sow a field of clover the soil is scratched and the seed eaten. If a stop is not put to the increase of these pests no man in his sober senses will embark on fruit-culture in country districts infested by them. My opinion is that it is little better than criminal folly to keep a close season for these birds. I have counted twenty-five pheasants on about an acre of potatoes on the lake-side, and I have put up nineteen on my own place when traversing a distance of 30 chains. Up to about nine years ago I supplied strawberries up to the middle of June. The berries come now as before, but they are all destroyed by the pheasants and the quail, especially the latter.

In former years I have sold in March, April, and May from 10 cwt. to 15 cwt. of strawberries. Now they are all destroyed."

The two species of quail introduced, the swamp-quail (*Synœcus australis*) and the Californian quail (*Callipepla californica*), have been hardly more successful than the pheasants. They never increased so rapidly, however, and their failure is not so marked. The Californian quail is still plentiful in some of the North Island districts, where farmers write against its name, "No good." At Te Puke, in the Maketu district, quail live largely on clover, taking both the seed and the young plants in the bush clearings. Stoats and weasels, cats, poison, and bush-fires are their enemies.

In regard to the Californian quail a farmer at Ngatimaru says: "I have noticed that this bird wants fairly large tracts of land. It is also better if the land is hilly and broken, with bush and scrub here and there. It seems to get on very well on land where there is plenty of bush. On other land it does well for a time and then its numbers are decreased, for what reason I do not know, unless it is on account of the cats, which I think are largely to blame."

A farmer in the Motu district, in the Auckland Province, says that quail need more protection, and he suggests that private owners should proclaim their properties private sanctuaries, and every third year should be a close one.

THE TWO SWANS.

There is a very striking contrast between the white swan and the black swan in respect to their acclimatisation in New Zealand. The black swan is near the top of the list of successes, while the white swan has increased slowly and with obvious difficulty, and has sometimes quite failed to establish itself. The black swan, in fact, has shown much greater adaptability than the other species, whose first attempts at incubation in Christchurch and other places were utterly ineffective. The black swan settled down at once to its new conditions. It was introduced into Canterbury partly with the object of destroying watercress in the Avon, which runs through Christchurch. In a few years the birds had increased largely, but in 1867 many of them forsook the Avon and made long and rather notable migrations to the wild country on the West Coast, and to Otago, and even Marlborough. Less than twenty were liberated on the Avon at first by the Christchurch City Council. These birds did the work desired from them, as they cleared a pathway through the watercress for the current. In 1880 there were hundreds of black swans in the Avon and Halswell Rivers, as well as the Heathcote, as many as five hundred sometimes

being counted on small areas. They achieved the same success in Otago, where about sixty were liberated from 1866 to 1870.

Black swans are now found in thousands on lakes, estuaries, and lagoons in many parts of the colony, from the extreme north to the far south. They keep much to the wild regions. In some places they wage a deadly war on the native ducks, taking their food-supplies from them and persecuting them relentlessly.

Further Introductions Suggested.

A rather striking aspect of the inquiries is that there is not the same consensus of opinion against the introduction of more English birds as there is against those we have already. Further introductions are suggested with quite as much confidence as characterized the first introductions, forty years ago.

The twenty-eighth question on the circular was, "Do you think that any other English birds could be introduced advantageously? If so, state the species you favour." Only a few of the correspondents are opposed to further introductions, although several sound a warning that English birds are liable to change their habits on coming to a new land and living under new conditions.

It is clear, however, that sentiment must still be reckoned with. This is shown by the fact that many more votes have been cast in favour of robin redbreast than in favour of any other bird that can be thought of. He heads the list of suggested importations of the future. The fact that jenny wren is not very far down in the list may be taken as further evidence that sentiment in regard to the birds of the Old Country is not dead. It is expected, however, that robin redbreast will be useful as well as ornamental. The swallow comes next to him, then several kinds of martins, then the plovers, the swift, and the wagtail, in that order. The cuckoo is a general favourite. Other birds named are the stonechat, shrike, snipe, more lapwings and hedge-sparrows, flycatcher, tits, titmouse, whitethroat, nightingale (which, by the way, has only one vote), waterousels, storks, American flycatcher and kingbird, goatsucker, grouse, partridge (French and English), jackdaw, blackcock, nightjar, woodpecker, winchat, wheatear, pipit, wryneck, crow, and butcher-bird.

I supply this list for what it is worth, and to give some indication of the feeling on the subject. The advisableness of introducing any of the birds named is a matter that should be gone into with great care when definite steps in regard to further importations are contemplated, and it could hardly be discussed here. The facts brought to light in respect to acclimatisation in

New Zealand are sufficiently striking to guard against thoughtless action. It might be advisable to forbid the importation of any more foreign birds without the sanction of a committee of experts, which could be appointed.

CONCLUSION.

My inquiry has not put an end to the controversy, which is one of those things that will continue as long as small birds and farmers exist. The lines of demarcation are too faint, and too hard to define, to enable it to be said with any certainty that the introduction of small birds into this colony was a mistake. The question rests largely upon speculative opinion, and absolute settlement need never be looked for.

A great deal of the evidence I have collected is confusing, and a little of it is obviously the outcome of prejudice and bitter enmity. There is, however, less of this than I expected.

For the most part the conclusions arrived at by the hundreds of correspondents who have returned the circulars are based upon actual observations extending over thirty or forty years. Many of those who went to the trouble of filling in the circulars are in the advantageous position of having known the small birds both at Home and in the colonies, and they are in a good position to make comparisons and note changes that have taken place in the birds' habits. In some cases considerable trouble has been taken, the circulars being accompanied by long letters. By the adoption of this system of seeking information many men have been reached who would never have imparted their knowledge in any other way. Several of the correspondents have been good enough to commend the system. They have expressed their willingness to supply more detailed information, if desired, and they suggest that the idea should be applied to other subjects that interest the agriculturist.

The evidence has been weighed carefully, and in forming conclusions I have endeavoured to be just to men and birds alike. The summary of the results, at any rate, is impartial, and I think I am justified in claiming that on the prominent points of the controversy a consensus of expert opinion throughout the colony is now placed at the disposal of all who wish to have it.

I have to thank Mr. T. W. Kirk for the trouble he took in distributing the circulars, collecting them through his Department, and forwarding them on to me.

The following is a list of birds that have been naturalised and established in New Zealand: Song-thrush (*Turdus musicus*), blackbird (*Turdus merula*), hedge-sparrow (*Accentor modularis*),

sparrow (*Passer domesticus*), greenfinch (*Ligurinus chloris*), chaffinch (*Fringilla cœlebs*), goldfinch (*Carduelis elegans*), redpoll (*Linota rufescens*), yellow-hammer (*Emberiza citrinella*), cirl-bunting (*Emberiza cirlus*), starling (*Sternus vulgaris*), house-mynah (*Acridotheres tristis*), Australian magpie (*Gymnorhina leuconota*), skylark (*Alauda arvensis*), rook (*Corvus frugilegus*), white swan (*Cygnus olor*), black swan (*Cygnus atratus*), swamp-quail (*Synœcus australis*), Californian quail (*Callipepla californica*), pheasant (*Phasianus colchicus*), ring-necked pheasant (*Phasianus torquatus*), lapwing (*Vanallus cristatus*).

Art. XXVI.—*Results of Dredging in Hauraki Gulf; with Descriptions of Seven New Species.*

By Henry Suter.

[*Read before the Wellington Philosophical Society, 3rd October,* 1906.]

Plate IX.

When returning from dredging in 110 fathoms off Great Barrier Island, the results of which were published in last year's Transactions, some dredging was also done in about 25 fathoms, on rocky bottom, one mile south-west off Channel Island, commonly known as "The Watchman," and the following is an account of the different species of *Mollusca* obtained:—

1. Cylichna thetidis, Hedley.

Mem. Austral. Mus., vol. iv, 1903, p. 395, fig. 111 in text.

A few immature shells. This is an addition to our fauna.

2. Drillia lævis, Hutton.

Cat. Mar. Moll. N.Z., 1873, p. 12.

One empty shell.

3. Drillia buchanani, Hutt., subsp. maorum, E. A. Smith.

Drillia (?) *maorum*, E. A. Smith, Ann. Mag. Nat. Hist. (4), vol. xix, 1877, p. 497.

One empty shell.

4. Daphnella protensa, Hutton.

Trans. N.Z. Inst., vol. xvii, 1885, p. 317.

One empty shell.