Economics of Ornithology in South Africa.

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The importance of the relationship of the habits of birds to the economy of agriculture generally is yearly becoming more and more pronounced, as the country becomes more settled and scientific methods take the place of rough farming. The question is considered to be such an important one in advanced agricultural countries that it has formed the subject of special investigation, and has led to the establishment of departments to carry on research. The economic value of birds is essentially scientific from the agriculturist's point of view; but it has not been sufficiently regarded as such by ornithologists, and has therefore been somewhat neglected by that body. Farming operations have also only lately been raised to the level of a science in South Africa, and it is not until that stage is reached that the value of research in this connection is realized. Further, the separate Provinces of South Africa, hitherto lacking funds, could hardly have been expected to undertake a research such as this which affects the farming community in the whole of the country. In view of the backward state of our knowledge of the real economic value of our birds and the method of leaving the carrying out of research to private individuals not being effective, it seems to be only right, in the interests of farming at least, that a Government department should be established under Union to deal solely with this subject. At any rate such is the opinion of the South African Ornithologists' Union. A department of this nature would form a convenient centre to which all matters affecting birds in their relation to agriculture could be referred—a base for the spreading of knowledge—and its duties might be defined as follows:

1. To prove the true economic value of birds (this is done in other countries by procuring specimens of the most important species, at all seasons of the year, and examining the contents of their stomachs).
2. To find out by inquiries in all parts of the country which species are considered to be the most troublesome, and to note changes of habits.
3. To assist in promoting the preservation of game.
4. To advise farmers as to the best method of remedying existing evils.
5. To note the dates of arrival and departure of migrants, define the distribution of species, and generally assist in the purely scientific side of ornithology, and to this end co-operate with the museums.

The development of a need for scientific investigation has taken time. Before the advent of white men in South Africa birds affected even the primitive agriculture of the natives; the patchy fields of corn had to be guarded against the same granivorous birds which now trouble us. But the conditions of that time differed widely from those obtaining now, as the grain fields were small and easily protected, and the question of obtaining and the paying of labour for the purpose had not then to be considered. The fowls and small stock
of the natives were also subjected to the attacks of birds of prey; but they were semi-wild and as well able to look after themselves as wild birds and animals, in addition to having the partial protection afforded by the presence of the owners, so they never formed the regular diet of hawks and eagles. Soon after the settlement of the country by white men a new feature arose in the introduction of cultivated fruit. Frugivorous birds, formerly dependent upon the precarious supplies of Nature, soon learned to appreciate the better quality and greater quantity placed within their reach, and it is not surprising that they forsook the wild fruit when that in the orchards began to ripen, even at the risk of being destroyed. New phases also arose as markets for the sale of produce were brought within the reach of farmers in the interior and new industries were undertaken. With these changes some birds, formerly regarded as useful, have become a nuisance, and some indigenous species have been turned to account as revenue producers. This is exemplified in the case of apiculture and trout acclimatization in the first instance, and domestication of ostriches and rearing of game birds in the second. The products of sea birds hardly enter into this discussion, although they do affect agriculture to a small extent. And the inducing of new conditions does not end at this, for we find that wherever a change takes place in the natural conditions of the country the habits of birds are affected. These changes may be due either to the advance of civilization or the failure of a natural supply of food, and, whatever they may be, they concern the farmer in one way or another. Several cases in point will be found recorded farther on, when the subject is dealt with in detail.

In Africa, wild life has become so accustomed to a strenuous fight for existence against the numerous birds and animals of prey that the changing of conditions by the closer settling of the country, and consequent thinning out of vermin, is bound to promote the increase of a great many of the smaller kinds of birds, and not always to the benefit of the farmer. Such untoward increases require to be closely watched and checked when they assume dangerous proportions.

In addition to our indigenous species we have also to take into account such as have been acclimatized and migrants which may become a pest. More outcry has been raised against the English house sparrow (*Passer domesticus*) in countries into which it has been introduced than against any of the indigenous birds. It was first introduced into the United States of America at a great many of the farming centres during the "fifties" of the last century in order to keep down grub pests; but in about twenty-five years it had become such a nuisance in other ways, and increased to such an enormous extent, that the Government was obliged to try to remedy the new evil at great expense and trouble. New Zealand and Australia have had the same experience of this bird. Although it was introduced into this country; at Durban, towards the close of the last century, it does not appear to have spread very far or made its presence felt to any great extent. That is no reason, however, for assuming that it will not become a nuisance in time to come, seeing that it has been acclimatized. The English starling (*Sturna vulgaris*) has already become a nuisance in the vicinity of Capetown, where it has been acclimatized for less than a quarter of a century. Some of our migrants may develop habits derogatory to the farmers' interests, but at present the majority are beneficial.
Such are the main general features of economic ornithology in South Africa; but, in order to better understand the whole subject, it is necessary to go into it in greater detail, and it will therefore be treated under the headings of grain, fruit, poultry, stock, and protection.

Descriptions of birds have been omitted in the majority of cases in the following pages for the sake of economy of space, and, in lieu of them, the best known names have been given, and it is hoped that for the present needs these will be sufficient. The Latin names have been taken from the Check List of South African Birds, published by the Transvaal Museum and South African Ornithologists' Union (Dr. J. W. B. Gunning and A. K. Haagner, Esq.).

Only such species as have a direct bearing on the subject will be mentioned.

**GRAIN.**

Most of the damage caused to crops of grain is due to finches resident in the neighbourhood of the fields. As there are two sides to the question of the economic value of these birds it is necessary to state them both in order to show what difficulties there are in the way of remedying the evil. The farmer is faced with heavy losses sometimes when protecting the crop is difficult, to the extent of receiving no return on his expenditure and labour, or even being out of pocket, and he naturally considers that the whole tribe should be exterminated. Naturalists, on the other hand, contend "that birds are only a nuisance for part of the year, and if for the rest of the year they are doing no harm some good is bound to accrue". In examining their view we find that the birds, although doing so much harm at certain seasons, probably keep back the dangerous increase of grubs and other insect pests by feeding their young upon them, and they themselves consume large quantities of noxious grass and weed seeds. It is impossible to estimate the amount of good done by the consumption of insects—or grass and weed seeds—until systematic research provides the material to prove it. Scientists have proved to us that Nature maintains to a greater or less extent a level of good and bad qualities, and to entirely exterminate a pest always gives rise to another evil, probably as great as that previously existing. Presuming, for instance, that a certain species of finch were considered to be a greater pest than others, without research having been made into its diet throughout the year, and that it was exterminated, we should find that either another species would fill its place or its absence might lead to the increase of an insect pest or an overgrowth of noxious weeds or grass. That is no reason, however, why the evil should not be alleviated, when it becomes serious, and thinning out may be found to be necessary; but, if attempted at all, it should be done by men specially detailed for the purpose. Driving away troublesome birds is of course the best method of preventing their ravages, but this is not always possible.

It is as well, perhaps, to mention that birds in their natural conditions nearly always confine their diet to some particular class of insect, seed, or whatever it may be, and it is in this respect that systematic research is of great value.

Mealies are not subjected to so much attention from granivorous birds as smaller grain, and it is about the latter we are most concerned.
When a field of small grain has been harrowed in and the workers have gone elsewhere, birds at once appear on the scene and soon devour such of it as has not been properly covered. The following species appear at this time only, although, of course, some of those enumerated farther on also do so:

_Columba phaeonota._ Rock Pigeon. (Roodpoot Bosduif.)

This species is found throughout South Africa wherever krantzes and old prospecting shafts afford them nesting sites. They are to be seen in such places during the greater part of the day, as they only go off to their feeding grounds in the early mornings and evenings. They are gregarious, and annually rear two or three broods.

_Turtur semitorquata._ Large Ring Dove. (Grote Tortelduif.)

These doves are nearly as large as the foregoing pigeons, and frequently feed in company with them. They are locally distributed near the coast belt, but their habitat is gradually extending farther inland. So far as is known they only rear one brood annually.

_Turtur capicola._ Cape Turtle Dove. (Gewone Ringduif.)

This species is common throughout South Africa, and frequently rears two broods annually. It is partial to kaffir corn, perching on the waving heads to get at the grain; as a rule it feeds on the ground, and probably this is a newly developed habit. Amongst other seeds it is partial to those of the "misberiedie" weed (_Amaranthus esculentus_ and spp.) and also the bulbs of the "eintje" (_Cyperus esculentus_ and spp.), when they are to be found on the surface of the ground.

_Turtur senegalensis._ Laughing Dove. (Lemoenduif.)

This species very seldom troubles the farmer, and it plays a great part in keeping down the increase of the "misberiedie", the seeds of which form its staple diet. The fact of its being troublesome occasionally is mentioned for the reason which will be seen when the subject of protection is dealt with. It is a very common species in certain places, and sometimes rears two broods.

_Heterocorax capcnsis._ Black Crow. (Zwarte Kraai.)

Black crows are omnivorous, and both useful and otherwise. They do much damage to young mealies just appearing above ground, pulling them up in order to get at the grain concealed below, and they also sometimes pick the grain from cobs hung out to dry. On the other hand they devour a great many insects, locusts, and even carrion. One brood of from four to six is reared in the early summer months.

_Anthropoides paradisea._ Blue Crane. (Blauw Kraanvogel.)

Blue cranes subsist mainly upon reptiles and insects, but they also do much harm in newly-sown mealie lands, pulling up the young plants and devouring the grain thus obtained. One brood of two is reared in midsummer, the eggs being deposited on the bare ground without any effort at concealment beyond the natural colour of the eggs.

After the young grain plants have grown a few inches high and obtained a firm hold in the soil, birds are not again troublesome until the ears begin to ripen, and it is at this last stage that most damage is done.
The next few species, commonly known as "finks," have much the same habits throughout the year, and are the worst kinds to deal with, especially those which are highly gregarious. They breed in the summer months, being then found in all moist valleys or along the banks of rivers and streams—the cocks in conspicuous brilliant-coloured plumage and the hens in a sombre brown and grey. Only one brood of from two to five young is reared annually, but probably under suitable conditions they sometimes rear more. The young birds in the nests are fed upon grasshoppers and other insects, and afterwards upon soft seeds. Until the winter months they generally keep to the neighbourhood of the breeding places and amuse themselves by constructing rough nests of strips of grass and reeds in any convenient bushes or rank growths of weeds and reeds. As the winter approaches nearer the cock birds change their bright plumage for a brown and grey similar to the hens, and the small family parties gradually join forces and form huge flocks. Towards the close of winter these flocks frequently contain tens, and even hundreds, of thousands of individuals, and when seen at a distance may be mistaken for swarms of locusts. At this season they often travel long distances in flocks in search of food, returning in the evenings to reed-beds to roost. Their food at this time of the year consists largely of grass and weed seeds. In the spring they gradually disperse in small parties to the breeding grounds.

*Promelana oix.* Red Bishop Bird, Red Fink. (Roodefink.)

This species is found in thousands in the vicinity of reed beds during the summer months, and when grain is cultivated near such places the greatest vigilance is necessary to save the crop from their depredations. Fifteen years ago the late Captain Baillie, of Vijfhoek, Potchefstroom, attempted to keep down their numbers by paying a penny each for their eggs on account of the trouble to which he was put whenever his crops showed signs of ripening. The expenditure was thrown away, however, as not only did his neighbours fail to co-operate with him—and miles upon miles of reed beds along the banks of the Mooi River, therefore, still afforded undisturbed nesting places—but his losses were not entirely due to this species, and if he had got rid of them probably other kinds would have taken their place. The nests of this fink are made of strips of reed-blades, firmly woven into an oval shape, lined with a few tops of grass and hung between two reeds or rank-weeds.

*Quelea.* Red-beak Fink. (Roodebek Fink.)

These consort with the last species to a certain extent, but in the winter, and when not breeding, they form flocks of their own. In some districts they are quite as numerous as the red fink. Nothing is known with certainty of their breeding habits, but it is supposed that they lay their eggs in the nests of other closely allied finks and leave the rearing of the young to the foster parents.

*Pyromelana taha.* Black and Yellow Bishop Bird or Golden Puff-back Fink. (Geelfink of Zwart- en Geelfink.)

This species is nowhere so common as the last two, and the flocks keep very much to themselves. Their nests are built in the grass in moist places near streams, and laid in December or January.
As this and the following species build their nests in the grass they do not necessarily frequent the neighbourhood of reed beds, although they roost in them when close at hand.

**Euplectes.** Large Black and Yellow Bishop Birds. (Grote Zwart- en Geelfinken.)

This genus contains several species very much alike in general appearance, and somewhat similar to the last both in plumage and habits; but the yellow feathers of the back are never erected or puffed out, and they are also larger. They are never found in large flocks of their own species, although they frequently consort with the kaffir fink and red-shouldered widow bird during the winter and non-breeding months. The eggs are two or three in number. The nests are usually placed in bunches of grass near streams running down the sides of hills and mountains.

**Coliuspasser ardens.** Red-collared Widow Bird or Kaffir Fink. (Kafferfink.)

This species is very widely distributed and found in great numbers in some districts. The nests are very similar to the last kind, but the choice of a site in which to build it is less restricted. The eggs are greenish-blue in colour with numerous speckles of dark brown and slate, and two or three in number.

**Coliuspasser albonotatus.** White-winged Widow Bird or White-winged Kaffir Fink. (Witvlek Kafferfink.)

This species is also widely distributed, but nowhere very common. The nests and eggs resemble those of the last species, but as a rule they have larger markings.

**Diatropura progne.** Long-tailed Widow Bird or Sakabula. (Flapfink.)

This beautiful bird is the bane of the small grain cultivator, being found both in the vicinity of reed beds and far away from them, in fact wherever there are vleis and moist valleys. It appears to be increasing in numbers, as its nest is so very cleverly concealed that finding it is quite a rare occurrence; and, except for small vermin, there is little to prevent its raising the whole brood. They are very polygamous, from six to ten hens being found to each full plumaged cock. The nests are placed in thick bunches of grass—old unburnt patches being the most favoured—the shorter tops of which are bent over and intertwined so as to hide the dry material of the nest itself, while the longer ends are allowed to remain in their normal position to preserve the natural appearance of the bunch. The cock birds are also always on the lookout for intruders, and when danger is apprehended fly around to each sitting hen to warn her, and she immediately slips off as unobtrusively as possible; the nests are therefore all the more difficult to find. The eggs are three in number, sometimes four, greenish (almost white) in colour, covered with speckles or large markings of slate-grey and brown.

**Urobranchyax axillaris.** Red-shouldered Widow Bird. (Stompstaart Flapfink.)

This kind is rather local, and nowhere found in such numbers as the long-tailed species, but helps to swell the flocks of others previously...
mentioned. Its eggs are greenish-blue with large blotches of slate-grey and brown, and usually three in number. It is rather particular as to its choice of a nesting site, preferring the long grass found growing in hollows—such as old antbear holes—near streams.

*Vidua serena.* Pin-tailed Widow Bird. King of Six. King Red-bead. (Hiets of Koning Roodebek.)

This species is very widely distributed, but it never forms large flocks like those previously mentioned. It deposits its eggs in the nest of some other small fink (usually the roodebekkie), destroying one of the host’s eggs to make room for each of its own.

*Tetraenura regia.* Shaft-tailed Widow Bird. (Pijlstaartfink.)

Rather a local species, and nowhere common. Nothing has been recorded of its nesting habits.

*Steganura paradisea.* Paradise Widow Bird. (Paradijsfink.)

This species is only found in the hot bushveld and coast belt. It is sometimes found in large flocks. Nothing has been recorded of its nesting habits.

*Ploceus* (genus). Yellow Weavers. (Geel Wevers.)

Some members of this genus live exclusively in the forests, and of the rest only a few species occasionally trouble the farmer. As a class they are decidedly useful as insect destroyers. Their nests are to be seen along all streams and rivers suspended from the drooping branches of trees or woven on to two upright reeds. The eggs of some species show a great diversity of colour.

The following species do not change the colour of their plumage at different seasons, nor are they found in very large flocks, although gregarious to a certain extent:

*Passer melanurus.* Black-head Sparrow. (Gewone Mossie.)

This sparrow is very prolific, frequently raising three or four broods during the year, and, being partial to the neighbourhood of towns and homesteads, it is rapidly increasing in numbers with the advance of civilization. The young birds are fed exclusively upon insects, and for the greater part of the year therefore it does not trouble the farmer. It is the individuals which have no young to care for that cause what little damage is sustained through this species.

*Passer griseus.* South African Grey-headed Sparrow. (Huismossie.)

This species is called the “huismossie” on account of its friendly habit of building its nest under the eaves or in holes in the walls of houses, which the last species very seldom does. Its habits closely resemble those of the black-head sparrow.

*Amadina erythrocephala.* Red-headed Finch. (Roodekopmossie.)

This species frequently consorts with sparrows in the vicinity of homesteads and on roadsides, but it is somewhat shyer. Civilization seems to suit this species also, and it is spreading into parts of the country where it was unknown fifteen years ago. It breeds during the winter months, occupying the disused nest of some other birds and rearing four or five young. The eggs are pure white.
Estreldinae. Waxbills or Rooibekkies. (Roodebekkies.)

Some members of this genus have become troublesome in fields of manna, but they subsist mainly upon small grass and weed seeds.

The following birds are granivorous, but so far they do not appear to have developed harmful propensities:

- *Coturnix.* Quails. (Quartels.)
- *Turnix.* Button-quaills. (Rietquartels.)
- *Textor niger.* Buffalo Weaver. (Zwarte Wever.)
- *Sporopipes squamifrons.* Scaly-feathered Finch. (Baardmannetje.)
- *Anaplectes.* Red-headed Weavers. (Roodekop Wever.)
- *Amblyospiza albifrons.* Thick-billed Weaver. (Dikbek Wever.)
- *Amauresthes fringilloides.* Pied Weaver Finch. (Boutefink.)
- *Hypargos.* Pearl-spotted Waxbills. (Perlgefleckte Fazantjes.)
- *Pytilia.* Red-faced Waxbills. (Roodewang Fazantjes.)
- *Lagonosticta.* Ruddy Waxbills. (Roode Fazantjes.)
- *Ortygospiza polyzona.* Quail Finch. (Pijperje.)
- *Neisna.* Swee Waxbills. (Swie Fazantjes.)
- *Ureaginthis.* Blue-breasted Waxbills. (Blauw Fazantjes.)
- *Hypochera.* Little Widow Finches. (Rouw Fazantjes.)
- *Passer motitensis.* Greater Sparrow. (Grotemossie.)
- *Philaeites socius.* Sociable Weaver. (Familievogel.)
- *Petronia.* Diamond or Yellow-throated Sparrow. (Geelvlekmossie.)
- *Alario.* Mountain Canary. (Zwartkopje.)
- *Serinus* and *Poliospiza.* Canaries or Seed-eaters. (Sijsies.)
- *Emberiza.* Gold-breasted Buntings. (Geelorst Streepkopjes.)
- *Fringillaria.* Buntings. (Streepkopjes.)
- *Alaudidae.* Larks (some species). (Leeuweriken.)
- *Oena capensis.* Long-tailed Dove. Namaqua Dove. (Namaquaduifje.)

Fruit.

The majority of frugivorous birds feed their young upon insects, and they do a certain amount of good in this respect, so that it is better to drive them away than to destroy them. Or, better still, as insects are also a pest to fruit growers, and in some places it is necessary to cover the fruit with netting, a double purpose would be served by adopting the same remedy where birds are a nuisance. When this is done there will be no need for a lecture on the destructive proclivities of frugivorous birds; but as we find the conditions, so must the subject be treated.

The amount of damage sustained depends largely upon the situation of the orchards. When they are located in the immediate vicinity of forests or places where birds can take refuge when pursued, and also build their nests in security, there it is that most damage is done. But even in the more sparsely-wooded localities in which bird-life appears to be very meagre at ordinary times, they have to be kept in check. In such places, when once a species has discovered
that a supply of fruit is obtainable and acquired the taste for it, all members of the species in the neighbourhood concentrate there and their depredations become a serious nuisance. Some species have become very precocious and persistent, and shooting them has very little effect, so that it is necessary to keep some one constantly on the watch to drive them off. For all classes of birds a shot-gun is the best weapon with which to scare them away, as the loud report, coupled with a depletion of their numbers, has great effect; but it must be used with care, or more damage will be done to the trees than is compensated for by the destruction of the birds. An air-gun merely destroys the otherwise useful birds, and they do not so soon learn to keep away.

As a rule the smaller species only rear one brood annually, but probably more when fruit is obtainable for an extended period.

Colius. Colies or Mousebirds. (Muisvogels.)

Colies are usually found in parties of from six to a dozen individuals—sometimes double that number—and are responsible for much of the damage done, both in the neighbourhood of forests and in the dry thornveld. They are essentially fruit-eaters, but sometimes vary their diet with insects. They creep about amongst the denser branches of trees (hence their name of "mousebird"), and their plumage matches the foliage so well that they are very difficult to locate. The brood of three or four is raised in the early summer months, and sometimes a second a few months later.

Pychnanotus. Blackcap Bulbuls or Toppies. (Pietkluutjekorel of Kuiifkop.)

Toppies are as a rule found in the same localities as the last, and cause quite as much harm. They are found either singly or in pairs, and are very common. Their lively and friendly habits protect them wherever fruit is not a consideration, and it is a pity that they do not recognize man's ideas of "individual rights" when their craving tempts them to the orchards. They have become so accustomed to man that they are not easily scared away, but remain in the vicinity of the orchards until the opportunity is given them to return and continue their depredations. The brood consists of three.

Andropiulus importunus. Green Bulbul. (Groene Bosvogel.)

This bulbul is only found in the dense forests, but when orchards are situated near such places they are very troublesome. Like the previous species their diet consists almost entirely of fruit, and, like the blackcap, two or three young form the brood.

Amyrurus morio. Redwing Starling. (Roodvlerk Spreeuw.)

This species is fortunately only found in the vicinity of krantzes, but in such localities it does an enormous amount of harm, eating large quantities itself and carrying off whole fruit to feed its young. It is gregarious and raises one or two broods of four or five young annually.

Spreo bicolor. Pied Starling. (Gewone Spreeuw.)

This species is only troublesome to soft fruit such as figs and grapes, and, being gregarious, it does much damage; but its bad qualities are more than compensated for by its good ones in the destruction of locusts, termites, and ticks taken from cattle. It rears one brood of five in the spring.
Lamprocolius. Glossy Starlings. (Glansspreeuwen.)

These starlings, like the others, are very troublesome in orchards. They raise one brood of three or four in the early summer months. They are not so entirely dependent upon fruit as the redwing, and consume large quantities of insects.

Lamprotornis. Long-tailed Glossy Starlings. (Langstaart Glansspreeuwen.)

These large starlings are very shy, and do not cause very much damage.

Cinnyricinclus verreauxi. Plum-coloured Starling. (Purpur Spreeuw.)

This species is a partial migrant from the north, and as it is highly gregarious at certain seasons its habits should be closely watched in case its ordinary food supply should fail. At present it only occasionally eats fruit such as grapes, preferring wild berries when they are obtainable. Some of them are said to breed in South Africa.

Poicephalus. Parrots. (Papagaai.)

Parrots are very shy and wary, and therefore easily scared away, but they do great damage when the opportunity is given them.

Bycanistes and Lophoceros. Hornbills. (Neushoornvogels of Boshkraai.)

Forest hornbills, with the exception of one species, all devour fruit when they can get it, and on account of their large size they are capable of doing great damage; fortunately they are very wary and easily scared.

Zosterops. White-eyes. (Glasoogies.)

These gentle little birds are very partial to soft fruit, and being gregarious do much harm. Their diet consists mainly of insects, especially the scale-insects (Cocidae).

Nectarinidae. Sunbirds or Honeysuckers. (Suikerbekjes.)

Some members of this family are very fond of the juice of soft fruit, using their sharp beaks to great purpose.

The following birds are frugivorous, but so far have not become very prominent in orchards:—

Musophagidae. Lories. (Louries.)

Capitonidae. Barbets. (Stombek Houtkappers.)

Vinago. Fruit Pigeons. (Groenduiven.)

Turturoena delagorguei. Crimson-winged Pigeon. (Papagaaiduif.)

This species is rare, but is said to be troublesome to fruit growers in the northern Transvaal and on record as being partial to mulberries near Durban.

Sylvia. Willow Warbler and Common White-throat. (Tuinfluiter en Grasmeerde.)

These two warblers are very partial to soft fruit, but not common enough to be considered seriously.
Columba arquatrix. Rameron or Olive Pigeon. (Geelpootbosduif.)

This pigeon is highly gregarious, migrating to all parts of the country in search of its favourite food. At present its diet is largely confined to wild chestnuts and berries of different species of the "stinkhout" tree. No doubt when new kinds of fruit are introduced into the country some of them will be found to suit its taste, and it will then become a serious nuisance.

POULTRY.

The question of the economic value of our birds of prey is a very vexed one. The destruction of our troublesome classes of hawks and eagles is bound to follow the advance of civilization, and we have to consider what the effects will be upon the increase of small mammals and birds which, under natural conditions, have become prolific enough to make up for the lessening of the numbers by the attacks of these so-called larger vermin.

The kinds which never attack poultry are very few and easily enumerated. Others again only occasionally become troublesome, and all of them, including the very troublesome kinds, do a large amount of good in keeping down the increase of small vermin, such as rats and mice, and locusts, termites, and other pests. The only practical remedy appears to be to educate the people most concerned to a knowledge of the names and habits of all species, as they would then be able to distinguish between the most troublesome kinds and those which are quite harmless, and in this way partly promote the increase of the useful kinds to make up for the destruction of the individuals which have developed a taste for poultry. The destruction of hawks of all kinds is being carried on by every one who attempts to rear poultry outside towns, and it is time that legislation should be brought to bear on it. The main difficulty lies in the fact that the farmer cannot be expected to tamely submit to the depredations of birds of prey without retaliating, but it is carried too far very often, and anything having the semblance of a "hawk" is ruthlessly destroyed without first considering whether it is a useful species or not. Of course poultry can be protected by wire-netting, but the small farmer is not always in a position to be able to purchase it, and there is also another consideration to be taken into account, i.e. game in the wild state. This last makes the question still more complex, as there is no means of protecting game from the attacks of vermin except by getting rid of the most destructive kinds, and the results of doing so will seriously affect other interests. At present the country is not in a position to undertake the destruction of any class of bird, and it will have to remain over until a sounder knowledge of their habits has been obtained. Hawks are frequently so much alike in general appearance that mistakes are often made in identity and the wrong birds destroyed, especially as a close view of them is seldom possible. For this reason also it is difficult to obtain authentic information regarding their destructive propensities, and some kinds get the blame for the damage caused by others. All the troublesome kinds of hawks are most in evidence when they have young ones to provide for, some kinds never venturing near poultry yards except at this time.

Owls are able to keep down the increase of nocturnal vermin, which can hardly be got at except through them, so they should be
strictly protected. Three of the larger species are said to prey upon sleeping poultry, but farmers themselves are responsible for losses from this cause in not having provided proper roosting places.

The following species are most in evidence as poultry thieves:—

**Astur melanoleucus.** Black Sparrowhawk. (Bonte Sperwer.)

A migratory species which is very destructive to poultry during the summer months in the forested regions near the coast of Natal and Cape Colony.

**Astur tachiro.** African Goshawk. (Zuidafrikaans Havik.)

A wily and daring chicken thief, and a resident in the dense forest regions of South Africa. It breeds in the spring or early summer months, and is then particularly troublesome.

**Astur polyzonoides.** Little Banded Goshawk. (Veelbandige Havik.)

This little species takes the place of the last in the thornveld, and in spite of its small size does considerable damage to small and half-grown chickens.

**Accipiter rufiventris.** Red-breasted Sparrowhawk. (Roodeborst Sperwer.)

A small but daring poultry thief, resident in the dense forests. It breeds in South Africa during the early summer months.

**Accipiter minullus.** Little Sparrowhawk. (Kleine Sperwer.)

This species is found in all wooded parts of the country, and is a daring chicken thief, appearing like a flash from the forest, seizing its prey and dashing back again before the astounded spectator has had time to realize its presence. It also breeds in South Africa.

**Micronisus gabar.** Gabar Goshawk. (Blauwe Sperwer.)

This species is distributed all over Africa in wooded localities, and is a resident. It is reputed to be partial to chickens in the Northern Transvaal, but it may have been mistaken for another species.

**Micronisus niger.** Black Goshawk. (Zwarte Sperwer.)

This species is rather rare, and is found in the thornveld. It is very troublesome in the bushveld of the Transvaal.

**Falco peregrinus.** Peregrine Falcon. (Slechtvark.)

A migrant from Europe and North Africa, and rather rare in South Africa. It is a highly predatory species.

**Falco minor.** South African Peregrine Falcon. (Kleine Slechtvark.)

This species is a resident in South Africa, and a local representative of the last.

**Falco biarmicus.** South African Lanner. (Zuidafrikaanse Edelvark.)

A very common species, found in the inland districts of South Africa, where it is resident and breeds. It is a powerful bird and very destructive to poultry.

**Buteo desertorum.** Steppe Buzzard. (Vaal Aarend.)

A very common species found throughout Africa, Western and Southern Asia, and Southern Europe, and a migrant to South Africa. It only carries off young poultry.
Spizaetus coronatus. Crowned Hawk Eagle. (Gekroonde Arend.)

A powerful and very destructive eagle which is confined to the forest regions of Natal and Cape. It breeds during the spring, building a large nest of sticks, lined with green leaves, on the fork of a large tree, usually in a secluded part of the forest.

Spizaetus bellicosus. Martial Hawk Eagle. (Breedkop Arend.)

This eagle is quite as destructive as the last and is more widely distributed, being found in the dry thornveld of the interior as well as in certain localities near the coast. It breeds in the Orange Free State and Transvaal, constructing a large nest of sticks, lined with green leaves, on the top or topmost branches of an isolated thorn or other large tree. Only one egg is laid in the winter months.

Hieraaetus spilogaster. African Hawk Eagle. (Honderjager.)

This eagle is distributed over the greater part of the eastern portion of Africa, but is rather rare in South Africa. It is usually found in the vicinity of mountains in the interior, and has been known to breed in Rhodesia. It frequently carries off full-grown fowls.

Aquila rapax. Tawny Eagle. (Roofarend of Kouwvogel.)

A powerful and common eagle, distributed throughout the greater part of Africa, and a resident in South Africa. It builds its nest as a rule on the top of a camel-thorn tree and lays two eggs during the winter months.

Hirurus aegyptius. Egyptian Kite. (Geelbek Wouw.)

This species is a migrant scavenger from Northern Africa, Southern Europe, and Asia, and sometimes breeds within the South African limits. It is very common during the summer months, and is very partial to young chicks when its ordinary food is difficult to get.

Melierax canorus. Chanting Goshawk. (Grote Gebandige Blauwvalk.)

This hawk is a fairly common resident of the drier districts of South Africa, and does much damage.

Circus pygargus. Montagu's Harrier. (Blauw Kuikendief.)

This harrier only occasionally troubles the poultry farmer, carrying off chickens when the owners are not in the vicinity. It is a migrant from Europe and Asia, where it breeds, and is fairly common in South Africa during the summer months.

The following species are not in the habit of attacking poultry, and only occasionally carry off stray chickens:—

Circactus pectoralis. Black-breasted Harrier Eagle. (Uilarend.)

Circaetus fasciolatus. Banded Harrier Eagle. (Gebande Uilarend.)

These two species are large enough to do considerable damage, and they are reputed to attack even sheep. But probably they have been confused with some other eagle, as the evidence adduced from the examination of the stomachs of individuals points to their subsisting mainly upon reptiles, termites, and such like small fry. They hover high over their quarry like kestrels and the black-shouldered kite.
**Kaupifalco monogrammicus.** African Buzzard Eagle. (Blauw Streepvalk.)

This species is also reputed to attack poultry, but probably it has been mistaken for some of the troublesome kinds which closely resemble it. It lives mainly on scorpions, centipedes, termites, beetles, locusts, and small birds and mammals.

**Polyboroides typicus.** Harrier Hawk. (Grote Blauwvalk.)

This hawk closely resembles the secretary bird, but it is smaller and does not keep to the ground. The natives state that it is very partial to dassies (*Procaria*), and it certainly is found in the vicinity of their haunts; but it is very shy, and little has been recorded of its habits.

**Circus.** Harriers. (Kuikendieven.)

Harriers are harmless and useful birds, except during the breeding season, when they are more venturesome and carry off young chickens to feed their brood. Their diet is mainly comprised of mice, reptiles, insects, and sometimes small birds.

**Baza verreauxi.** Cuckoo Falcon. (Koekoekvalk.)

This is a rare species, and little has been recorded of its habits.

**Scotopelia peli.** Pel's Fishing Owl. (Visuil.)

A very rare species found near streams along the coast belt. It is reputed to carry off game birds such as guinea-fowl.

**Bubo lacteus.** Giant Eagle Owl. (Reuzeu Ooruil.)

A rather rare but widely distributed species, found in the thorn-veld. It is very destructive when once it has located roosting poultry, returning night after night until it is shot or scared away.

**Bubo capensis.** Cape Eagle Owl. (Kaapse Ooruil.)

This species also has the reputation of being destructive to roosting poultry. It is confined to Cape Colony and Natal, where it is common.

**Stock.**

Small stock farming as affected by birds might well have been included under the heading of poultry, as the large eagles which attack sheep also carry off poultry; but in other respects there is a distinct difference, and it is more convenient to treat them separately.

Large stock is affected beneficially only, certain birds ridding them of parasites.

A change in habits, due to the advance of civilization, is noticeable in the case of two of our scavengers having taken to killing sickly sheep and lambs in the absence of carrion. This development is due either to an increase in their numbers consequent on the abnormal amount of food obtainable during the late war, or the fact of animals which have died of disease having been buried to prevent infection. The common vulture was known to attack sheep before the war, however, and it had already ceased to be protected by law by that time, so that the history of this development must be traced farther back. In former times South Africa was overrun with the larger antelopes and other big game, and carnivorous animals preying upon them did not consume all of what they killed. Then the white
hunter appeared, and large numbers of animals were killed for the sake of their hides and the carcasses left to rot in the veld or be devoured by scavengers; but when the game had been driven out of the settled districts vultures were left without their means of subsistence. Most of the destruction caused by vultures is recorded from the neighbourhood of the krantzes in which they breed, and it is not unlikely that they only do so when they have young ones to provide for and cannot travel great distances in search of carrion. It was not until quite recently that the white-necked raven took to attacking sheep, and it is quite an unexpected departure from their usual habits. Probably the development is due to the same cause as in the other case, and it goes a long way to prove what has been said by scientists that "changes of the natural conditions induce new habits in the fauna of a country".

There has been a very noticeable decrease in numbers of the larger eagles since the country has become more closely settled. This is due to the unrelenting extermination that has been carried on by small stock farmers. One cannot help regretting the loss of these magnificent birds, but in this utilitarian age there is no help for it.

The following birds are beneficial to the stock farmer:—

*Buphagidae.* Oxpeckers. (Rhenostervogels.)

These birds are locally distributed in the neighbourhood of places where buffaloes and rhinoceroses were formerly to be found. They live entirely upon parasites taken from animals, crawling all over their bodies and clinging on in any position, while the animals calmly allow them to do so without molestation. They are said to peck at sores on stock, keeping them open in order to obtain the blood which exudes; but this habit is amply compensated for in the destruction of ticks.

*Bubulcus ibis.* Buff-backed Egret. (Bosluisvogel.)

This egret depends largely for its food on the ticks which fall from cattle when grazing. The young are fed principally upon grasshoppers and locusts. They are very common in some districts, and large flocks of them are often to be seen at great distances from the reed beds in which they roost. They breed in companies, hundreds of their nests being placed close together in reed beds and vleis.

*Corvus scapulatus.* Pied Crow. (Bonte Kraai.)

This crow somewhat resembles the white-necked raven; but it is smaller and has the whole of the under surface of the body white and a white collar round the back of the neck, whereas the raven has only the white collar, and the under surface of the body is black. It does not make a practice of picking ticks from cattle, and only does so when other food fails. Like the black crow, it is omnivorous.

*Spreo bicolor.* Pied Starling. (Witgat Spreeuw.)

This starling also occasionally picks ticks from cattle. It has already been mentioned under fruit.

The following kinds are troublesome to small stock farmers:—

*Spizaetus bellicosus.* Martial Hawk Eagle. (Breedkop Arend.)

This species often attacks sheep, and does much damage. It has been mentioned under poultry.
Spizaetus coronatus. Crowned Hawk Eagle. (Gekroonde Arend.)
Also a destructive species, and mentioned under poultry.

Aquila verreauxi. Black Eagle. (Zwarte Arend of Dassievanger.)
This eagle lives in mountainous parts of the country, where it lives principally upon dassies; it sometimes attacks sickly sheep and lambs.

Aquila rapax. Tawny Eagle. (Roofarend of Kouwvogel.)
This species subsists largely upon meercats and other small mammals, sometimes attacking sickly sheep and lambs, and it does not despise carrion.

Gypaetus ossifragus meridionalis. Southern Lammergeier. (Lam-mervanger.)
This species is said to be troublesome to small stock farmers in the mountainous parts of the country it inhabits, but its natural food is carrion and bones.

Gyps kolbei. Common Vulture. (Gewone Aasvogel.)
Corvultur albicollis. White-necked Raven. (Withals Kraai.)
These last two are scavengers, and have already been mentioned in my opening remarks. Both species build their nests on ledges of krantzes.

Scavengers.

In view of the changes which have taken place in the habits of two scavengers, it will be as well perhaps to mention the others in case they should also develop destructive propensities:

Otogyps auricularis. Black Vulture. (Zwarte Aasvogel.)
This species is rare and shy, and seldom condescends to feed in company with the other kinds, for which reason—and because the others will not venture near a carcass when a black vulture is feeding—it is often called the "king vulture". I have seen it devouring meercats, but cannot vouch that it killed them itself.

Lophogyps occipitalis. White-headed Vulture. (Witkop Aasvogel.)
This is a rare species, only found in the northern parts of South Africa; beyond our limits it extends into North Africa.

Gyps ruppelli. Ruppell's Vulture. (Ruppell's Aasvogel.)
Another North African species sometimes found in South Africa.

Pseudogyps africanus. White-backed Vulture. (Witrug Aasvogel.)
This species closely resembles the common vulture at a distance, but is generally darker in colour and shows a white patch down the back when in flight. It builds its nest in trees, and not in krantzes.

Neophron percnopterus. Egyptian Vulture. (Egyptise Aasvogel.)
Neophron monachus. Hooded Vulture. (Monnik Aasvogel.)
Both rare visitors from the north.

Helotarsus ecaudatus. Bateleur Eagle. (Berghaan.)
This eagle feeds principally upon carrion; at other times upon reptiles and small mammals.
Leptoptilos crumenifer. Marabou Stork. (Afrikaansche Maraboe.)

This stork is very shy, and with the advance of civilization has retreated farther north, though it sometimes returns for a short time when carrion is obtainable in large quantities, such as during the late war.

Milvus aegyptius. Egyptian Kite. (Geelbek Wouw.)

This bird has been mentioned under poultry. Its ordinary food is refuse and carrion.

Corvus scapulatus. Pied Crow. (Bonte Kraai.)

The pied crow has been mentioned as a benefactor to stock.

Heterocorax capensis. Black Crow. (Zwarte Kraai.)

This crow has been mentioned under grain. It is usually the first to notice a dead animal, and picks out the eyes before the larger scavengers appear on the scene.

Haliaetus vocifer. Sea Eagle. (Zee Arend.)

Although the diet of this eagle is essentially fish, it does not despise carrion when pressed by hunger.

Protection.

Three Provinces of the Union have seen the necessity of adopting protective legislation in the interests of birds other than game; but they are not consistent, and there seems to be a division of opinion as to what kinds should be protected. In Cape Colony protection is left in the hands of municipal or district officials, each district having a list of its own. This is decidedly a good method, as most of the wanton destruction of birds is done by boys. In Natal one list of protected birds serves for the whole Province, but, like those of Cape Colony, too many species are enumerated and a great many of them are not wholly useful. In the Transvaal only locust and tick birds, and two other kinds which it was feared might be exterminated, are protected, and a few more might well be added to the list.

In reviewing the lists published in Natal and Cape Colony several kinds are found enumerated that might well be excluded on account of their being partly harmful. Some species of turtle doves are troublesome to grain growers; white-eyes are partial to soft fruit; kingfishers prevent the increase of acclimatized fish; and drongo shrikes are a nuisance to apiculturists. These are not all of them, but sufficient to show that the subject has not been universally examined from all points of view.

For the present protection should be given to such kinds as are known to be wholly useful, and, seeing that so little is known about birds by people generally—including the police—to those only which would be easily recognized by everybody. Wholly useful kinds, and those which are not, are frequently so much alike in general appearance that they are not easily distinguished from each other by any but the trained naturalist. To protect all such kinds means involving the legal authorities in the technique of ornithology, and to avoid this a great many offenders are sure to be let off. On the other hand, if a few well-known and really useful birds are protected the law is sure to carry more weight, and protection would have the desired effect. There is no fear of immediate extermination of any of our
useful birds which do not come within the jurisdiction of the law, and in a few years, when more has become known about birds and their habits, others can be added to the list.

Only wholly useful birds should be protected, because farmers and others must be allowed to protect their own interests, and if a saving clause is inserted in the law allowing them to do so as likely as not it would be abused and made an excuse for wantonly destroying other really useful kinds. For injuring well-known and decidedly useful birds there can be no excuse. The export of plumes of any but domesticated birds for the purpose of trade should be strictly prohibited.

A great deal of ignorance exists amongst people who have birds constantly before them both as to their names and habits, and newcomers, anxious to learn something about them, have the greatest difficulty in eliciting information. This is natural when it is considered how little encouragement has been given to children to study them, and the lack of popular literature on the subject. South Africa is a young country in which few people have had the time to undertake the study, except a few naturalists and collectors who were more concerned with the scientific and profitable side of the question, and the result is that we have not got enough simple and popular books within the reach of all to encourage it. The best means of promoting the study would be to introduce it into the schools. Doing so would not only produce universal knowledge of this interesting subject; but it would also assist a practical purpose in affording proper protection to useful birds. The more that is known about our birds the greater will be the benefit to the country.

The following birds are suggested for protection:

As Friends of the Stock Farmer.

*Buphaga.* Oxpeckers. (Rhenostervogels.)
*Bubulcus ibis.* Buff-backed Egret. (Bosluisvogel.)

As Consumers of Locusts and Termites.

*Glareola.* Pratincoles or Locust-birds. (Sprinkhaanvogels.)
*Ciconia ciconia.* White Stork. (Grote Sprinkhaanvogel of Wit Ooievaar.)
*Ciconia nigra.* Black Stork. (Grote Zwart Sprinkhaanvogel of Zwarte Ooievaar.)
*Creatophora carunculata.* Wattled Starling. (Lelspreeuw of Vaalspreeuw.)

As Small Vermin and Insect Destroyers.

*Cerchneis.* Kestrels. (Roodevalken of Steenvalken.)
*Elanus caeruleus.* Black-shouldered Kite. (Blauw Valkje of Wit Sperwer.)

*Strigidae.* Owls. (Uilen.) Except the three largest species.

As Insect Destroyers.

*Hirundinidae.* Swallows. (Zwaluwen.)
*Macropterygidae.* Swifts. (Windzwaluwen.)
*Motacillidae.* Wagtails. (Kwitjes.)

As being Beautiful and likely to be Exterminated.

*Balaerica regulorum.* Crested Crane. (Mahem.)
*Coraciidae.* Blue Jays or Rollers. (Trouwtpanden.)