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## THE STARLING FAMILY AT HOME AND ABROAD

(WITH FRONTISPIECE)

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NOW THAT the so-called Chinese, or Japanese, Starling (*Aethiopsar cristatellus*) has gained a firm foothold in British Columbia, and is said to be advancing not only inland but southward, it becomes an object of economic interest to all dwellers along the Pacific Coast. For this reason I have undertaken, at the request of Dr. Grinnell, to add my own experience of the Starling in various countries (both of native and introduced varieties) to the more extensive observations of others, to the end that we may consider the probable future of this foreign importation and speculate on the role it is likely eventually to play in the biological balance of this section of North America.

*Sturnus vulgaris*. European Starling. For many reasons this Starling is the most widely known of the whole family. Its native range includes western and central Europe and portions of Asia. It winters in Africa and has penetrated as far north as Greenland. The species has been artificially spread to the remotest parts of the earth, including New Zealand, Australia, Canada and the United States. Not only does it flourish in New York and New England, but its more recent spread or introduction to the mid-western states and Oregon has been announced.

E. H. Forbush says (Circular 45, Mass. State Board of Agriculture, Feb., 1916) that this bird was introduced into New York City in 1890 and 1891. On the first occasion 80 birds were liberated; the next year, 40 more. In less than two generations it has increased greatly in numbers and has spread almost as rapidly as did the House Sparrow. These results are, of course, due to fitness and ready adaptation to a new and pleasing environment. The European Starling is a hardy, resourceful, attractive, prolific, pugnacious and practically omnivorous animal, endowed with a high degree of intelligence. Two broods are raised, some say three, each year. Possessed of these qualities, and with few effective enemies, it is small wonder that this species has occupied American birdland with marked success.

It must not be forgotten that in Europe, and especially in England, where the Starling is one of the commonest birds, its economic status still remains unsettled. It is conceded that it destroys worms, grubs, snails and a number of noxious insects, and the benefits thus conferred on the farmer *may* exceed the damage inflicted on fruits and orchards. It is, on the other hand, widely and loudly blamed for "mass" attacks on small fruits, when very large flocks co-operate to destroy whole acres of currants, raspberries, etc. S. H. Goodwin (Bird-Lore, 1908, p. 130) furnishes a report from English horticulturalists on this subject. I quote briefly a few witnesses, who

voice an average opinion. "The Starling is a useful bird, foraging for the larvae of craneflies and wireworms; rids the sheep of a few of their ticks; but in a fruit district it comes in droves into the strawberries and attacks the cherries wholesale; also peas, apples, plums and raspberries." Another says that he does not grudge the blackbirds and thrushes their toll of fruit in return for their song, but he regards the Starlings with different feelings. They threaten in his neighborhood the utter destruction of the small fruit and other crops. "They come in millions, in flocks that darken the sky, and the noise of their flight is like the roar of the sea. Their numbers increase each year."

From Kent, the garden of England, comes the cry: "The starling is a terror, and you must have a gun always in your hand, or woe betide the cherries; they come in thousands." And the same tale is told by the orchardists in Switzerland and the south of France; also from New Zealand we hear similar complaints. While it must be borne in mind that the bird's standing as to usefulness or otherwise in one country is not a safe criterion as to what may happen when it is introduced into another with different fauna, flora and climate, it seems plain from Mr. Forbush's report that the Starling in Massachusetts acts pretty much as it does in England.

Examination of stomach contents of 102 Massachusetts birds showed that their food is about the same as that taken by them in England and other European countries. Professor Beal, of the United States Biological Survey, reports that of these specimens, taken mostly in the month of June, 1910, three had eaten earthworms, eighteen, millipeds and spiders, twenty-two, millipeds but no spiders, and eighteen had taken only spiders. The average of millipeds in 22 stomachs was nearly 40 per cent. More than half the birds had eaten caterpillars, forming 45 per cent of the stomach contents. There was also a great variety of other insects in small proportion, most of them injurious to the farming interests. The vegetable content was largely of fruit. The specimens having been taken during the cherry season, most of the birds had eaten largely of that fruit, the stomachs of 18 containing an average of 56.17 per cent of the skins, stones and pulp of cultivated cherries.

Among the bad habits of the Starling in New England, Forbush cites the consumption or destruction of pears, apples, strawberries, lettuce, radishes, wheat and other edibles. The principal spoliation came from a descent of Starlings "in thousands" upon the fruit growers' fields and orchards. The rate of increase and the actual numbers in New England localities invaded by the European Starling have been pretty definitely determined by many observers. Thus, Dr. Edward W. Viator, who has carefully recorded the birds annually seen at Prospect Park, recorded an average of 29 Starlings daily in 1908, 31 in 1909, and 41 in 1910. Mr. John H. Sage of Portland, Connecticut, saw two pairs in that town in 1908; by June, 1910, they had increased to about 100. As for Starlings in the mass, these have been estimated by trained observers to have increased from flocks of 1,000 (in the fall) to 8,000 or, in some instances, to 10,000.

Convincing proof of the enormous increase of the English Starling in America is better furnished by the report of "A Pennsylvania Starling Roost" (*Auk*, vol. 34, 1917, p. 338) made by George MacReynolds. Surely no greater aggregation of these birds has ever been noticed in Europe. Competent observers of this great host, assembled near Doylestown, Pennsylvania, during January and early February, believe that their numbers were at least a million. Their aerial evolutions and chatter were awe-inspiring, and the distant multitude made a noise that was likened to an engine blowing off steam. The excrement of these immense flocks was hauled away in carts and served to fertilize considerable areas.

Reports have been published recently of specimens of *Sturnus vulgaris* from Illinois, Wisconsin, Indiana and neighboring states. For example, H. L. Stoddard (Yearbook of the Milwaukee Museum, 1923, p. 185) describes two males taken in or near Milwaukee during February and March, 1923, dead from the effects of a blizzard. He remarks that this record extends the range of the bird from Port Stanley, Ontario, and Cleveland, Ohio, the nearest points at which it had hitherto been reported. He very properly adds that it is probably only a matter of time before the species will be a common breeder in southern Wisconsin and other localities in the Mississippi Valley.

Harrison F. Lewis (Auk, vol. 39, 1922, p. 513) reports that a pair of these winter-defying birds was found in Labrador in 1917, where they not only raised a summer brood, but flourished in temperatures many degrees below zero. This is probably the earliest Canadian record. Since that year the occurrence of the European Starling has been reported from many parts of Ontario and Quebec. Henry Mousley (Auk, vol. 40, 1923, p. 539) mentions that L. M. Terrill recorded three from St. Lambert, near Montreal, April, 1923; J. H. Fleming, on August 24, 1920, saw a flock of seven near Toronto; and E. M. S. Dale counted seventeen near London, Ontario, in February, 1923.

To the colonization of this hardy bird on the Pacific coast allusion has already been made. Lord (Birds of Oregon and Washington, 1913, p. 239) notes that in the spring of 1901 the European Starling could be seen in Portland, Oregon, nesting in various nooks and crevices of public buildings, apparently in considerable numbers. One might just here raise the question—will *Sturnus vulgaris*, after multiplying, after the usual fashion, due to the favoring climate, limitless nesting opportunities and plentiful food supply of Oregon, follow the somewhat similar example of his species in New Zealand, and, resisting the invading hosts of *Aethiopsar cristatellus* from the north, perchance drive them back on their Canadian lines? It is perhaps an idle query and a profitless speculation. So many things may meantime happen. Moreover, the Crested Mynah may be a better fighter than his New Zealand cousin, *Acridotheres tristis*.

That the European Starling drives certain birds from their nests is too well known to discuss at length. Both at home and abroad all the starlings that form the subject of this sketch prefer nesting places about buildings, in boxes, holes, hollows and crevices of all sorts. This habit brings them in competition with almost every variety of woodpecker, with owls, nuthatches, martins, pigeons, bluebirds, wrens, tree swallows, and many other birds. In the regions occupied by it, the aggressive and sturdy Starling has always had the advantage. He himself excavates no tree. He watches the work under way by a Flicker or other hole-maker and, when the hollow suits his taste, drives away the excavator. As for nesting-boxes, the only way in which the Starling can be prevented from ousting the native tenant is, as Mr. Job shows, to make the entrance-hole less than  $1 \frac{2}{3}$  inches in diameter. Naturally, the Starling competes with native birds for their food supply, and, in winter, for instance, this competition may result disastrously, if and when there is a food shortage and the flocks of Starlings become numerous, or the birds have gained an extensive range. In such a contingency it may be expected that the foreign importation will be the last to suffer.

The Massachusetts Report sums up the evidence in a judicial manner when it states that "it is too early yet to say what will be the final result of the introduction of the Starling into this country. Its value as an insect destroyer is plain, but its unchecked increase may prove a calamity to several species of useful native

birds, and from the experience of other countries we may assume that it is likely to become a pest to the fruit grower." Speaking elsewhere of the credit side of this bird's economic ledger, Forbush refers to its usefulness in some parts of Europe because of its partiality for the numerous and destructive land snails. But, he adds, it is not thus beneficial here, because we are not similarly afflicted in this country. He also believes that the Starling can furnish no service in North America that cannot be equally well performed by our own native birds, such as blackbirds, bobolinks, meadowlarks and sparrows, although it may be of use in supplementing the efforts of these and other birds when their numbers are not sufficient to keep in check the insect enemies of our grass lands.

The economic status of the European Starling in this country has been best established by the extensive labors of E. R. Kalmbach and I. N. Gabrielson (Bulletin No. 868, U. S. Dept. Agric., 1921), who not only examined 2157 stomachs of birds, collected throughout their range, but made many observations of them in the field. The authors conclude from their investigations that the food of the Starling is mainly injurious insects, and that, on the whole, it should be classed as a neutral, if not beneficial, introduction. As a supplement to these general conclusions, they add that, although legislation should not prevent the killing of the birds when they are found in the act of destroying crops, they should have general protection. These authors also admit the possibility that the Starling may increase to such an extent that it may eventually become not only a nuisance, but a positive menace; but that time has not yet arrived.

Commenting on this report, the editor of the Auk very pertinently remarks that "the Starling can take care of itself without protective legislation, and that it might be well to leave it in that category, as it is now in most of the states where it occurs. Then, in case of any undesirable development in its habits, its numbers could be checked without waiting for the repeal of a law."

The life history of Australasian importations has proved to be much the same as that of the same birds in the United States. In the center of the city of Auckland, New Zealand, where the English Starling has been long established, I know of at least one nest, built in a chimney that had not been recently used as a smoke carrier. Daily, a pair of birds sat on the top of the ventilator, evidently much at home in the crowded town, disappearing every now and then into the opening below, to reappear as suddenly and mysteriously, as if from nowhere.

Hutton and Drummond (Animals of New Zealand, p. 28) and, more elaborately, G. M. Thomson (Naturalisation of Animals in New Zealand, p. 154, *et seq.*) tell the story of the introduction of several starling species into the Dominion. *Sturnus vulgaris* was imported very early, into Nelson about 1862, into Auckland in 1865, and so on. Their increase throughout the two islands was phenomenal. Correspondents write Mr. Thomson in these terms: "When I arrived from England in 1875, there were only four starlings in the town. They increased rapidly and took possession of the limestone bluffs that look over the bay. After eleven years they were there in hundreds of thousands. Here the bird has few, if any, enemies."

From New Plymouth (in northern New Zealand): "Every evening tens of thousands of starlings perform their cloudlike gyrations around and above the island of Moturoa, which is clearly seen from the hill. Every person who sees them compares them to rapidly moving clouds." As elsewhere, opinion is divided in New Zealand on the economic value of the alien European Starling. Thomson believes it to be, so far, beneficial. He says that the effects on the insect life of the country by Starlings, and through them on the vegetable and other animal life, is incalculable.

They have nearly destroyed the grasshoppers, formerly so abundant; and many other groups of insects must have suffered. They remove great quantities of ticks from sheep and cattle, and help to keep insect pests from them: Surely, high praise from such an eminent authority. But he modifies this otherwise clean bill of health by adding that "indirectly they are credited by many observers with having exterminated pheasants, partridges, introduced quail, wild turkeys, wild fowls, etc., from many districts, by having eaten out the insect food, so that these larger birds are now unable to rear their young broods. In many places they are accused of being fruit-stealers, attacking not only small fruits, but also pears, plums, and peaches."

Thomson (*loc. cit.*) says of this bird in Australia that in many parts of New South Wales cherry growing has become impossible owing to the persistent attacks of the introduced European Starling. *Sturnus vulgaris* has been placed as no. 382A on the R. A. O. U. list. It is there noted (Leach, Australian Bird Book, 1923, p. 186) as an introduced, nomadic species, very common throughout its unrestricted range—the open country. Its food is a composite of insects, caterpillars, and fruit.

*Acridotheres tristis*. Common Mynah. House Mynah. This is probably the second-best known species, transplanted during the last fifty years from India to many lands outside its normal range. Among the many observers that have studied this bird at home is Douglas Dewar (Birds of the Indian Hills, 1915, p. 60), who says that it is nearly as abundant in the hills as it is in the plains. "This bird is considerably smaller than the Crow. His head, neck and upper breast are black, while the rest of his plumage is quaker-brown, save for a broad, white wing-bar, very conspicuous during flight, and some white in his tail. The legs and bill look as if they had been dipped in the mustard pot, and there is a bare patch of mustard-colored skin on either side of the head.

"This sprightly bird is socially inclined. Grasshoppers form its favourite food. These it seeks on the grass, over which it struts with as much dignity as a stout raja. In the spring the Mynahs make free with our bungalows, seizing on any convenient holes or ledges as sites for their nests. The nest is a conglomeration of straw, rags, paper, and any rubbish that comes to beak. The eggs are a beautiful blue."

The only other Mynah commonly seen in the Himalayas, according to Dewar, is the Jungle Mynah (*Aethiopsar fuscus*). It closely resembles *Acridotheres tristis*, but careful inspection reveals a little tuft of feathers on the forehead, which is lacking in the latter. Moreover the yellowish patch of skin about the eyes is not seen in the Jungle Mynah.

Jerdon (Birds of India, Assam and Burma, p. 325), points out that the adjective *tristis* refers not at all to the disposition of the lively Common Mynah, but to its sad-colored plumage. He adds to the usual description of this Starling that there are irregular, whitish dots on the red-brown irides, that the average length is 10 inches; wing 5.25; tail 3.5. He remarks that they are noisy birds, and early in the morning and evening seek a particular tree, where they may collect in hundreds, keeping up a continual, though occasionally interrupted, chatter.

This latter habit is not, of course, confined to the starling genera, although it is with them a common incident. I well remember several of these "Mynah trees" on Viti Levu, Fiji Islands, where the noisy birds made themselves quite obnoxious to certain neighborhoods. In one locality a large and spreading wild fig was a favorite roosting resort for several hundred Mynahs. About sundown they flew from every point of the compass and before settling for the night gave the near-by citizens the benefit of a concert that could be heard a quarter of a mile away. I often was an interested audience, and did not dislike the alternate rise and fall of so many avian

voices. Whether this musical display would have appealed to me were it repeated outside my bedroom window every evening as well as each morning just before sunrise is a question I cannot answer.

The citizens living in the immediate vicinity of this particular Mynah tree, however, decided they had stood it long enough, for one evening when I happened along to hear the sunset orchestra, there was silence in the trees. On inquiry I found that firearms and other offensive agents had been brought into play with the result that the birds chose another resting place some 500 yards distant, where they were not further molested during the remainder of my stay in Fiji.

Returning to Jerdon's account, he noticed that shortly after sunrise the Mynahs disperse in small parties, and, in the breeding season, fly off to their nesting grounds. Some of them remain about the houses and native huts, picking up rice, fragments of bread, etc., even coming indoors in search of food. Still others, with cowbird-like propensities, attend flocks of sheep and herds of cattle, generally for the purpose of catching the grasshoppers and other insects disturbed by these animals as they slowly move about cropping the herbage. Some of the birds perch on a cow's back, and, it may be, take useful toll of the bovine parasites; but I have never seen them actually do this, although it is a common experience to see one or more Mynahs perch on the backs of cattle in the Fijis and elsewhere. A companion of mine was so struck with this habit that she suggested the phrase "To every cow her Mynah!" The odd pedestrian habits of this bird did not escape the notice of Jerdon. Certainly he is a graceful and rapid walker, nodding his head as he struts across lawn or highway and assisting progress by occasional hops. He is also a straight and quick flyer. His call-notes, apart from his matin and evensong, are of great variety, some of them not unmusical, especially when, in his capacity of mimic, he has learned the notes of a better songster.

In India all the Mynahs are commonly kept as cage birds. They are easily tamed and domesticated, and may even be taught to follow some member of the household about like a dog or a cat. Although not as good a talker as some others of the Sturnidæ, the Hill Mynah for example, the Common Mynah is a good mimic, and often picks up words and even short sentences. Jerdon is authority for the statement that this bird was introduced into Mauritius to destroy the grasshoppers, and is now perfectly naturalized in that colony. He is sacred to Ram Deo, and is the bird that is represented as perching on the arm of that deity.

Hume (*Nests and Eggs of Indian Birds*, 1890, vol. 1, p. 377) tells us that a pair of Common Mynahs bred yearly in the roof of his verandah at Simla, at an elevation of 7,000 feet. They are very domestic birds and greatly affect the habitations of man and their immediate neighborhood. They build in roofs of houses, in holes in walls, and in the earthen chatties that in some parts the natives hang out for their use, as the Americans hang boxes for the Purple Martin. Very rarely do they nest on the branches of trees. The nest itself forms a shapeless but warm lining to the hole, and is composed chiefly of straw and feathers in which fine bits of cotton, strips of rag, shreds of old rope, dried snake skin and all sorts of odds and ends may be incorporated. I well remember watching the construction of one of these nests during the month of September in Suva, Fiji. It was built in an air-space of our hotel verandah, and the most miscellaneous collection of material was gathered by the birds. One of the favorite articles was the lining of a straw mattress that they had discovered and pulled out of its covering. Pieces of twine, excelsior and paper were also carried into the nesting hole.

According to Hume, the normal breeding season of the common Mynah in India lasts from June to August; but on Ross Island, in the Andamans, where they were introduced about 1880, they seem to breed all the year round. Hume thinks this abnormal prolificness may be due to the uniformly warm temperature of these islands and the great heat of the sun at all seasons, rendering much incubation unnecessary. Even on the plains of northern India, and in the hot weather, when the Mynahs breed, they do not "sit close," and since in the Andamans the days and nights are so constantly hot the eggs can almost hatch by themselves. This may be partly the reason why the birds raise more broods annually than they do on the mainland. The eggs are spotless, glossy, sky-blue or greenish-blue, are rather long, oval or pear-shaped. Four or five eggs are generally found.

I have had personal experience of and have studied *A. tristis* in Tahiti, Rarotonga, New Zealand, Fiji and Hawaii. So far as I could learn, the habits of the bird are about the same in all these lands. The rate of increase varies a little, but where food and human habitations are plentiful there the Mynah flourishes. Bird life on the Society Islands is not very noticeable, but, such as it is, to the casual observer the wayside avifauna seems to consist almost entirely of introduced starlings and pigeons. This is not so true of Suva and the other towns on Viti Levu, Vanua Levu and Ovalau of the Fiji group, but there they are also much in evidence. It was a relief to visit such islands as Kandavu and Bega, that were free of the pest. In all the countries mentioned, the House Mynah was imported in the hope that it would help to eradicate noxious insects, and especially those inimical to the planter's interest. So far as I could learn, it gained its first foothold in Fiji about 1880.

During my stay of six months in Fiji I had ample opportunity to observe and study the Common Mynah and, at the request of the Government, made a report on its (probable) economic status. From this report I quote briefly: That a bird may be included in the list of "animals useful to agriculturalists" it is generally necessary to decide not only its attitude towards the planter's or gardener's products, but also the influence it exerts upon the friends and enemies of these forms of plant life. I have not examined the stomachs of many Mynahs, but in the digestive tract of those I have shot I have invariably found, in areas where Köster's curse (an introduced Brazilian plant) was at all plentiful, the seeds and soft parts of that pest, the former unaffected by the intestinal juices. Moreover, I found very few insects in the stomach. This evidence, so far as it goes, shows that in certain localities at least, the Mynah is a disseminator of noxious weeds and a very poor exterminator of (possibly) harmful insects. I would, consequently, strongly urge that the stomach contents of, say, ten of these birds be carefully explored, after their morning meal, in twenty typical localities, to settle this question more definitely. I believe that birds taken in the immediate vicinity of five copra and five sugar plantations, as well as in and about ten paddocks infested by lantana, Köster's curse and other plant pests, in widely separated localities, would do more than any other plan to decide whether the Common Mynah is the planter's friend or his enemy, whether it is inimical in certain environments and, possibly, of economic value under other and different surroundings. Such a test would do more to furnish essential information than any amount of evidence based on mere opinion or casual observation of the habits of these birds. As to the influence exerted by the Mynah on the native bird life of the Colony, it is, I am convinced, distinctly deleterious. There is no doubt but that the smaller birds are forced out of, and driven away from, many localities by the advancing hordes of this resourceful, highly intelligent and pugnacious intruder. I have often seen the Mynah chasing small birds and engaged in encounters with larger ones, including

pigeons, doves, honeyeaters, etc. The harm arising in this way affects seriously the good work of the very useful insectivorous birds, such as the Silver Eye, the Thick-heads, the Fijian "Robin", the Fantails and other insect eaters, upon whose helpful aid the agriculturalist must rely to hold in check the multitude of his entomological enemies. From this standpoint alone the Mynah is a menace to colonial agricultural interests. Birds thus disturbed and harried are not only limited in their nesting and reproductive functions, but they are very likely to desert those areas where they are most needed and in which they normally thrive.

The continual increase of the Mynah in Fiji is a matter of importance. Even if the bird is not an evil now and in his present numbers, it may become one by large accessions to the ranks, as has been the case in other countries. At least until a definite policy, as the result of scientific investigation, has been adopted the Mynah should be denied entry to those islands, Kandavu for example, to which, as I think happily, it has not yet gained admission.

Dayton Stoner (Auk, vol. 40, 1923, p. 328) has also studied this bird around Suva. He found that the hope that *tristis* would control noxious insects has not been realized. Other food has been more easily secured; native birds are to some extent molested and their numbers more or less held in check by this thrifty, pugnacious bird. Also, the habitations of the people are not improved by the building of nests in their chimneys, eaves, spouts, etc., and by the defilement that follows.

Stoner has noted an interesting fact about the Fiji Mynah that may have an important bearing on the numbers of this bird. He discovered on a Mynah taken on June 19, 1922, a number of parasites. These Dr. Ransom, of the U. S. Bureau of Animal Industry, recognized as worms of a new species. They were extracted from between the cornea and conjunctiva; others, flies and lice, with eggs of the latter, were also found on the body of the same bird. A number of Mynahs of the same series were shown to be similarly infested. Should the Mynahs be attacked by these enemies to any considerable extent it may seriously retard their increase.

Bahr (Bull. Brit. Ornith. Club, no. 171, 1911, p. 102; see also his paper in the Ibis on the Birds of Fiji) remarks that the Mynahs "have increased to an alarming extent. They were introduced to rid the sugarcane of several insect pests, but so far have been mainly instrumental in driving away native birds."

It is a curious fact that Brisson (Ornithologie, II, p. 278, 1760; accepted by Bowdler Sharpe, Cat. Birds Brit. Mus., XIII, p. 80), under the synonym *La Merle des Philippines*, describes this Mynah, thus giving color to the belief that it was a very early introduction into our Far Eastern islands.

Edward Newton (Ibis, 1861, p. 115) sent home several skins of *A. tristis* from Mauritius, labeling them as introduced from India. Elsewhere (*loc. cit.*, p. 273) he says they are universally distributed throughout the island, and that thousands roost, for example, in a grove of trees by the Mer St. Martin, chattering and screaming in their well known fashion.

Dr. J. A. Leach (An Australian Bird Book, 1923, p. 187) gives the introduced common Mynah a place in the R. A. O. U. list as no. 382B, and notes it as very common and non-migratory throughout Australia, where its food is, as elsewhere, mixed insects and fruit; its preference is for urban life.

The Common Mynah was introduced (Thomson, *loc. cit.*) into New Zealand in the early seventies. One of the most remarkable facts in its history is the increase of the birds after their first importation, and then their subsequent diminution and, in some localities (the southern towns, for example), their eventual disappearance. The last incident seems to be due to the invasion of these districts by their cousins, the



European Starlings, the increase of the latter keeping pace with the decrease of the former. F. W. Hutton, writing 1890, says: "A few used to be seen about Christ Church, but they have disappeared before the starlings." Opinion as to the economic value of this Mynah in New Zealand is divided. For instance, the Agriculture Inspector for New Plymouth in 1903 blamed the bird as the chief cause for the spread of the blackberry, an introduced pest in the Dominion; but Thomson regards this as an error, because the House Mynah is in New Zealand mainly insectivorous and not to any extent a fruit-eater, and it is almost confined to towns.

On the other hand, Drummond, a most competent authority, says, in May, 1910, that they are very destructive of apricots, apples, pears, strawberries and gooseberries. Still another witness has seen a dozen Mynahs follow the plough all day unweariedly, picking up an abundance of grubs.

Just here it may be proper to say that the Australian Mynahs (also introduced into New Zealand) of which there are at least five species, of the genera *Manorhina* and *Myzantha*, are not starlings at all, and do not come within the purview of this paper. On the other hand, some of the Dominion importations of Indian Mynah did reach New Zealand by way of Australia.

O. Finsch (Ibis, 1882, p. 390) saw several years before this date *A. tristis* well established in Wellington and Wanganui, New Zealand. He also noticed the English Starling as a common bird in Dunedin and Christ Church.

McGregor (Condor, iv, 1902, p. 60) found *A. tristis* well established in Hawaii in 1900. It was extremely abundant at that date on Maui Island. Bryan (Auk, vol. 18, 1901, p. 387) says the Common Mynah has an unenviable reputation in the Hawaiian Islands, that it was introduced by Dr. Hillebrand, and that experiments were under way to establish more nearly the exact relation of the Mynah to his friends and foes.

The account given by H. W. Henshaw (Birds of the Hawaiian Islands, 1902, p. 129), so far as I could learn during a recent visit to Hawaii, accurately describes avian conditions at the present time. He says that *A. tristis* is widespread over the islands, and there is no doubt that the bird is constantly increasing in numbers. Notwithstanding that the Mynah destroys vast numbers of insects and in this way is of direct and great value in the cane-fields, in the pastures, and among cattle, there is a strong and growing prejudice against the bird. The charge is made that the Mynah invades the cote of the domestic pigeon, and even ejects the eggs and young birds. "That the Mynah sometimes dispossesses the pigeon of its home there is no doubt, although, on the other hand, it not rarely shares a portion of the cote with the proper owners, and seems to rear its young on not unfriendly terms with them. The object of the Mynah is not direct injury to the pigeons—for apparently it eats neither their eggs nor their young—but is solely to find a safe refuge for its own eggs, the Mynah being partial to boxes and to cavities in trees in which to nest." Henshaw does not believe that this habit of the interloper is important, as the alien can easily be expelled from dovecotes. A more serious charge against this Mynah is that he eats and otherwise destroys figs and small fruits; also that he fights with, and drives away, native birds. It is perfectly true that all native Hawaiian birds are diminishing greatly in numbers and there is a widespread belief that the House Mynah is largely responsible for this decrease.

With certain reservations, Henshaw believes that *tristis* is a beneficial species. But, he says, "even a species which is in the main beneficial may increase to such an extent as to be a nuisance, and such seems likely to be the case with the Mynah. Its numbers, even at present, are startling, and there seems to be no limit to the possibil-

ities of its increase. Any altitude, high or low, is suited to its tastes. It is true that the bird shuns the dense forest, but in tracts where the undergrowth has been somewhat thinned by cattle it is entirely at home, no matter how far from civilization." Although the writer tries to take an optimistic view of the Mynah's presence in the Territory, he believes it has come to stay, and that so wary and resourceful a bird is not likely to be seriously reduced in numbers by traps, guns or poison. It may be possible to check the increase by a liberal expenditure of money, but anything approaching extermination is practically impossible.

*Aethiopsar cristatellus*. The Crested Mynah. This starling exhibits characters that readily distinguish it from other birds even at a distance, and that serve as points of definite recognition by the most superficial observer. They are chiefly the stocky build of this robin-sized bird, whose glossy-black plumage is in striking contrast with a large, white, marginal *wing-patch*, fairly well marked above, but seen still more plainly beneath; hence more *conspicuous during flight* than when the bird is perching and with folded wings. Added to this peculiarity is his yellowish-white bill, overhung by a *fanlike crest* which is placed entirely in front of the eyes and so far forwards on the upper mandible that it conceals the nostrils. There is no other bird along the Pacific Coast that resembles this Mynah, nor any that carries similar conspicuous markings. The fact of ready recognition will, doubtless, prove of practical advantage in dealing with the bird in future should it greatly increase in numbers or invade distant areas. The bird's original habitat is central and southern China. (For portrait, see frontispiece to this article, fig. 41.)

Nearly all members of the Starling family have acquired a good reputation as cage-birds. Among writers on the subject A. G. Butler (Foreign Birds for Cage and Aviary, vol. 2, p. 34), gives one of the best accounts of these intelligent animals. The misleading vulgar synonym, "Japanese" Starling, derived from the fact that the bird is imported into Japan and sold there as a domestic pet. It is, indeed, not impossible that it was by way of Yokohama that *A. cristatellus* was brought into Vancouver. Russ, speaking of early importations into Germany, says that it is one of the most charming starlings in the trade, although it is uncertain and easily excited. He also says that the species was successfully bred as a captive in 1875.

Richard C. McGregor (Some Features of the Philippine Ornis, 1920, p. 364) gives an account of the introduction of this bird into the Islands. He says that for several years there was a roost of these Starlings in the trees in front of the Luneta police station, on Bagumbayan Drive, where their chatter was very noticeable at night. He remarks that this bird appears to have been introduced by the Spanish Government about 1850 with the hope that it would reduce the number of locusts, which were and are still a very serious pest to the agriculturist. He adds that Blair and Robertson (The Philippine Islands 1493-1898, 1907, p. 127) say that at least three attempts were made by the Spanish Government between 1849 and 1852 to introduce and establish a species of *martin*, probably one of the starlings, into the Islands for the purpose mentioned. McGregor believes that the introduced bird does eat some locusts, but it has not increased in numbers sufficiently to have been of much use in alleviating the pest. Meantime the Starling has spread to towns in the vicinity of Manila; it has also reached towns about Lake Bay, and it was noted at Tagudin, Ilocos Sur, in 1909. At this date it has been recorded only on Luzon.

R. Swinhoe (Ibis, 1863, p. 382) gives a graphic account of this bird in the level country of Formosa, and reports that it is identical with the Chinese species. It ranges over the island the whole year.

For the purpose of gathering information of a definite character regarding the introduction and subsequent career of the Chinese Starling on the Pacific Coast of North America, I sent a brief questionnaire to the following gentlemen, whose experience as naturalists and long residence in British Columbia distinguish them as authorities on the subject: Mr. F. Kermode, Director of the Provincial Museum; Mr. J. A. Munro, Chief Federal Migratory Bird Officer for the Western Provinces; Major Allan Brooks, Okanagan Landing; Mr. F. R. Butler, Secretary of the Game Conservation Board; Mr. Fred G. Crickmay, Vancouver, and Mr. R. A. Cumming, South Vancouver. Mr. Kermode (Report of the Provincial Museum, 1920, p. 20) and Mr. Munro (Canadian Field-Naturalist, 1922, p. 32) have both written interesting accounts of this bird. Without attempting to tabulate (and thus repeat) the information furnished by these gentlemen, I shall give the concensus of opinion.

The earliest date given for the introduction of the species is 1897, when two pairs were seen. Major Allan Brooks writes me that he first saw this bird in British Columbia some time during 1903, when it was very scarce. It was certainly unknown as early as 1894. Replying to the question as to whether the Crested Mynah molests or displaces birds native to British Columbia, Mr. Kermode voices the unanimous opinion of my informants when he writes: "From personal observation, I find that the Japanese Starling has been a great offender in taking the nesting sites of some of our valuable insectivorous birds, and during the last few years it has been noted, especially in the vicinity of Vancouver, that many of these birds have deserted their old haunts or nesting places, now occupied by Starlings. This is particularly true of the woodpeckers and wrens. In the case of the wren, they first oust the occupant and then enlarge the nesting hole."

In Vancouver, as elsewhere, this Mynah builds its nest in almost any kind of hole or crevice, whether made by other birds or not, in houses or barns, in telephone poles, cavities in trees, etc. All the observers are unanimous in reporting a steady and marked increase in the total numbers and flocks of this bird. Mr. Cumming estimates their present numbers at between 6000 and 7000 in Vancouver alone.

To this date, *A. cristatellus* is confined to an area roughly circular in form, with a radius of about 50 miles from the Vancouver waterfront. This enlargement of its range, Cumming says, represents an advance of about a mile a year in the past sixteen years. The principal roosts are still in the center of the city; others, scattered about the suburbs and adjacent rural districts, shelter a relatively small number of birds. Lulu and Sea islands, as well as the municipality of Point Grey, have acquired additional colonies. Munro mentions the more distant New Westminster as at present the farthest outpost of the advancing host.

The food of the Chinese Starling in British Columbia is apparently of the same character as that eaten by the same bird in cities and rural localities in other parts of the world. In the town proper they act as scavengers and devour all sorts of refuse foodstuffs. When possible, they eat loganberries, raspberries, pears and cherries, especially the last. In 1911 Major Brooks watched a tree being stripped of its crop of cherries, a stream of Mynahs coming and going to and from their nests carrying the fruit to their young. Messrs. Munro and Crickmay do not believe there is any evidence so far adduced that *cristatellus* will eat the tent-caterpillar, so destructive to British Columbia plant life. It is felt that if he would imitate the small "Tom-tit" in this particular all his sins of omission would be overlooked and his increasing numbers gladly encouraged. Munro has made an examination of the stomachs of ten Starlings taken during the month of June, when the tent-caterpillar plague is at its height, but found no evidence that any of these noxious insects had

been eaten. Of course, as he points out, this material is entirely too small to base any reliable conclusions upon, but it does stand as an indication of the sort of food one group of these birds mostly eats. In all the stomachs vegetable matter was in excess of animal. The former included unidentified fruit pulp, raspberry and service-berry seeds, oat husks and leaf fragments, while the latter consisted of spiders and several insects, among them house flies, a milliped, and larvae of various kinds. Munro also points out that there are over 130 insect and weed-seed destroying birds within the boundaries of the Province, so that on that score alone there does not appear to be a place for a bird of such doubtful reputation as the Crested Mynah.

I cannot discover any record of disease or parasitic enemy of *crisatellus* that might check his undue increase and spread along the Pacific Coast; indeed all the factors of adequate food supply, climatic conditions, nesting opportunities and freedom from natural enemies combine to insure his steady march both inland and along the ocean front.

The query "Do you regard the introduced starling as a useful acquisition?" was almost uniformly answered in the negative. Mr. Butler, however, thinks that "the starling is in some instances a useful bird, but only in respect of its insectivorous and refuse diet." To this statement he joins the proviso that he regards the stealing of the nests and eggs of native birds as outweighing even these advantages. Kermode reports that W. B. Anderson, Dominion Inspector of Indian Orchards, has authentic records from two observers who saw Chinese Starlings destroying tent-caterpillars. All of which points to the necessity of making during the year fairly frequent examinations of a sufficiently large number of Mynah intestinal tracts properly to settle the debated food question. As an indication of what one might find (in winter) in the stomachs of a few urban specimens, Mr. Cumming, at the request of Dr. Grinnell, took and sent to the Museum of Vertebrate Zoology eight birds for inspection. These were all shot between 8 and 9 P. M., March 2, 1924, in the neighborhood of the market gardens of Vancouver. Dr. H. C. Bryant has been good enough to examine the stomach contents for me, with the following results:

M.V.Z. No.	Sex	State of stomach	Contents	Per cent of animal matter	Per cent of vegetable matter	Sand and gravel
44477	♀	Full	5 oat kernels and hulls 1 caterpillar	5	95	0
44478	♂	Half full	Oat hulls and green vegetable debris	0	100	0
44479	♀	Nearly empty	Unidentified green vegetable matter; buds (?)	0	100	0
44480	♀	Three-fourths empty	Oat hulls and green vegetation not identified; sand or fine gravel	0	95	5
44481	♂	One-third full	Seeds and seed hulls; one small earth-worm	20	80	0
44482	♂	Empty	-----	-----	-----	-----
44483	♀	Nearly empty	Vegetable matter, 60%; two small, dry stems, 40%	0	100	0
.....	♂	Full	5 oat kernels and hulls, 98% green vegetable matter, 2%	0	100	0

It is desirable that a similar examination of the gullet, stomach and duodenal contents be made every two months during the year, so that a more satisfactory opinion may be given and more definite evidence furnished as to the annual food intake of the Vancouver colony.

As it is important to learn whether *crisatellus* has recently reached our Pacific States, and especially those bordering on Canadian soil, I wrote to several ornithologists in Oregon and Washington. Stanley G. Jewett was the only one who had definite knowledge of such introduction. Under date of March 24, 1924, he writes me from Portland, Oregon, as follows: "I have one record of the occurrence of the so-called Japanese Starling this side of Vancouver, B. C. On February 4, 1922, one of these birds made its appearance at a residence in East Portland, when several interested bird students also saw it. I got permission from the Police Department to shoot the bird, but had to leave town for a few days and on my return the Mynah had disappeared." In this connection it must always be remembered that a solitary appearance of this bird, especially in localities much removed from its ordinary habitat, may result from the escape of a captive. It is a favorite cage-bird among our Japanese and Chinese inhabitants, and is occasionally found in our bird stores.

*Conclusions.* From the foregoing study of the Starling in general and of *Aethiopsar crisatellus* in particular, one may arrive at certain conclusions as to the present activities and probable future of the colonies planted in this country.

(1) The habits of all the expatriated Sturnidae are, under somewhat similar environment, everywhere the same. They are all omnivorous. Insects of several species (some of them noxious), a few varieties of obnoxious weed-seeds, city garbage, cultivated fruits—these form the ordinary diet of the introduced species.

(2) The chief objections urged against these alien birds are their driving away and displacing valuable native birds and their destruction of garden fruits—berries, cherries, pears and other products of the orchard. When they have increased to such an extent that they form large flocks they invade gardens in the fruiting season and strip the trees and vines.

(3) The Crested Mynah has gained a firm foothold in Vancouver and vicinity, and has come to stay. It is rapidly extending its range and increasing its numbers; the latter are variously estimated at from 5000 to 7000, the descendants of a few pairs liberated less than 25 years ago.

(4) In British Columbia it has behaved much like the European Starling in New York State and in New England, under some influences devouring hurtful insects and deleterious weed-seeds, under others destroying important fruits, especially devastating cherry and similar crops.

(5) Examination of the stomach content of the imported Crested Mynah, although not as yet thoroughly carried out, indicates much the same finding as in the case of the Atlantic Coast Starling.

(6) *Aethiopsar crisatellus* drives off native British Columbian birds, and of those that breed in holes and crevices confiscates their nests and destroys eggs and young.

(7) Owing to the large supply of useful and efficient *native* insectivorous birds in British Columbia and the Pacific States it does not appear likely there is or will be an economic place for a bird that is only in part a destroyer of noxious insects. Moreover, any considerable displacement of purely insectivorous birds by an omnivorous species is rarely advisable, since the latter often abandons an insect diet for the preferable or more easily obtained fruit foods.

(8) So far as known, *A. crisatellus* has on the Pacific Coast no enemies or other agent likely to check its spread or limit its numbers. One may confidently expect that in the course of time this prolific and resourceful bird will breed in hundreds of thousands and literally occupy the land. It will, then, as other Sturnidae

have done under similar conditions, become a pest, not only taking the place properly belonging to more useful birds, but will, at seed-time and harvest, descend upon orchard and field in devouring myriads.

(9) If careful examination and field observation during the next year or so confirm these prognostications, the Chinese Starling should be actively and effectively dealt with ere it is too late, that is, before countless numbers and a wide range render effective action impossible.

(10) The possible extermination of this species on the Pacific Coast would be greatly assisted by the fact that it has markings (peculiar crest, wing-spots, etc.) that readily distinguish it from any native birds.

*Berkeley, California, March 31, 1924.*

## BANDING WHITE PELICANS

(WITH MAP)

By HENRY B. WARD

(Contributions from the Zoological Laboratory of the University of Illinois, No. 238)

CONCERNING one of the most interesting and peculiar North American birds, the White Pelican (*Pelecanus erythrorhynchos*), relatively little is definitely known of the routes taken by individual groups in migrating from the breeding grounds to the winter feeding grounds. In winter it occurs abundantly along the western shore of the Gulf, both in the United States and in Mexico, along the Pacific Coast of Mexico and part of Southern California, and infrequently in the interior of Mexico.

The breeding grounds are nearly all north of the fortieth parallel and all of them west of the Great Lakes. Due to the encroachments of man many of the smaller breeding places listed by A. C. Bent (Bull. 121, U. S. Nat. Mus., 1922) have been broken up and the large colonies remaining are in Canada or the northwestern United States. Only two breeding grounds are concerned in this paper, one on Yellowstone Lake, Wyoming, the other at or near Reed Lake, in the vicinity of Morse, south-central Saskatchewan, from which a single record will be given first.

On September 30, 1921, a tame pelican, then about six months old, was banded at Morse, Saskatchewan. Although allowed entire freedom it remained at the place of banding until October 22, when it was observed to fly south. Five days later (October 27) it was reported from Lindsay, South Dakota, where its tameness made its capture a simple matter. In reporting the "return" Mr. Ray Norman stated that he had added his own name and address to the band and again released the bird. It has not been heard from since. Reference to the map will show that this bird (no. 100,553) was apparently following the general course of the Missouri River, as Lindsay, although on the Cheyenne River, is but a few miles west of the larger stream. These data are admittedly of a fragmentary nature but they point to the use of a definite and well-known migrational highway for the white pelicans noted in the fall on the streams and lakes of the great plains; these birds come probably from the breeding grounds of the north-central United States and south-central Canada.

In connection with some studies on the pelican at Yellowstone Lake, made under the joint auspices of the United States Bureau of Fisheries and the National Park Service, I had an opportunity to band some of the young birds in July, 1922. I am greatly indebted both to the United States Commissioner of Fisheries and the Superintendent of Yellowstone Park as well as to many others connected with both services for assistance without which my work could not have been carried out.