

American Museum Novitates

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY
CENTRAL PARK WEST AT 79TH STREET, NEW YORK 24, N.Y.

NUMBER 1803

DECEMBER 7, 1956

Remarks on the Starlings, Family Sturnidae

BY DEAN AMADON

INTRODUCTION

An invitation to prepare the manuscript of the family Sturnidae for the "Check-list of birds of the world," begun by the late James L. Peters, presented an opportunity for further work on this family of birds which I briefly reviewed in 1943. I am indebted to Dr. Herbert Friedmann for permission to study the collections of the United States National Museum, and to Mr. James C. Greenway, Jr., for similar courtesies at the collection of Harvard University. Dr. Ernst Mayr and Dr. Charles Vaurie have been kind enough to read and criticize the manuscript.

THE FAMILY STURNIDAE

In the manuscript for the "Check-list" just referred to I recognize 27 genera and 110 species of starlings. In a later section of the present paper the genera are listed in phylogenetic order and briefly discussed. A listing of the species and subspecies is not necessary for present purposes, but many of them are mentioned in the final section of the present contribution. In those genera of starlings having an insular distribution, and particularly *Aplonis*, one finds several forms at a level of distinctness where one can decide only arbitrarily whether it is best to call them races or species. As the genus mentioned does contain some similar sympatric species, I have been somewhat conservative and have listed a few well-marked insular forms as species. Of the 110 species, perhaps 10 represent such examples of still visible allopatric speciation.

The starlings are an Old World family, primarily Ethiopian and Oriental in distribution. They have penetrated the Papuan part of the Aus-

tralian region, where one genus, *Mino*, is endemic. It is closely related to some Asiatic genera, such as *Ampeliceps*. A second genus, *Aplonis*, has become a very successful "island hopper" and extends throughout much of Polynesia, even as far eastward as the Society Islands, if the extinct *A. mavornata* was really from there. The Polynesian *A. tabuensis* occurs on many little islands in central Polynesia where, at most, one or two other land birds are present. One species of the genus has reached the northern forested fringe of Australia, but this population is not even subspecifically distinct. It is the only starling in Australia, and the open reaches of that continent were never colonized by the terrestrial, open-country members of the family. Although primarily Papuan and Polynesian, one or two species of *Aplonis* reach the East Indies, the Philippines, and even coastal Bengal.

The starlings also colonized parts of the Palearctic region, but the several species found there are mostly members of the genus *Sturnus*. One or two species of *Acridotheres* do barely get into the Palearctic, but this genus, in any case, is very similar to *Sturnus*. The penetration of the Palearctic region is most extensive in the Orient, where the boundaries between it and the Indian or Oriental region are least marked. Thus five species of *Sturnus* breed in one part or another of China, whereas only one is found in most of Europe. In addition, two or three species of *Acridotheres* reach southern China, but this is hardly the Palearctic region. The family has also showed a slight tendency to spread northward into the Palearctic from India, where *Sturnus pagodarum* and *Acridotheres tristis* reach Afghanistan and, in the case of the latter, Turkestan. *Sturnus vulgaris*, the most widespread of the Palearctic species, may also have come from this direction. The more strictly Ethiopian forms have been unable to penetrate across the Sahara and are lacking in North Africa and Europe. One or two of them reached southern Arabia and one species, *Onychognathus tristramii*, is endemic to Arabia, Israel, and Transjordan. One species of starling is present on Madagascar. It is placed with an Indian, rather than an Ethiopian, genus. There are also two extinct, monotypic genera, one of them known from but a single specimen, from the Mascarene Islands, east of Madagascar. Both genera appear to be more closely related to Indian than to African starlings, although this is not definite.

THE GENERA

The main lines of relationship indicated in my 1943 paper still seem valid, but in reworking the family I have recognized several genera then suppressed. On the other hand, one genus, *Charitornis*, previously recog-

nized, has been made a synonym. A brief review of the genera follows:

Aplonis: This genus seems to be primitive in some respects, and the rather peripheral distribution in New Guinea and Polynesia of the majority of the species may be a further indication of this. Therefore, I now place it at the beginning of the family preceding the primitive glossy starlings of Africa. This is a fairly large genus, and it has been subdivided generically in the past, though without much success. The last segregate to be named was *Rhinopsar* Danis (1938), based on the interesting new species *bruneicapilla* from Bougainville Island, Solomons. This is a rather peculiar starling, but it is very definitely related to *Aplonis mystacea* of New Guinea, and it seems best to consider *Rhinopsar* a synonym of *Aplonis*.

Poeoptera: This African genus contains three species, two of which, *kenricki* and *stuhlmanni*, have sometimes been segregated in a separate genus, *Stilbopsar*. They do not seem to differ enough from *P. lugubris* to necessitate such action. The genus *Poeoptera* is related to *Onychognathus*, though somewhat less specialized.

Grafisia: The rare West African species described as *Spreo torquatus* by Reichenow was later placed in a monotypic genus *Grafisia* by Bates. In 1943 I returned it to *Spreo*, but the bird differs from the members of that genus in a number of respects and is more arboreal. It also resembles *Stilbopsar* (= *Poeoptera*) in some respects and was once placed in that group by Chapin who, inadvertently, redescribed the species as *Stilbopsar leucothorax*. Chapin has later recognized the genus *Grafisia*, and this seems the best course to follow.

Onychognathus: The African Chestnut-winged Starlings form a natural group, yet the 10 species have been split into seven genera at one time or another. Two Abyssinian species, *albirostris* and *salvadorii*, are most different, but even they may be placed in *Onychognathus* without hesitation.

Lamprotornis: In this genus I combine both the long-tailed typical *Lamprotornis* and the shorter-tailed starlings often placed in *Lamprocolius*. It seems unnecessary to separate these two species groups generically, especially as the wedge-tailed *acuticaudus* is intermediate. Admittedly, however, the contrast between some of the extreme species, such as *caudatus* and *cupreocauda*, is rather great.

Coccycolius: The rare and beautiful West African *Coccycolius iris* is usually left in this monotypic genus, although I once placed it in *Lamprotornis*. Its color pattern is unique for the family, and the purple markings suggest those of the Violet-backed Starling, *Cinnyricinclus leucogaster*, to which it may be related. It seems advisable to retain *Coccycolius*.

Cinnyricinclus: This genus contains three species, two of which, *sharpii* and *femoralis*, do not appear particularly close to the genotype, *leucogaster*. The relationship of the three does seem to be a genuine one, however, and I follow Chapin and others in uniting all three in *Cinnyricinclus*, though generic names have been applied to both of the other two.

Speculipastor: Reichenow named this monotypic genus but later placed the single included species in *Spreo*. I followed him in 1943, but actually the African Magpie-Starling, as it has been called, does not fit very well into that genus. Its bill is peculiar, and in color it is more like *Grafisia torquata*, though not in proportions. Probably it is best left in a separate genus, *Speculipastor*, as originally described. This permits the use of the first specific name applied to the bird, *bicolor*. In *Spreo* the type of the genus is *Turdus bicolor* Vieillot, an older name.

Neocichla: The peculiar species *N. gutturalis* has more often been placed in the Turdidae or Timaliidae than in the Sturnidae. Chapin (1946), however, whose opinion must be respected, thinks it is a starling, related to *Spreo*. Admittedly there is something sturnine about the appearance of the bird's head, but its wings are very short and rounded! Probably familiarity with its nidification will permit a more decisive opinion about it.

Spreo: This group, after the removal of *Grafisia*, *Speculipastor*, and *Cosmopsarus*, appears monophyletic, although it still encompasses considerable variability.

Cosmopsarus: As just indicated, I now feel that this genus fits only with considerable difficulty into *Spreo* and is best kept separate. True, the coloration of *C. magnificus* is quite similar to that of some spreos, but aside from its much longer tail it is an altogether more slender bird, as is also *C. unicolor*.

Saroglossa: This genus, as I delimit it, contains two species—*spiloptera* of India and *auratus* of Madagascar. Admittedly they differ in a number of respects, but the similarities seem to me real and the geographic inferences interesting enough to warrant including them in a single genus. The Madagascar species has usually been placed in a monotypic genus, *Hartlaubius*.

Creatophora, *Necropsar*, AND *Fregilupus*: The African Wattled Starling, *Creatophora carunculata*, a locust follower, seems to be related not so much to the other African starlings as to *Sturnus* itself. Still, it may be a development of some *Spreo*-like ancestor.

The two extinct species *Necropsar leguati* and *Fregilupus varius* of the little islands east of Madagascar also suggest in coloration some of the Asiatic forms, notably some East Indian species of *Sturnus*, rather than

the African glossy starlings. Isolated as they are near Madagascar and resembling in color some of the Vangidae such as *Falcullea*,¹ the question naturally suggests itself as to whether these birds were not vangids rather than sturnids. Examination of a specimen of *Fregilupus* preserved in the flesh in New York and of a skin in Leiden and another at Harvard supports the idea that they are members of the Sturnidae as always believed to be. Most important, the outer primary is small, as in starlings.

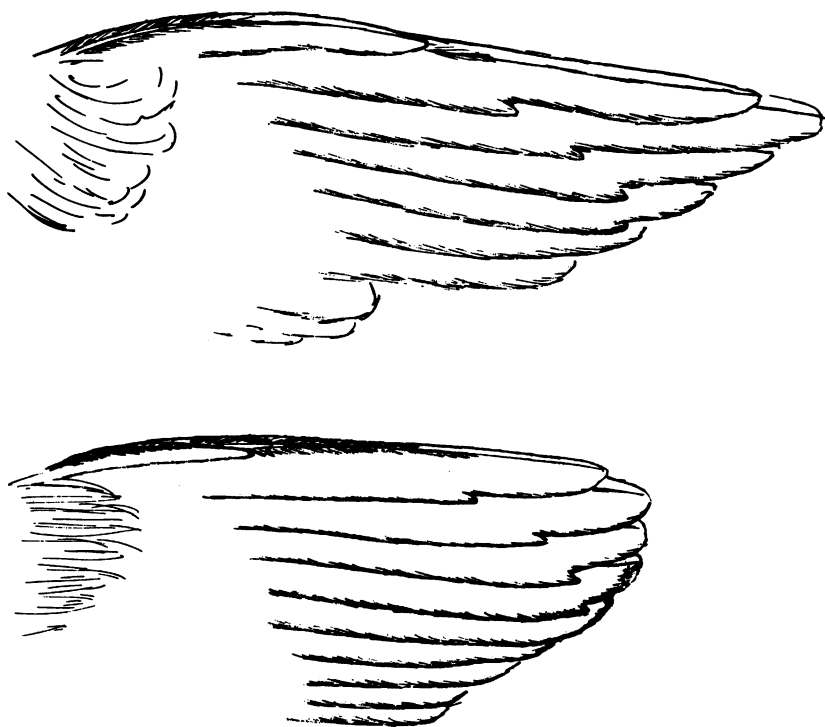


FIG. 1. Wing of *Lamprolornis ornatus* (upper) and *Leucopsar rothschildi* (lower), to show indentations on the inner vanes of the longer primaries.

Sturnus: After reviewing the problem again, I still feel that *Pastor*, *Sturnopastor*, *Sturnia*, and *Gracupica*, among others, should be considered synonyms of *Sturnus*. The genus as thus enlarged contains about 15 species, which it is difficult, if not impossible, to subdivide into natural groups of more than two or three species each.

¹ William L. Sclater (1924-1930, p. 671) placed *Falcullea*, the member of the Vangidae that most resembles *Fregilupus*, in the Sturnidae, but with reservations. I believe *Falcullea* to be a vangid.

Leucopsar: This monotypic genus, the single species of which is endemic to the island of Bali, is closely allied to some of the East Indian species of *Sturnus*, as well as to *Acridotheres*. It does not quite fit into either genus, however, and has at least one unique character, the peculiar indentations on the inner webs of the primaries. This character is found elsewhere in the family only in two species of the African genus *Lamprolornis* (fig. 1). The two genera are certainly not very closely related, even though they do share this specialization which may be connected with some type of courtship performance involving a noisy flight.

Acridotheres: This genus is very similar to *Sturnus*, and a number of recent ornithologists have placed it there. In general, however, the forms of *Acridotheres* are larger than those of *Sturnus*, more robust, and perhaps broader winged. Most of them have a type of frontal crest lacking in any species of *Sturnus*. The courtship habits are also said to be different. It seems convenient to keep *Acridotheres* separate from *Sturnus*. If the two are united, *Leucopsar* must also be included in the enlarged genus, and the name *mahrattensis* must be used for the species now called *Acridotheres fuscus*.

Ampeliceps: I once placed *Ampeliceps coronatus* of Siam in the Papuan genus *Mino*, though with some misgivings. After reconsideration, it seems more than likely that the two are not really related in any special sense and that it is best to keep *coronatus* in a separate genus, *Ampeliceps*. It may, as a matter of fact, be more closely related to *Acridotheres* than to *Mino*. The following genus provides a natural geographic link between *Ampeliceps* and *Mino*.

Basilornis: This group has four geographically representative species on Celebes, Sula, Ceram, and Mindanao. They all differ in the nature of the crest and in the relative length of the tail, and the first three are a superspecies, to which the more distinct *mirandus* of Mindanao may also belong (fig. 2).

Streptocitta: The Celebes species *torquatus* is a long-tailed relative of *Basilornis celebensis*. It has a representative on Sula which has commonly been placed in a monotypic genus, *Charitornis*, because of the larger bald areas on the head. I now regard this as a specific character only (fig. 3).

Sarcops: This monotypic Philippine genus is evidently related to *Basilornis* and *Streptocitta* but is now very distinct (fig. 2).

Mino: This Papuan genus contains two species, *dumontii* and *anais*, the latter sometimes placed in a monotypic genus. The burnt orange color of some parts of the plumage shows relationship to *Basilornis*.

Gracula: The talking mynahs may be specialized offshoots of some such genus as *Ampeliceps* or *Acridotheres*; see the white wing patches. It

seems best, however, to place them at the termination of this main group of starlings because of their obviously specialized and advanced status.

Scissirostrum AND *Enodes*: These two Celebes species are certainly generically different from each other although related. They are so distinct from other starlings as sometimes have been placed in a separate subfamily, or even removed from the Sturnidae, to which, however, they seem to belong.

Buphagus: The African tick birds are very distinct and are best placed in a separate subfamily. One can say only that they are probably of com-

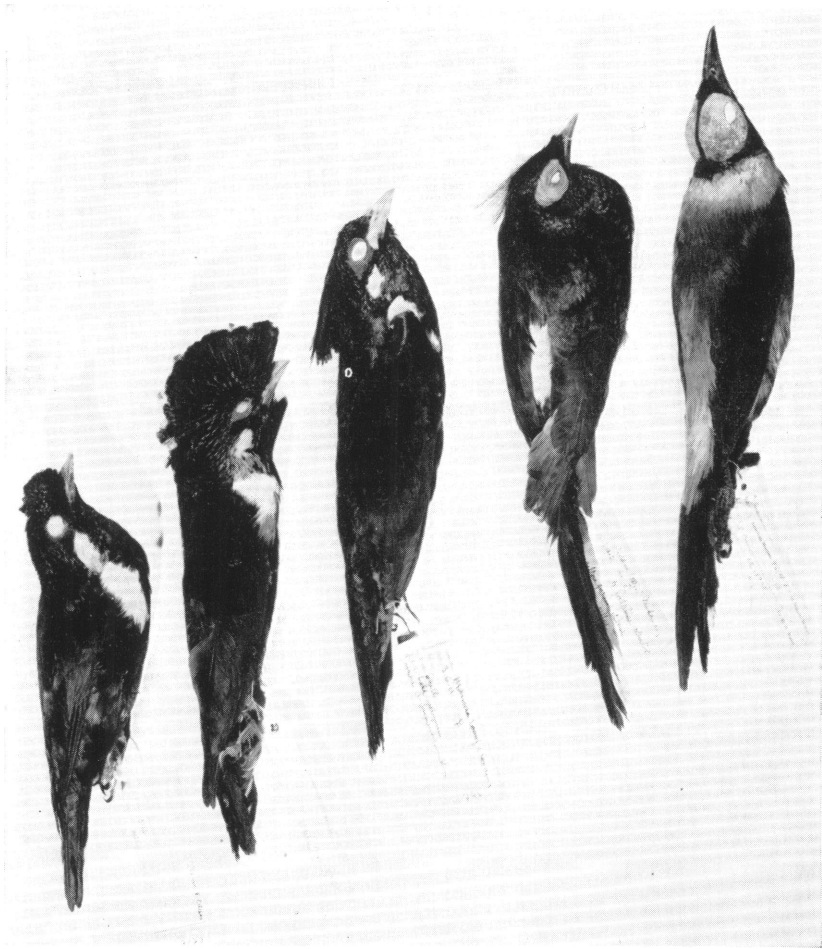


FIG. 2. From left to right: *Basilornis celebensis*, *B. galeatus*, *B. corythaix*, *B. mirandus*, and *Sarcops calvus*.

mon ancestry with other starlings. There is a certain degree of resemblance to *Scissirostrum* of Celebes, but this is presumably secondary. In *Scissirostrum* the strong beak is used to dig nesting holes, woodpecker fashion, in dead wood, while in *Buphagus* the bill is used to shear ticks from ungulates. The Bank Mynah, *Acridotheres ginginianus*, and a few other starlings dig nesting burrows, though in earthen banks rather than in trees. These species lack the specialized bill of *Scissirostrum*.

DOUBTFUL GENERA

Pityriasis: The Bornean Bristle-bird, a most peculiar creature, has usually been placed in the Laniidae or Prionopidae. Mayr (1943) suggested that it may be a starling. I am inclined to think, however, that its resemblance to some of the larger mynahs is purely superficial, and would prefer to leave it as a subfamily of the Prionopidae.

Hypocolius: This curious bird of the Middle East was placed by W. L. Sclater (1924-1930, p. 670) in the Sturnidae, but with reservations. It has also been placed in the Prionopidae, the Laniidae, and the Bombycillidae at one time or another. Delacour and I (1949) argued that it is a bombycillid. While I do not feel so sure of this now as at that time, it seems quite certain that *Hypocolius* is not a starling.

Zavattariornis: In 1943 (p. 14) I gave reasons for believing this interesting Ethiopian form to be a member of the Corvidae, as first described, rather than the Sturnidae. Examination of a specimen anatomically by Ripley (1955) supports this allocation.

Callaeas, *Philesturnus*, AND *Heteralocha*: The New Zealand wattlebirds form a natural little family (Callaeidae), probably closer to such groups as the Corcoracidae, Paradisaeidae, and Ptilinorhynchidae than to the Sturnidae.

Picathartes: This is another very peculiar genus. Delacour and I (1951) have argued against Lowe's claim that it is a sturnid. Usually assigned to the Corvidae, with little or no justification, it may be a very aberrant babbler or babbler-like bird and can be treated as a subfamily of the Timaliidae. Others will prefer to give it full family status.

RELATIONSHIPS OF THE FAMILY

As already implied, starlings are a rather diverse group ecologically. Many of them flourish in tropical jungles, while others, both in Africa and Asia, are birds of open country or scattered woodland which, like *Sturnus vulgaris*, do much, if not the principal part, of their foraging on the ground. At one time the jungle starlings were placed in a separate family called the glossy starlings, family Eulabetidae or, as it would now be

called, Graculidae. These glossy starlings differed by their glossy plumage, their thick, fleshy tongues adapted for fruit eating, and by the fact that their eggs are spotted. As I attempted to show in my earlier paper, and as has been evident for some time, there is no need whatsoever for such a separation, nor are the two groups clearly distinct. The genus *Gracula* itself is connected very nicely with *Sturnus* by such intermediates as *Mino*, *Ampeliceps*, and *Acridotheres*. The African starlings also include dully colored terrestrial or semi-terrestrial forms, such as the Wattle Starling, *Creatophora*, and some of the species of *Spreo*.

The family Sturnidae is a natural homogeneous group, in which a subdivision into two large groups is purely misleading, though, as is so often the case among the song birds, there are a few peripheral genera the allocation of which is more or less dubious.

In general, starlings may be described as Old World song birds of medium, or tending towards large, average size, often brightly colored and of rather robust proportions and even "coarse" appearance, often with a stout bill and strong, well-scutellated tarsi. Among other families of oscines of similar distribution and more or less similar morphological attributes, one thinks of the Oriolidae, the Vangidae, and the Dicruridae. The Prionopidae, including the curious *Pityriasis* of Borneo, as well as the Australian Cracticidae which, in turn, may be allied to such Australo-Papuan groups as the Paradisaeidae, are somewhat similar but less closely related. Their distribution is also different. In the New World some of the Icteridae, such as the Meadowlark, *Sturnella* ("little starling"), have a definite resemblance to sturnids, but this has long been recognized as superficial. The position of the family Corvidae is also in doubt, as it may be a group of northern rather than tropical origin.

Related as they seem to be on the one side to certain other medium-sized tropical Old World song birds, such as the Oriolidae, the question is whether the Sturnidae, as has often been suggested, also are related to the weaver birds or Ploceidae. If one compares such a starling as the common Indian House Mynah, *Acridotheres tristis*, with a more or less primitive weaver bird such as the House Sparrow, *Passer domesticus*, certain resemblances, though of doubtful importance, are evident. Both are aggressive, quarrelsome birds with omnivorous feeding habits. Both build untidy nests in crannies of trees and buildings, and, lacking these, both build crude, domed nests in trees. In the genus *Aplonis*, many of the species, like the generality of starlings, nest in crannies or holes, but one species, *A. metallicus*, of New Guinea, lives in colonies and builds domed, semi-pensile nests. Its nesting behavior is thus not dissimilar to that of some of the colonial species of Ploceidae. *Acridotheres ginginianus*, the Bank

Mynah of India, nests in colonies in holes in a river bank which it digs itself. The curious *Scissirostrum* of Celebes is also colonial. Delacour (1943) has suggested that this genus may have a particular relationship to the Ploceidae, but I am inclined to doubt this.

If the two families are truly similar, one might expect that the Ploceidae evolved from sturnid-like ancestors in Africa. The Ethiopian buffalo-weavers, subfamily Bubalornithinae, approach starlings, at least in size, more closely than any of the other weaver birds. Thence one would go to the sparrows of the subfamily Passerinae and finally to the more typical and specialized weaver birds of the subfamily Ploceinae.¹ One might conclude that, although the special relationship of the Sturnidae to the Ploceidae remains to be proved, they at any rate do demonstrate how more specialized and smaller song birds such as the weaver finches may have evolved from medium-sized, starling-like ancestors.

REMARKS ON EVOLUTION

The starlings of Africa are, on the whole, relatively unspecialized as compared with those of Asia and particularly those of the East Indies. Adherents of "Mathew's hypothesis" might conclude that the family originated in the Indian region and that the more primitive forms have retreated to Africa, Papua (*Aplonis*), and other peripheral areas, where they still persist. This may be correct, but a few specialized forms do occur in Africa: the Wattled Starling, *Creatophora*, and the tick-birds, *Buphagus*, the latter so distinct they are placed in a separate subfamily. And if the Ploceidae evolved from sturnid antecedents in Africa, as is possible, the latter must have been there a very long time.

In the East Indies and Philippines the conditions for evolution of well-marked specialized types of starlings (as of other groups) are certainly very favorable: insular isolation in tropical forests. This may be the reason for the presence of many well-marked genera in that area, rather than greater length of residence. There are only a few unspecialized starlings in the Orient, such as *Saroglossa* and *Aplonis*. The species of *Sturnus*, well represented in both the Indian and the Palearctic regions, though relatively unspecialized, are dominant and abundant. One suspects that their lack of ornaments and frills indicates not any "primitiveness" but rather a "streamlining" for life in more open and often in colder regions. On the other hand, to conclude that the tropical genera are, as a group, overspecialized is certainly unwarranted. *Gracula religiosa*, a

¹ Recent opinion places the estrildine weavers in a separate family, allied to the cardueline finches.

tropical species, is a very alert, adaptable bird. It learns to talk, for example, much better, on the average, than does the Common Starling, *Sturnus vulgaris*. Perhaps in this case the rule that among related animals those of larger size have a larger (better) brain is in operation.

Wattles, crests, and bare areas of skin on the head are rather frequent among starlings, though as often absent as present. They probably are used in courtship, though few definite observations exist, so far as I know. In *Creatophora* the male in the breeding season acquires long wattles; simultaneously the head becomes denuded of feathers.

Interesting variation as regards development of crests or bare areas of skin is visible in the genus *Basilornis* and the (probably) derived *Sarcops* (fig. 2). *Basilornis celebensis* of Celebes has a short medial crest. A dab of burnt orange on the sides of the lower neck suggests the less specialized *Mino anais* of New Guinea. *Basilornis galeatus* of the Sula Islands is very similar, with yellow-orange feathers on the sides of the breast as well as the throat. It is closely related to *celebensis* but has a splendid long medial crest of specialized feathers running the length of the crown.

The third species of the genus, *B. corythaix* of Ceram (the only island of the Moluccas where the genus occurs), has lost all the orange color, as have the forms to follow. Its crest is still long but is restricted chiefly to the occiput; the feathers forming it are somewhat decomposed. The fourth and final species of the genus, *B. mirandus* of the mountains of Mindanao, is the most aberrant. The crest is a wisp of long, much dissected feathers—perhaps a stage in the process of losing it. The first three species mentioned above have small areas of bare black skin around the eyes, which are somewhat larger in *corythaix*. In *mirandus* these areas are still larger and bright yellow in color. The rump and lower back, black in the other three, are white in this species, and its tail is much longer. *Basilornis corythaix* of Ceram is intermediate in tail length.

The final member of this group is *Sarcops calvus*, a species distinct enough to be given generic separation. It is a common bird throughout the Philippine Islands, though perhaps altitudinally separated from *Basilornis mirandus* on Mindanao. In *calvus* the bare areas on the sides of the head are enormous and quite cover the head except the throat and a narrow coronal stripe of short black feathers. The bare skin is yellowish, perhaps not so bright as in *mirandus*, and the tail is not so long as in that bird. The rump of *calvus*, though not pure white as in *mirandus*, is grayish white. Its plumage is, even where black, much duller, less glossy, than in any of the species of *Basilornis*. It thus seems that *Basilornis mirandus* and *Sarcops calvus* have a special relationship to each other. Perhaps they represent a double colonization of the Philippines by some form of

Basilornis since modified or extinct, or differentiation may have occurred within the Philippines, with *Sarcops* eventually becoming much the more widespread and "successful" of the two Philippine species.

The data just presented are of interest from the standpoint of the genus concept. We have a species, *calvus*, distinct enough to justify separation in a monotypic genus *Sarcops*, and yet, both in external appearance and in distribution, more closely allied to *Basilornis mirandus* of Mindanao than to any of the other three species of *Basilornis*. Generic recognition here as elsewhere should be based on degree of difference, not on closeness of relationship to other living species *per se*. In rapidly evolving or plastic groups a species that is very distinct in many ways may be allied quite closely by more conservative characters to other species. If the distinctions are of sufficient magnitude, generic separation should be accorded such forms.

At a somewhat higher level de Beer (1954) has emphasized this phenomenon under the term "mosaic evolution": some features change rapidly, others more slowly, to produce, in such a form as *Archaeopteryx*, an animal with some parts reptilian, some avian. If the advanced features are striking enough, recognition, as in *Archaeopteryx*, even of a new class may be desirable, while other groups that have changed less radically, though possibly over a much longer time and in a greater number of characters, will not warrant separation at such a high taxonomic level.

Two other species, related to *Basilornis* and *Sarcops*, show corresponding but less extensive variation. The species *torquatus* of Celebes is clearly allied to *Basilornis celebensis* of the same island, but is larger, longer tailed, and has a somewhat different color pattern. The feathers of the forehead appear as though brushed towards the center, a weak suggestion of the medial crest of *B. celebensis*. Bare areas of black skin, about a centimeter in width, surround the eyes. All but the most radical taxonomist would agree that *torquatus* is best kept in a separate genus, and it is, of course, placed in *Streptocitta*. On the Sula Islands occurs a species, *albertinae*, in which the bare skin covers the entire sides of the face and extends across the throat. Scarcely a suggestion of a crest remains, and the plumage is more extensively white than in *torquatus*. It is a moot question as to whether Schlegel was justified in placing *albertinae* in a separate genus, *Charitornis*. In those days the separation was made quite automatically between species differing in the feathering of the head to the extent shown by *torquatus* and *albertinae*. Personally, I now feel that the two can be kept in the same genus because of their similarities in size and proportions; they were probably once subspecies (fig. 3).

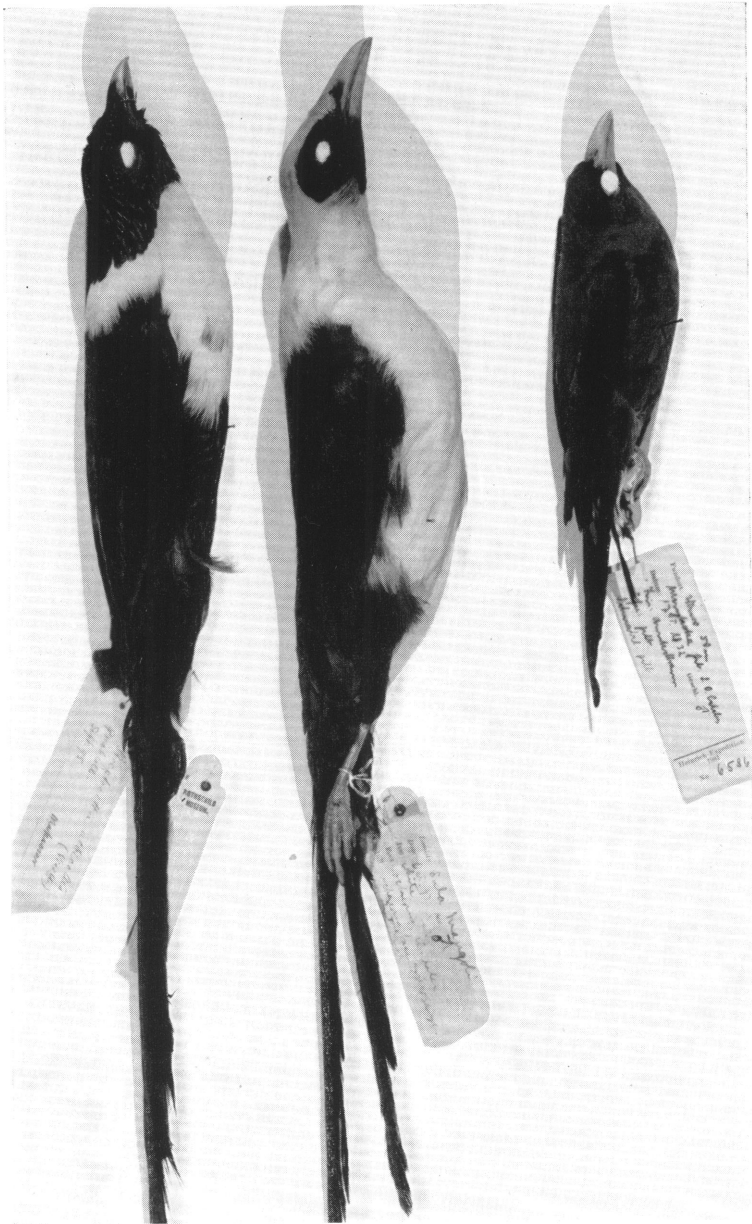


FIG. 3. From left to right: *Streptocitta albigollis*, *S. albertinae*, and *Scissirostrum dubium*.

It is possible that the differences as regards development of a crest and of unfeathered areas on the head in the sympatric forms of *Streptocitta* and *Basilornis* on Celebes and in the Sula Islands, and of *Basilornis* and *Sarcops* on Mindanao are the result of species recognition interactions. Actually, the differences between the allopatric forms mentioned are so great as to make this doubtful, and the variation may be the result of intraspecific selection. *Basilornis celebensis* is the most primitive of the one group. The crest has become much larger in the Sula form *galeatus*, while in *corythaix* and *mirandus* it is less pronounced and gives the appearance that it may be no longer selected for, and hence is "degenerating." On the other hand, the bare areas on the head are progressively larger in the sequence listed. Finally, in *Sarcops* the bare areas almost cover the head, the crest has been entirely lost, and the plumage is duller. This species, thus, in many respects shows a trend towards despecialization.

SPECIES DYNAMICS

The genus *Aplonis*, containing about 15 species and inhabiting both large islands and small atolls, would make an excellent subject for a study of species dynamics. Some interesting conclusions are possible even without research in the field. Few members of the genus are found outside the Papuan and Polynesian areas, although *A. panayensis* is a common enough bird in the Greater Sunda Islands and the Philippines. The essentially insular nature of the genus is evident even here, for *panayensis* has colonized many off-lying smaller islands. There are half a dozen races, for example, on the West Sumatran Islands. Though it reaches Bengal, *panayensis* seems rather rare, or at least local, on the mainland of Asia; on the other hand, I have examined a large series from Talibon Island off the coast of Trang, Siam, which suggests that it is commoner on such islands than on the mainland. This, of course, is characteristic of insular forms, which often have not much success in colonizing the more heavily competitive continents.

It is well known that islands often serve as refuges for vanishing forms, but this would hardly be expected to be true of large islands, recently attached to the mainland and with an essentially continental fauna, such as Sumatra, Borneo, and to a lesser extent the Philippines. Even then, however, interactions between species may be so severe as to favor, by slightly reduced competition, the forms on these and other large continental islands. In the Philippines, for example, one finds the eagle *Pithecophaga*, and on New Guinea the related *Harpiopsis*, with nothing at all like them today on the mainland of Asia, though they may be related to *Harpia* and

Morphnus of South America. [The latter continent, of course, is a still better example of how big an "island" may be and still retain value as an asylum for many primitive forms, even after (limited) contact with larger areas, in this case Holarctica, is established.]

But it is on small islands that one can most readily observe the crucial importance of interspecies competition, whether between closely related species or species belonging to different groups. In such surroundings limited ecological variety, initial absence of competitors, and genetic reduction of variability because of small population size, all combine to make such islands evolutionary traps, as Mayr once expressed it. Such species are in a very precarious position once competitors arrive. It is for this reason that one may find within a single genus, such as *Aplonis*, widespread and common species, e.g., *A. tabuensis*, while others, e.g., *A. feadensis*, apparently maintain a toehold only by living on the smallest atolls and thus avoiding congeneric competitors (in this case probably *A. cantoroides*). *Aplonis santovestis* of Espiritu Santo Island in the New Hebrides and *A. corvina* of Kusaie Island, Carolines, became restricted to the mountains after the arrival of more aggressive invaders of the same genus, viz., *A. zelandicus* in the New Hebrides and *A. opaca* in the Carolines. Even so, the earlier species were not very successful, surviving, so far as is known, on but one island in each of the island groups in question. Their restricted habitat is attested to by the fact that each has been secured only by one collector. The two specimens of *corvina* secured by Kittlitz were the only ones ever known of this now apparently extinct species.¹

Other starlings the extinction of which demonstrates that, even in this on the whole advanced and aggressive family of song birds, restriction to a small island may lead to fatal lack of adaptability are *Aplonis mavornata*, supposedly from Raiatea Island, Society Group; *Fregilupus varius* of Reunion, extinct since 1832 or thereabouts; and *Necropsar leguati* of the islet of Met, and probably near-by Rodriguez Island.

PARALLEL EVOLUTION

Many examples of parallelism are to be found in the Sturnidae. One very specific and surprising example, already mentioned, is the curious indentation on the inner vanes of the longer primaries of *Leucopsar rothschildi* of Bali Island in the East Indies and of two West African

¹ Coultas searched for it in vain in 1931. One of the two specimens of *corvina*, that in the Senckenberg Museum at Frankfurt, the type of Hartert's genus *Kittlitzia*, was lost during the Second World War (Steinbacher, 1954, p. 302). The other specimen is supposedly in Leningrad.

sibling species, *Lamprotornis splendens* and *L. ornatus* (fig. 1). *Leucop-sar* and *Lamprotornis* are by no means closely related genera and would, as a matter of fact, once have been placed in two different families, Sturnidae and Eulabetidae (Graculidae).

The reason for this curious parallelism is unknown. Quite possibly these species have a noisy display flight of some sort which is accentuated by these devices. Their actual evolution might presumably be facilitated by the retention of more or less homologous genes even in these long-separated genera—genes apt to mutate in parallel fashion. One is reminded of the parallel existence of hooklets on the outer primaries in the American Rough-winged Swallow, *Stelgidopteryx*, and in the otherwise quite different African swallows of the genus *Psalidoprocne*. In this instance, the hooklets, which are on the outer margins of the wings, are thought to facilitate mating.

ADAPTIVE MODIFICATIONS OF THE BILL

In birds, as in most animals, adaptive radiation, at least at the level of the genus and above, seems most often governed by changing methods of securing food. The bill is most directly concerned with food-getting and, of course, shows a great many adaptations for that purpose. But the bill is used also for other things, particularly nest-building, and it is remarkable that the contours of this appendage seem so much governed by feeding habits and so little by the other uses to which it is put. Among the weaver birds (Ploceidae), as an example, the bill is often very stout and grosbeak-like, for cracking seeds, yet the birds somehow manage to construct finely woven pensile nests with this seemingly poor instrument. *Amblyospiza albifrons* is such a weaver bird.

In some birds, to be sure, such as the woodpeckers (Picidae), the bill is so adapted as to be used both in securing food and in making a nest, or, in this instance, nest burrow. Even here the feeding adaptation is probably the primary one. In a few other birds such as the toucans (Ramphastidae) or the puffins (Alcidae: *Fratercula*, *Lunda*), the bill is ornamented and shaped in a way unrelated to feeding and presumably has something to do with courtship or species recognition.

Actual modification of the bill for nest-building seems rare, but, from what is known of its habits, has occurred in the curious Celebesian starling *Scissirostrum dubium* (fig. 3). The heavy, almost woodpecker-like bill of this bird is, according to Heinrich (*in* Stresemann, 1940, pp. 30–31), used in digging nesting burrows in hard, dead wood. He thought this starling might feed in the manner of a woodpecker but found no indication of this. Instead it feeds on fruits.

SYSTEMATIC NOTES ON RACES AND SPECIES
GENUS *APLONIS*

Aplonis opaca

The Japanese, especially Momiyama, named a number of extremely slight variants in this species. The nominate race is restricted to Kusiae; and the race *ponapensis*, to Ponape. All the birds from the other islands in the Carolines and from the Marianas and Palau belong, in my opinion, to a single race, *kurodai* Momiyama. Synonyms of this last are *anga*, *guami*, and *harterti* of Momiyama, and *orii* and *aeneas*, both described jointly by Taka-Tsukasa and Yamashima.

Baker (1948, p. 71) thought that immatures of this starling from Ulithi Atoll have the venter more dully colored than those of Truk Atoll and the Marianas. Dr. Friedmann has been kind enough to have 11 immatures from Ulithi sent to me for comparison. I see no good evidence for geographical variation in the immature plumage of the two groups mentioned. Whenever, as on Ulithi, a series of immatures were taken within a period of a day or two, they have a certain similarity in color that may tend to set them apart from a series more heterogeneous as to age. To this I ascribe the variation noted by Baker.

Aplonis panayensis

This variable species inhabits a large area, including innumerable islands. Many subspecies have evolved, but more forms have been named than are worth recognizing. Ripley (1944, pp. 405-406) has revised the races of the West Sumatran Islands, and I have followed him for the most part. I am indebted to Dr. Herbert Friedmann for permission to examine material in the United States National Museum, including several forms named by H. C. Oberholser from the W. L. Abbott collections. The relationship of *Aplonis panayensis* to *A. minor* poses another difficult question; this is discussed under the latter species.

The valid races of *panayensis* seem to be the following (type localities are given in parentheses):

1. *Aplonis p. affinis* Blyth (Bengal). This race, which ranges locally from eastern Bengal to the base of the Malay Peninsula, differs from the following only in larger size. The few specimens I have seen were not appreciably larger than *strigata*, but they included none from Bengal.

2. *Aplonis p. strigata* Horsfield (Java). Synonym: *halictypa* Oberholser (Talibon Island, Trang, Siam). The race *strigata* is found throughout the Malay Peninsula, Sumatra, Java, and western Borneo, and also on many small offshore islands.

3. *Aplonis p. eustathis* Oberholser (Kota Bangoen, eastern Borneo). Similar to *strigata* but smaller and possibly, according to Deignan (1954), with slight color differences. Deignan regards *eustathis* as a form of *A. minor*, but it is so exceedingly similar to *strigata*, except for smaller size, that I am inclined to regard it as a subspecies of *panayensis* (see discussion below under *A. minor*).

4. *Aplonis p. heterochlora* Oberholser (Mobur, Anamba Islands). Synonym: *richmondi* Oberholser (Taya Island, Berhala Strait, eastern Sumatra). The range is Anamba Islands, Natuna Islands, and Taya Island. It is like *strigata* but larger and bigger billed, the latter characteristic distinguishing it from *affinis*. *Aplonis p. heterochlora* is much like *pachistorhina*, but not quite so coarse billed; perhaps the color tone of the two is slightly different also.

5. *Aplonis p. tytleri* Hume (Andaman Islands). This race of the Andaman and Nicobar Islands is of large size, though the bill is not large. It has a duller gloss than the preceding races.

6. *Aplonis p. altirostris* Salvadori (Nias Island). Synonyms: *rhadinorhampha* Oberholser (Simalur) and *nesodrama* Oberholser (Pulo Babi). Native to the West Sumatran Islands of Simalur, Nias, and Babi, this race has a rather distinctive arched but not especially long bill. Riley (1929, p. 33) first pointed out that *rhadinorhampha* and *nesodrama* are synonyms of *altirostris*.

7. *Aplonis p. leptorrhyncha* Stresemann (Pini). Restricted to Pini Island, Batu Group, western Sumatra. Ripley, following de Schauensee (1940, p. 41), considered *leptorrhyncha* a synonym of *pachistorhina*. Examination of Stresemann's series, a half dozen birds now in the Rothschild collection, shows at once that *leptorrhyncha* is an excellent subspecies, characterized by a very slender bill of distinctive shape and by plumage glossed with blue and not, as in the two other adjacent races, with green. The feathers on the throat and nape are noticeably more lanceolate than in *pachistorhina*.

Mr. de Schauensee kindly sent for examination a specimen in the Philadelphia collection taken on Pini, which he had assigned (*loc. cit.*), quite correctly it would appear, to *pachistorhina*. It is in immature plumage, but the incipient gloss on the back is greenish and the neck feathers are not so lanceolate as one would have expected in the young of *leptorrhyncha*. More important, the bill is heavy and agrees with that of *pachistorhina*. In view of the uniformity of the original series of *leptorrhyncha*, it does not seem at all likely that this specimen is an individual variant of that race. Nor are there apt to be two species on this small island. Until further information is available, it seems best to regard the specimen as a

straggler of *pachistorhina*. Although it was secured from a dealer, the skin is fully labeled, and Mr. de Schauensee considers it unlikely that there has been a mistake in locality.

8. *Aplonis p. pachistorhina* Oberholser (South Pagi Island). This race is found in the Batu Group, except on Pini; and on Siberut, Sepora, and South Pagi of the Mentawi Group, all in the West Sumatran Islands. It is a little larger than *altirostris* and has a longer, coarser bill.

9. *Aplonis p. enganensis* Salvadori (Engano Island). This form, restricted to the type locality, has, as Ripley has pointed out, a distinctive immature plumage. The adults also differ from those of other subspecies in a number of ways.

10. *Aplonis p. gusti* Stresemann (Bali). The Bali race is of small size, and the dorsal gloss is much bluer than in the adjacent *strigata* of Java.

11. *Aplonis p. alipodis* Oberholser (Pulo Pandigang, Maratua Islands). Synonym: *suggrandis* Bangs and Peters (Maratua Island). The race of the Maratua Islands is larger than *strigata*. In size it is like *panayensis*, but it lacks the oily, purplish gloss of that form. Instead, it is rather bluish dorsally, except for one specimen of the half dozen examined (United States National Museum), which was indistinguishable in color from *strigata*.

12. *Aplonis p. panayensis* Scopoli (Philippines). Synonym: *neglecta* Walden (Celebes). Larger than *strigata*, the race *panayensis* also differs in the oily sheen of the plumage, which has a slight purplish wash on the breast and back. The race is found throughout the Philippines, including Mindanao. Celebes birds are ever so slightly less purplish, but *neglecta* is not worth recognizing, as Meyer and Wiglesworth (1898, p. 555) long ago concluded.

13. *Aplonis p. sanghirensis* Salvadori (Sanghir). The Sanghir Island birds comprise a very distinct race, of large size. The feathers of the forehead, only slightly prolonged in other forms of the species, are extended into a crest. This, plus the fact that the range of the form lies between the Philippine and Celebes populations of *A. p. panayensis*, might lead one to give specific status to *sanghirensis*, but Meyer and Wiglesworth (1898, p. 560) state that intergradation occurs on the islands between Sanghir and the northern peninsula of Celebes. The race reflects the tendency, so usual in this species as in many others, for the birds of small islands to be of larger size.

Aplonis minor

As Stresemann pointed out (1940, p. 22), the characters of the Celebes race *montosa* Riley are best shown in specimens from the central part of

that island. Towards the south, intergradation with the nominate race becomes evident. As a matter of fact, Stresemann has labeled some of Heinrich's specimens from southern Celebes as the nominate form, but in the published report cited above, he listed them all as *montosa* and also referred specimens from Buton Island south of Celebes to that race. Van Bemmelen and Voous (1951, p. 36) objected to this and stated that all specimens examined by them from Buton and also from Muna belong to *A. m. minor*. Riley, when he described *montosa* (1921, p. 57), had as his only material of *minor* "three females from Penkek and Tobea Islands, Buton Strait." These islets are north of Buton and directly off the coast of Celebes. I have examined two of these three specimens, collected by Roy Chapman Andrews, and agree that they are best referred to *minor*. As there is a gradual transition from *montosa* to *minor*, it seems best to call all birds from Celebes *montosa* and all those from the islands to the south *minor*. Van Bemmelen and Voous suggest that the uncertain allocation of birds from Muna, Buton, and other near-by islands may reflect a mixture of migrants of nominate *minor* from the islands to the south. While this is possible, it could equally well reflect individual and clinal variation in resident birds. The same authors believe that this species may be a migrant only on Bali and Java.

Now to consider the form *Calornis kuehni* Hartert (1904, p. 220), described from the South-west Islands. I have compared the original series and the type, in all more than a dozen specimens, with ample material from the Lesser Sundas, including a topotypical series of *minor* from Timor. Although there is a barely perceptible tendency for the birds of the South-west Islands to have a little more purple, less green, on the crown, it certainly provides no basis for racial separation. Most specimens, including adult males, appear identical with *minor*.

A third form of *Aplonis minor* is *todayensis* Mearns from 4000 feet on Mindanao in the southeastern Philippines. Mayr (*in* Delacour and Mayr, 1945) first demonstrated that this bird is a form of *minor*, not to be confused with the large *A. p. panayensis*, which also is found on that island. In color *todayensis* is more like *panayensis* than are the two races mentioned above: *minor* and *montosa*.

In Borneo the situation becomes more difficult. A form described from eastern Borneo some years ago by Oberholser has, under the name *A. panayensis eustathis*, recently been considered by Deignan (1954) to be a representative of *minor*. It is smaller than *A. panayensis strigata*, which occurs in other parts of Borneo, but exceedingly similar to it in color. I was able to examine the series of *eustathis* in Washington and also a series of *strigata* from Sarawak, but unfortunately Mr. Deignan was not

present at the time of my visit. In the paper cited he makes all the forms of *minor* races of *panayensis*. At the same time he regards them as more primitive and less successful relicts of an earlier wave of colonization which have been driven into peripheral areas by the larger *panayensis*.

In Celebes *A. m. minor* is found in the south; *A. p. panayensis*, in the north. They may be related closely enough to repel each other ecologically, but there is no evidence of intergradation. The differences between the two in Celebes are quite pronounced both in size and color.

On Mindanao the difference in color is less but that in size between *A. p. panayensis* and *A. minor todayensis* is as great as that separating the two species on Celebes. Of course, *todayensis* may be an altitudinal race of *panayensis*, but it was found at only 4000 feet; *panayensis* probably goes that high. Furthermore, it is not usual for subspecies of higher altitudes to be smaller than those of lower ones.

In Borneo again, as in Celebes, the separation is geographical rather than altitudinal; *eustathis* in the east, *strigata* in the west. Deignan described slight color differences which in his opinion link *eustathis* with *minor* and separate it from *strigata*. I had forgotten this at the time I compared the birds; my independent conclusion was that *eustathis* is identical in color with *strigata* from Sarawak. I think it more likely that *eustathis* is a race of *panayensis* than that it is a representative of *minor*. The bill of *eustathis* is almost as large as that of *strigata*, and does not have the small, sharp-pointed appearance of that of *minor*. It is entirely possible that *strigata* and *eustathis* intergrade across central Borneo.

According to the older literature, a second area of overlap between these two birds (in addition to Mindanao) is on Bali and eastern Java. But van Bemmelen and Voous, as noted above, think *A. m. minor* may be only a migrant to these areas from the Lesser Sunda Islands.

To summarize, *panayensis* and *minor* are closely related, but the former seems to be more successful and widespread. *Aplonis minor* now exists for the most part in peripheral areas or, which may amount to the same thing, at higher altitudes. The two seem to interact as species by competing, not as races by interbreeding and intergrading. Hence I regard *minor* as a full species. The status of *eustathis* is a moot question. I believe it is a race of *panayensis*, while Deignan thinks it is a form of *minor*, in which he may be right.

Aplonis metallica

Stresemann (1912, pp. 311–312) reviewed this species but lacked specimens from Manus, Admiralty Islands. Rothschild and Hartert later (1914, p. 297) listed the characters of the very distinct *purpureiceps*

Salvadori from that island. On Rambutyo to the eastward, the only other island in the Manus Group that supports this species, the form present is *nitida*. The latter extends through the rest of the Bismarck Archipelago and the Solomon Islands. The type locality is New Ireland.

Purpureiceps differs from nominate *metallica* of New Guinea, north-eastern Australia, and the Moluccas by its much shorter tail, the absence of any purple patch on the back, and the presence of a clearly defined green line above the eye. *Nitida* is a variable race, intermediate between *purpureiceps* and *metallica* but distinct enough for recognition. As is *metallica*, it is long-tailed, but with only a touch of purple on the back, and slightly smaller.

I follow Stresemann in uniting the Queensland, Australia, birds with *metallica* of New Guinea, as there does not seem to be the slightest difference between them. Mayr (1942, p. 162) in his New Guinea list omitted Queensland from the range of nominate *metallica*, thereby implying that the Australian birds, which have been called *purpurascens* by Gray and *saphire* by Mathews, are not the same.

There are two other good races, *inornata* of Biak and Numfor Islands in Geelvink Bay, and *circumscripta* of the Tenimber and Damar Islands.

Aplonis brunneicapilla

This interesting species, described by Danis (1938) from a skin in the Paris Museum, is very distinct, but seems definitely to be related to *A. mystacea* of New Guinea, another relatively uncommon species. Beecher (1945, pp. 31–33) collected *brunneicapilla* on Bougainville and Guadalcanal and determined the habitat and associates of this *aplonis*. More recently Cain and Galbraith (1956, pp. 281–287) were able to make a detailed study of its nesting ecology on Guadalcanal. The two central rectrices of this specialized *aplonis* have streamer-like tips, which frequently break off, at least during the nesting season.

OTHER SPECIES OF *Aplonis*

The following forms of *Aplonis*, which have been regarded as subspecies at one time or another, seem to me to warrant specific status:

1. *Aplonis crassa* (P. L. Sclater) of the Tenimber Islands. This form may well be a representative of *A. cantoroides*, but seems to be probably specifically distinct, especially as *cantoroides* itself ranges throughout New Guinea, the Bismarcks, and the Solomons without breaking up into subspecies.

2. *Aplonis insularis* Mayr of Rennell Island. Mayr originally described

this as a species, but later (1945, p. 263) made it a race of *feadensis*. It is very distinct from that form, and I prefer to list it as a species.

3. *Aplonis dichroa* (Tristram) of San Cristobal, Solomon Islands. Here also I feel that specific status is best, and not treatment as a race of *Aplonis grandis*.

GENUS *POEOPTERA*

Poeoptera kenricki

The type locality of this species is the Usambara Mountains in north-eastern Tanganyika. The population of the Kilimanjaro region has been assumed to be the typical race, an assumption which, if one may judge from a series in the American Museum as compared with three males and one female from Usambara, is correct.

Van Someren (1945, p. 11) described a race *bensoni* from Meru on the slopes of Mt. Kenya, supposed to be larger and to have color differences. We have only one specimen from the Kenya district, but Dr. A. L. Rand has kindly examined and measured van Someren's material, now in Chicago. He concludes that *bensoni* is worth recognition on the basis of size, although the alleged color differences are doubtful. Combined wing measurements in millimeters are as follows:

MALES: Usambara (3), 105–106; Kilimanjaro (11), 100–107; Mt. Kenya (9), 108–112.

FEMALES: Usambara (1), 97; Kilimanjaro (11), 96–102; Mt. Kenya (5), 102–105.

Rand adds (*in litt.*): "The color difference van Someren postulated, blacker plumage, is very vague in the male; in the female the difference seems to be the reverse: the Kilimanjaro birds are slightly blacker above and more glossy on the back than Meru birds."

GENUS *ONYCHOGNATHUS*

Onychognathus walleri

Friedmann's (1937, p. 338) arrangement of the races of this starling seems entirely satisfactory. Variation is in size only.

The following wing measurements, sexes combined, will give a good idea of the size differences of the three forms:

1. *O. w. preussi*, 17 (all from Fernando Po): 107–119 mm. Range: Highlands of Fernando Po and of the Cameroons.

2. *O. w. elgonensis*, 20: 114–129 mm. Range: Highlands of Kenya, west of the Rift Valley; of Uganda; and of the Kivu and Ruwenzori areas in the eastern

Congo. As Chapin (1954, p. 138) has pointed out, Congo specimens are a little smaller than those of Mt. Elgon; on the other hand, the birds of the Mt. Kenya area are slightly larger than those of Elgon, but not enough so to justify recognition of van Someren's *keniensis*.

3. *O. w. walleri*, 17: 131-142 mm. Range: Highlands of Kenya, east of the Rift Valley, south through Tanganyika and northern Nyasaland.

Onychognathus morio

Geographical variation in this species is masked by considerable individual variation. Size increases clinally from South Africa to Ethiopia. It has been customary to recognize three races in this cline: *morio* in South Africa, *rüppellii* in Ethiopia, and *shelleyi*, with type locality Tanganyika, for the intermediates.

Grant and Mackworth-Praed (1943, pp. 54-55) briefly reviewed this species and made *shelleyi* a synonym of *rüppellii* because of overlap in shape and length of the bill; they say nothing about general size. I am inclined to follow this arrangement, because it is impossible to mark off an intermediate race satisfactorily. Specimens from Nyasaland and northern Mozambique are nearer in average size to ones from Ethiopia than to those of South Africa, so it is best to place the arbitrary dividing line between the two races rather far south. Nominate *morio*, then, will have as its range Southern Rhodesia, southern Mozambique, and the eastern parts of South Africa.

I have not seen the race *neumannii* of the drier northern section of Nigeria and the Cameroons, said to be characterized by a heavy curved bill. Some Ethiopian specimens have such a bill, in others it is much more slender; its length also varies. As early as in 1904 Neumann (1904, p. 568) pointed out the great variation in thickness of the bill in Ethiopian specimens and wondered whether *morio* and *rüppellii* might be different species. If the extremes are compared, such a suggestion is not surprising.

The type of *Amydrus montanus* van Someren, usually upheld as a valid race of *morio*, has a rather long slender bill (figured by W. L. Sclater, 1924, p. 6). This form was described from the 9000- to 10,000-foot zone on Mt. Elgon and is supposedly confined to the upper reaches of that mountain. Actual comparison of the bill of the type shows that it is matched in length by frequent specimens from the range of *rüppellii* and *morio*, and in slenderness by a few. Furthermore, a second topotypical specimen (an adult female) has a bill that is in no way unusual. Hence I do not believe that *montanus* is valid even as a subspecies, but it is possible that birds from high elevations on Elgon may on the average be a little larger and longer billed than others.

The only remaining form to be mentioned is *modicus* Bates (1932, p. 7) from Kulikoro on the upper Niger in French West Africa, from whence it reaches the eastern borders of Senegal. This form was apparently overlooked by Grant and Mackworth-Praed (*op. cit.*) in their review of the species. I have not seen *modicus*, but it is said to have a relatively short tail and a bill like that of *rüppellii*, rather than the heavy arched one of the intervening race *neumanni*.

Onychognathus tristramii

This species extends in suitable rocky areas from the Dead Sea Valley in Israel south to southern Arabia (Aden and the Hadramaut). The southern birds were separated as *hadramauticus* von Lorenz and Hellmayr, but P. L. Sclater (1917, p. 140) noted that the form was barely recognizable, and Meinertzhagen (1954, p. 88) synonymized it. Although topotypical *tristramii* seems to have the chestnut in the wing a little paler, and the males more frequently have spots on the primary coverts than do southern birds, it is probably unnecessary to recognize *hadramauticus*, though more material should be examined.

Onychognathus fulgidus

There have been a number of uncertainties about the races of this starling. The robust nominate form from São Tomé Island presents no problem. The next oldest name is *hartlaubii* G. R. Gray from Fernando Po. This locality was queried by W. L. Sclater (1924–1930, p. 663), but Chapin (1954, p. 140) and I (Amadon, 1953, p. 435) have pointed out that J. G. Correia secured a series of this species there which agrees with birds from the Lower Guinea mainland. The race *hartlaubii* inhabits the area from Fernando Po and the Cameroons, or perhaps southern Nigeria, to northern Angola and eastern Uganda.

Amydrus reichenowi Cabanis, 1873, is a synonym of *hartlaubii*. The locality was given as "West Africa." Bannerman (1948, p. 84) suggested Aguapim, Gold Coast, as restricted type locality, but Stresemann, under date of August 26, 1953, writes me that the type was taken near "Tobis Stadt (= Duala)," Cameroons. The type was collected by Reichenow himself, who visited both Aguapim and Duala.

With *reichenowi* removed as a possible name for the population of Upper Guinea, two names, both proposed by Neumann, are available. They are *harterti*, 1903, from the Gold Coast, and *leoninus*, 1920, from Sierra Leone. It is now agreed that the Upper Guinea birds may be united in a single race, smaller in size than *hartlaubii* and perhaps differing slightly in color, so *harterti* becomes the name for this form. The

type of Neumann's *leoninus* was a specimen in the British Museum obtained at Bo, Sierra Leone, by Robin Kemp (1905, p. 246) who listed it in his paper on the birds of that country. Later Bannerman (1948, p. 85) stated that he could not find this specimen and queried the occurrence of the species in Sierra Leone. He apparently did not notice that this specimen had been made the type of Neumann's (1920, p. 82) *leoninus*.

Onychognathus tenuirostris

Males from the type locality, Ethiopia, have the head glossed with green, while those from the eastern Congo and presumably also from Tanganyika and the highlands north of Lake Nyasa are glossed with blue. Kenya birds are intermediate, but of 10 males from Mt. Kenya and the Aberdares, most of which were collected by Meinertzhagen or Chapin, all but one seem closer to the greenish nominate form. Meinertzhagen (1937) described two Kenya races, *theresae* from the Aberdares and *raymondi* from Mt. Kenya. His material came from high altitudes, but it is now known that the species occur much lower, too. I follow Chapin and others in using *theresae* for the blue-headed southern race,¹ even though, as just noted, birds from the type locality are at best intergrades with the nominate form, if not actually closer to it. The only alternative would be to regard both of the forms proposed by Meinertzhagen as synonyms of *tenuirostris* and then to propose a new name for the more typical blue-headed birds of the Kivu, Tanganyika, and northern Nyasaland.

GENUS *LAMPROTORNIS*

Lamprotornis corruscus

Geographical variation in this starling, with the exception of the well-marked race of Pemba Island, is so slight and ill defined that I am not inclined to recognize either of two races described by van Someren. One of these, *mandanus*, has as type locality Manda Island, on the coast of Kenya; the other, *jombeni*, is from the Jombeni Hills, northeast of Mt. Kenya. Nominate *corruscus* itself is from Kaffirland, South Africa.

Specimens from South Africa, of which I have seen eight, average slightly greener on throat and nape than ones from farther north, but many specimens from the two regions are absolutely the same. There is an even more vague tendency for the southern birds to be larger and

¹ *Raymondi* has line precedence, but *theresae* has been used and may be accepted on the "first reviser" principle.

longer billed than those of coastal Kenya and Tanganyika. Specimens from the interior of Kenya and Tanganyika (= *jombeni* of van Someren) are again slightly larger. Bowen (1931, p. 68) noticed this and assigned two specimens from Meru, vicinity of Mt. Kenya, to nominate *corruscus*, but did not bring into question the validity of *mandanus*. The following combined measurements will help show the slight nature of the variation involved. I am indebted to Dr. A. L. Rand for measurements of the type of *jombeni* and of other specimens from the area ascribed to this form by van Someren. So many of our specimens are unsexed that I group the two sexes together.

LOCALITY	NUMBER	WING LENGTH
South Africa	9	107-116
Coasts of Kenya and Tanganyika	35	95-115
Mt. Kenya area	4 (all males)	112-121

Lamprotornis c. vauhani Bannerman from Pemba Island is a well-marked race, distinctly different in color, and larger. The wing of the one specimen examined, a male, measures 122 mm.

Lamprotornis nitens

Although allegations of geographical variation in color in this starling may be found in the literature, I am unable to verify them. There is clinal variation in general size; southern birds are larger than the northern, more equatorial ones. Whether this is a gradual cline throughout or whether some "steps" occur it is difficult to say at the moment. In the west the transition from the small birds of Gaboon and Angola to the medium-sized ones of Southwest Africa seems to be entirely gradual. Such medium-sized birds extend in a broad belt from Southwest Africa east through Bechuanaland and the southern parts of Rhodesia to the Transvaal and Natal. Cape Province birds do appear to be rather abruptly larger, but here, too, fuller data may reveal a gradual cline. The range of wing lengths for birds from these various regions, based on our material, is as follows:

Small (Angola): 107-136 mm.

Medium (Southwest Africa to Natal): 122-140 mm.

Large (Cape Province): 136-148 mm.

These figures agree well with those of other writers on the species. Males are somewhat larger than females, but one cannot be enthusiastic about recognition of races based solely on size when it is necessary to separate the sexes to find a difference, with the exception, of course, of

species in which the sexes are so different in size or color that one is not at the mercy of the collectors who sex the skins.

Should *L. nitens* be divided into two or three races on the basis of the size variation outlined above? One's first inclination would be to name only the extremes of this cline. There is, however, a nomenclatural tangle as regards the name for the large Cape Province birds. Clancey and Holliday (1951, pp. 111-116) believe that neither of two older names (*phoenicopterus* Swainson, *decoratus* Hartlaub) pertains to the Cape form, which they named *culminator*. Later, Vincent (1952, p. 97) used *decoratus* for the Cape birds, but Clancey (1952, p. 55) does not agree. Further study may show that one of these names can be used for Cape birds. Meanwhile it may be best to recognize the intermediate form, using for it the name *phoenicopterus*.

Lamprotornis chalybaeus

There has been considerable disagreement over the races of this starling. The following forms (of which the type localities are given in parentheses) seem admissible, though they vary in distinctness:

1. *Lamprotornis c. hartlaubi* (Senegal). Bannerman (1948, p. 54) among others has denied that it is possible to separate this form from nominate *chalybaeus* of the Sudan, but, as Bates (1934, p. 695) and others have noted, West African birds are a little less bluish, more bronzy. Furthermore, in *hartlaubi* there is scarcely a suggestion of a spot on the bend of the wing, while in *chalybaeus* a metallic purple spot is often present.

2. *Lamprotornis c. chalybaeus* (Ambukol, Sudan). The birds of the highlands of Ethiopia and Kenya are often included in this race, but I agree with Chapin (1954, p. 156) that the latter are so much larger that they deserve racial separation. The exact limits of the range of *chalybaeus* remain to be worked out; it presumably intergrades with *hartlaubi* near the eastern borders of the Sudan. Lake Chad specimens are said by Bates (*loc. cit.*) to belong with *hartlaubi*. To the northeast nominate *chalybaeus* may extend into Eritrea. Specimens from the mountains of Somaliland are nearer the following race, though intermediate.

3. *Lamprotornis c. cyaniventris* (Ethiopia). Chapin (*loc. cit.*) has used the name *massaicus* Neumann for this large race, but *cyaniventris* Blyth and *abyssinicus* Hartlaub are both older names, as noted by Stresemann (1925, p. 155) in his review of the species. Ethiopian birds are the largest of all, so it is well that the type locality of the race should be in that country.

4. *Lamprotornis c. sycobius* (Tete, Mozambique). A very distinct race, said to intergrade with the preceding in extreme southern Kenya. As noted below, the range of this form is usually given as extending somewhat too far to the south.

5. *Lamprotornis c. nordmanni* (Huilla, Angola). Rather similar to *sycobius* but with a copper-colored rather than violet spot on the bend of the wing. Hoesch and Niethammer (1940, p. 308) questioned de Schauensee's record (1932, p. 197) of *nordmanni* from the Kalkveldt, Southwest Africa, and thought the record, based on an immature, might pertain to *L. nitens*. William L. Sclater (1924-1930, p. 657), however, had noted that two specimens from Lake Ngami belong to *nordmanni*, and I have examined another specimen from the same locality. We have also an undoubted example of *nordmanni* taken at "Ovaguenyama," Southwest Africa, by Eriksson. It is possible, of course, that some of the numerous starlings de Schauensee saw and believed to be *chalybaeus* were *nitens*, but *nordmanni* does extend across the continent (specimens from the western Transvaal belong to this race). One battered skin from Southern Rhodesia also seems to be *nordmanni*, and even in Nyasaland some specimens are nearer to *nordmanni* than to *sycobius*. In as much as the type locality of *sycobius* is rather far south, it is necessary to be somewhat liberal in drawing the southern limits of that form. Its characters are best developed in Tanganyika.

It is interesting that the only race of *L. chalybaeus* that overlaps *L. nitens* in distribution, namely, *nordmanni*, should be the only one to have a copper-colored shoulder spot like that of *nitens*.

Lamprotornis acuticaudus

Chapin (1954, p. 153) has pointed out that the race *katangae* Dirickx is not valid.

Lamprotornis splendidus

As I have shown elsewhere (1953, p. 434), the population of this starling on Fernando Po consists of birds sufficiently larger in size to warrant recognition of a race, for which the name *lessoni* Pucheran is the oldest available. On Principé Island one finds again the smaller *L. s. splendidus*. It may be a newcomer there, for Principé is also the home of the endemic species *L. ornatus*, which, as shown by its notched primaries and other characters, was evidently derived from an earlier invasion of *splendidus* stock. Or the presence of *ornatus* may have "inhibited" size increase on Principé, after the second colonization.

Lamprotornis mevesii

The province of Benguella, in west-central Angola, is occupied by a very distinct subspecies of this starling, described as *Lamprotornis purpureus* by Bocage in the 1868 *Jornal Lisboa* (vol. 1, p. 334). The head, breast, and back in this form are bronze, not blue as in the nominate form. Unfortunately, when the genus *Lamprocolius* is included with *Lamprotornis*, as I believe it should be, Bocage's name becomes preoccupied by *Turdus purpureus* P. L. S. Müller (described in *Systemae naturae*, Supplement, p. 143, 1766). Müller's name applies to another species in the enlarged genus *Lamprotornis*. For the preoccupied name *Lamprotornis purpureus* Bocage I propose ***Lamprotornis mevesii chalcus***, as a new name.

Lamprotornis purpuropterus

Dr. A. L. Rand has suggested to me (*in litt.*) that *purpuropterus* may be conspecific with *L. caudatus*. I have not seen specimens of *caudatus* from the region east of northern Nigeria, but Lynes (1924, p. 656) found it to be common in Darfur and western Kordofan. He did not encounter *purpuropterus* in these areas. The differences between the two are rather striking, and unless intergradation can be demonstrated one must conclude that they are separate species. To be sure, *aenocephalus*, the northern race of *purpuropterus*, has a longer tail than the nominate form, but it is still considerably shorter than that of *caudatus* and composed of narrower feathers.

GENUS *SPREO**Spreo hildebrandti*

In 1943, while writing my earlier paper on the Sturnidae, I corresponded with the late Professor Neumann, then in Cuba. He especially asked me not to describe a race of *Spreo* that he had under study! This, I suppose, was *Spreo hildebrandti kelloggorum* Neumann (1944), described in what was probably Neuman's last contribution to the ornithology of Africa, a continent he had visited as early as 1893. The material on which this race was based had been studied by Boulton some years previously, but he and Chapin had decided after correspondence (which I have seen) that the variation was too slight to warrant being named. *Kelloggorum* is supposedly deeper yellow on the breast, but this seems to be largely a matter of wear, and I do not think the race is valid.

*Spreo pulcher**Spreo pulcher rufiventris* Rüppell

This race is not very well differentiated. Birds from Eritrea and Ethiopia appear a little bluer, less oil-green, on the upper parts than a series from Senegal. I was inclined to attribute this to the more worn plumage of the Senegal material, but several others have noticed a similar tendency, so *rufiventris* may be tentatively upheld.

GENUS *COSMOPSARUS**Cosmopsarus regius*

Van Someren's race *magnificus* from Tsavo, Kenya, differs by having a coppery rather than purple breast stripe. This race is restricted to southeastern Kenya and does not seem to occur in southern Ethiopia or in the interior of northeastern Kenya, contrary to what was stated by W. L. Sclater (1924-1930, p. 663).

GENUS *CINNYRICINCLUS**Cinnyricinclus leucogaster*

Nominate *leucogaster* of West Africa and the savannas north of the Congo forest differs from *verreauxi* of eastern and southern Africa, aside from slight differences in size, only by the amount of white on the outer vane of the outer rectrices. It is quite possible, therefore, as others have suggested, that some of the records of *leucogaster* beyond its main range represent mutants of *verreauxi* rather than genuine stragglers.

The only really good race of the species is *arabicus* Grant and Mackworth-Praed (1942) which extends from western Arabia into northern Ethiopia. Females of *arabicus* are uniformly gray above, quite different from those of other regions. Bowen (1930) described a race, *friedmanni*, from southern Ethiopia as like *leucogaster* but larger. The size differences are hardly worth mentioning, but the females from this area (not mentioned by Bowen) seem quite variable. Some are like those of *arabicus*, others like those of *leucogaster*, still others are intermediate. Perhaps *friedmanni* can be tentatively upheld as a little larger than *leucogaster*, with female plumage intermediate between *leucogaster* and *verreauxi* on the one hand and *arabicus* on the other. Otherwise, one might have to replace *arabicus* with *friedmanni*, which would be undesirable, as the latter was named without awareness of the characters of that race, and from a marginal area.

Bowen (*ibid.*) proposed another name, *lauragrayae*, with type locality Meru, Kenya, for a form said to be like *verreauxi*, type locality Angola, but smaller. I agree with Chapin and others that the variation is not sufficient for recognition.

GENUS *STURNUS*

Sturnus malabaricus

Koelz (1954, p. 19) has described *S. m. assamica* from the Naga Hills, Assam, as darker than *S. m. malabaricus*. Although I have not seen Koelz's material, specimens from Assam do on the whole seem richer in color, more rufous ventrally, than a series of the nominate race from farther west. The describer stated that birds from eastern Assam are nearer *malabaricus*, and this may explain the presence of a few paler examples in the material examined. Three taken in North Cachar in March are pale and small, in fact inseparable from *S. m. nemoricola* of Burma and south, of which they may represent vagrants. *Sturnus m. nemoricola* is known to migrate from the northern part of its range, becoming abundant in northern Thailand in winter (Deignan, 1945, p. 527), and may move eastward to some extent also. On the other hand, a specimen from Lower Pegu, Burma, taken in winter, resembles a migrant of *assamica*.

For a discussion of the other races of *Sturnus malabaricus*, see Marien (1950). I agree with him that *erythropygius*, the insular relative of *malabaricus*, is best left as a species. It has three races: nominate *erythropygius* of Car Nicobar, Nicobar Islands, *andamanensis* of the Andamans, and *katchalensis* of Katchal Island.

GENUS *ACRIDOTHERES*

The species of this genus, aside from *tristis*, are difficult to understand, and almost all possible arrangements have been advocated. The genus must have had a rather complex evolutionary history in the Indochinese countries, as shown by the presence there of such puzzling forms as *grandis* and *albocinctus*. To dispose of the last-named first: Deignan (*in litt.*) and others regard *albocinctus* as a race of *cristatellus* of China and Indochina, but the two occur together in western Yunnan (as breeders?), and I have seen no intermediates. Unless further evidence is adduced, *albocinctus*, which after all is quite a different bird from *cristatellus*, is best kept as a distinct species.

The relationships of *grandis* are more puzzling. In Siam and Indochina it is a long-crested, black bird with no particular resemblance to the Jungle Mynah, *Acridotheres fuscus*. To the north, however, especially in north-

ern Burma, the crest seems to become clinally shorter, although in skins from western Yunnan it is almost as long as in those of Siam. The question is, Does this change represent independent variation in *grandis*, or intergradation with *fuscus* or *cristatellus*, or both? Ticehurst (*in* Garthwaite, 1937, pp. 555-557), considered *grandis* a race of *fuscus*, while Marien (1950, p. 483) mentions a specimen from the lower Chindwin, "which is very similar to *grandis*, but the lower part of the abdomen is a pale buff color, approaching *fuscus* in that respect." I have looked at this specimen and, though it appears mature, the fact that the young of *grandis* have some buff on the abdomen makes this character of dubious value as an indication of intergradation. Furthermore, *grandis* and *fuscus* seem to occur together. Deignan writes me that he collected both at Prachuap Khiri Khan, Siam, while Walter Koelz tells me that in eastern Assam he found *fuscus* a common bird in the valley near Dimapur, while *grandis* was present, though scarce, in the hills near Kohima, a few miles away. Deignan and Koelz think they are separate species, as do I, though this, of course, does not rule out the possibility of occasional hybridization in some areas.

Four males of *grandis* taken by the Vernay-Cutting Expedition in northern Burma are very short crested, yet they seem to be adults. The fact that two of them have some black in the under tail coverts (which are typically white in *grandis*) suggests infiltration with *cristatellus*, not with *fuscus*. Though Mayr (*in* Stanford, 1941, p. 354) placed *grandis* as a race of *fuscus*, he remarked that "it is very probable that these birds should be considered a subspecies of *cristatellus*" and pointed out that, with one exception, our specimens of the two forms from western Yunnan segregate by season. *Cristatellus* may be only a migrant in that area, but Delacour (quoted in Marien, 1950, p. 483) believes that *grandis* and *cristatellus* are both common breeding birds throughout northern Indochina. Marien also notes that Stephen Eaton collected at Poseh, Kwangsi, a male of *cristatellus* on May 2 and one of *grandis* on the following day, both in breeding condition. Through the kindness of Dr. Charles Sibley, I have examined this specimen of *grandis*.

One must tentatively conclude that *grandis* is not a race of either *fuscus* or *cristatellus*. This is not at variance with its appearance: *grandis* resembles *cristatellus* in some ways and *fuscus* in others, while differing from both. The presence of another closely allied form, *albocinctus*, in the area should caution one against assuming that *grandis*, *fuscus*, and *cristatellus* are, or were, races of a single species.

Should the shortness of the crest in *grandis* evident in central and northern Burma and probably in adjacent Assam prove to be of racial

significance and not merely an indication of occasional introgressive hybridization with *crisatellus* (or possibly *fuscus*), then the name *infuscatulus* Stuart Baker from the lower Chindwin may be used for this population.

Forms of the genus *Acridotheres* occur on Java (*javanicus*) and southern Celebes (*cinereus*). To me they seem to be races of *fuscus*, which ranges south to Singapore and is now established in clearings on Sumatra. Robinson and Kloss (1921-1924, p. 358), however, considered *javanicus* a race of *grandis* (or vice versa, as *javanicus* is the older name), and Deignan tells me he believes this arrangement to be the correct one. Several species of birds present in Indochina and Siam do reoccur in Java, so the distribution cannot be said to militate against such a relationship.

GENUS *MINO*

Mino dumontii

The populations of this species inhabiting New Guinea and the off-lying islands, including the Arus, are sharply separated from those of the Bismarcks and Solomons by the configuration of the feather tracts on the throat. Treatment of the variation within these two groups is a difficult matter.

To consider first those of the Bismarcks and Solomons, the oldest name is *krefftii* P. L. Sclater, type locality "Solomon Islands." Later it was found that a large part of the collection containing this form came from New Ireland, but it did include three species native to the Solomons but not to New Ireland (Mayr, 1933). As the species *Mino dumontii* is common in the Solomons and, as we have just said, some of the species in the collection studied by Sclater did come from these islands, Mayr (*loc. cit.*) was scarcely justified in changing the type locality of *krefftii* to New Ireland. Birds from there and from the Solomons are not separable.

Hartert (1929, p. 18), in the last of his many important contributions to the systematics of Papuan and East Indian birds, described a race *Mino dumontii sanfordi*, type locality Guadalcanal, pointing out that the birds of that island are somewhat smaller than those of the other Solomons and of the Bismarcks. He did not restrict the type locality of *krefftii*, merely stating that the type which he and Kinnear had examined was not the small bird of Guadalcanal.

Wing lengths of this starling on Guadalcanal (and Malaita, where the size is also small) range from about 145 to 160 mm., with most of a large series falling in the range 150-155 mm. Seven from New Ireland measure from 157 to 163 mm.; 13 from New Hanover, 165 to 172 mm.; and three

from the small island of Tanga in the eastern Bismarcks, 155 to 165 mm. But in the south-central Solomons, especially on Russel (Puvuvu) and also Florida, wing lengths above 170 are not uncommon, and some males reach 175–177 mm. or even more. Those from the larger islands in the northern Solomons, such as Bougainville, are again somewhat smaller, about like those of the Bismarck Archipelago. Either we must recognize three poor size races, one of which, the large bird of the Russel group, is as yet undescribed, or combine all these birds under the name *krefftii*. The latter course seems preferable.

Mayr (1931, pp. 19–21) found a somewhat similar situation in *Aplonis grandis grandis* in the Solomons. He wrote: "This subspecies agrees in coloration all over the northern, western, and central Solomon Islands, but there is a considerable difference in size. The largest population is found on Ysabel Island and on Florida Island. Birds from the Central Group are slightly smaller and have sometimes considerably smaller tails (Gatukai!) Still smaller is the series from Choiseul Island, and the smallest members of this race occur on Bougainville Island. The measurements of the Bougainville and Ysabel birds do not overlap, but as the birds of so many other islands are intermediate in size, it seems to be wiser not to give any name to the Bougainville population. To state the fact that the birds of this island are smaller, is quite sufficient. Naming the Bougainville birds would raise the difficult question as to what name to apply to the birds from Choiseul and all the islands of the Central Group."

For other examples of random size variation of a nature to make application of trinomials difficult even when the variation is considerable, see Mayr (1942, p. 37).

Another problem is posed by the populations of *Mino* on New Britain (Neu-Pommern) and Rook Island to the south of it. These birds are of average size, but their tails are relatively short. In this respect they approach the short-tailed race of New Guinea, but the throat feathering is like that of *krefftii* and shows no intergradations with nominate *dumontii* of New Guinea.

The tail length in a series from New Britain and Rook Island ranges from 87 to 102 mm.; New Ireland, 101 to 106 mm.; Ysabel Island, Solomons, 97 to 110; Russel Island, 110 to 120; but in the smaller birds of Guadalcanal and Malaita only from 87 to 104 mm.

Stresemann (1922, p. 406), when naming the birds of New Britain, which he called *giliau*, also stated that they have a smaller white speculum in the wing than does *krefftii*. This difference is at best a slight average one. It seems best to regard *giliau*, as well as *sanfordi*, as a synonym of *krefftii*.

To turn now to the populations of the Papuan area, the type locality of the species is Dorey in western New Guinea. Von Berlepsch named a form *violaceus* from Astrolabe Bay, but the difference in iridescence imputed to this form is apparently a matter of feather wear (Mayr and Rand, 1937, p. 187). Stresemann (1922) believed that *violaceus* is not valid, but named the birds of the Aru Islands *aruensis* on the basis of smaller size and smaller wing speculum. This race has not usually been recognized.

Mayr and Rand (*ibid.*) showed that birds from the Astrolabe Bay area and the north coast generally are somewhat larger and, to the west, also have the yellow of the abdomen somewhat deeper in color than those of other parts of New Guinea. There is, however, considerable overlap in every respect between *dumontii* and "*violaceus*," and, if series from the interior of New Guinea are included in the comparison, the problem becomes even more difficult. All in all, the trends of variation in this species within New Guinea are so slight that it seems best not to recognize them by name but to regard both *violaceus* and *aruensis* as synonyms of nominate *dumontii*. Rand (1942, p. 494) in his last contribution to the problem left the question in abeyance.

GENUS *SARCOPS*

The one species of this genus has been revised no fewer than four times in the past few years: Gilliard (1949), Rand (1951), Parkes (1952), and Salomonsen (1952). I have followed the more conservative of these authorities and recognize the following three races:

1. *calvus* Linnaeus (synonym: *mindorensis* Gilliard). Range: Northern Philippines (Luzon, Polillo, Catanduanes, Mindoro).
2. *melanotus* Ogilvie-Grant (synonyms: *similis*, *samarensis*, and *minor*, all of Salomonsen). Range: Central and southeastern Philippines from Panay and Samar to Basilan and Mindanao.
3. *lowii* Sharpe. Range: Sulu Islands.

Parkes thought that *mindorensis* of Gilliard is separable from nominate *calvus* by larger size. Mindoro birds are a *little* bigger, but some conservatism is called for in this species or one will end with too many races, none recognizable in the hand, as Salomonsen seems to have done. Parkes states that *lowii* of the Sulu Islands is a very distinct form, basing this on a series in the United States National Museum. We have seven old Sulu Archipelago birds which are not very distinct from Luzon examples of *calvus*. A series in the United States National Museum, which I have examined, show the characters of *lowii* better.

Admittedly there is some island to island variation in the black-backed

populations grouped under *melanotus*, but it is partly concealed by a great deal of individual variation, and the trends are not consistent. Even *calvus* and *melanotus* are occasionally bridged by individual variants, while in southern Luzon all types occur. It appears impossible to segregate the black-backed birds successfully on geographical premises, and I follow Rand and Parkes in considering all of them as *melanotus*.

GENUS *GRACULA*

There has been a double invasion of this genus on Ceylon; the earlier arrival, *ptilogenys*, occurring chiefly in the hills, and the later, *indica*, in the lowlands, even though in southern India the latter is a bird of the hills. The two overlap but slightly in Ceylon and perhaps "repel" each other ecologically. I agree with Ripley (1946, p. 227) that they should be kept as separate species.

I have also followed Ripley (1944, pp. 402-405) in his treatment of the forms of this species found on the West Sumatran Islands. In one instance it means uniting under the same name (*batuensis*) birds from some of the West Sumatran Islands with those of islands in the South China Sea (Anambas, Tambelans, Tioman). All these populations have as their only racial character intermediate size between the very large *robusta* of Nias and near-by islands, and the small *religiosa* of Java, Sumatra, Borneo, and Malaya. As subspecies are in part practical rather than natural categories, such a grouping seems better than the recognition of two indistinguishable but isolated subspecies.

Neumann (1941, p. 113) described the grackles of Bali as a distinct race, *exceptio*, supposedly of smaller size. The Bali birds seem to be slightly smaller, but the difference is hardly sufficient for recognition. The more measurements one assembles, the less is the apparent difference. As already pointed out, many of the island populations of this species vary in dimensions, and rather broad groupings seem best.

The Indian races are smaller even than nominate *religiosa*, and if one compares them with *robusta* it is hard to believe that the two belong to the same species. Perhaps they do not, but the intergradation is fairly gradual, and it is usual to retain all members of the genus (except *ptilogenys*) in a single species.

The race *andamanensis* of the Andaman and Nicobar Islands, of which the name *halibrecta* Oberholser from Little Nicobar Island is a synonym, is similar to *intermedia* in color and in the configuration of the face wattles but usually has a somewhat coarser, longer bill. I am indebted to Mr. H. G. Deignan for sending me information about the material of this form in the United States National Museum, which includes the type of *halibrecta*.

LITERATURE CITED

- AMADON, DEAN
1943. The genera of starlings and their relationships. Amer. Mus. Novitates, no. 1247, 16 pp.
1953. Avian systematics and evolution in the Gulf of Guinea: the J. G. Correia collection. Bull. Amer. Mus. Nat. Hist., vol. 100, pp. 393-452.
- BAKER, E. C. STUART
1926. The fauna of British India. Birds. Second edition. London, vol. 3, xx+489 pp.
- BAKER, ROLLIN H.
1948. Report on collections of birds made by United States Naval Medical Research Unit No. 2 in the Pacific War Area. Smithsonian Misc. Coll., vol. 107, pp. 1-74.
- BANNERMAN, DAVID ARMITAGE
1948. The birds of tropical West Africa. London, vol. 6, 364 pp.
- BATES, GEORGE LATIMER
1932. [Account of a journey to the French Niger and French Sudan.] Bull. Brit. Ornith. Club, vol. 53, pp. 5-12.
1934. Birds of the southern Sahara and adjoining countries in French West Africa, part 5. Ibis, pp. 685-717.
- BEECHER, W. J.
1945. A bird collection from the Solomon Islands. Fieldiana, Zool., pp. 31-37.
- DE BEER, GAVIN R.
1954. Archaeopteryx and evolution. Advancement Sci., no. 42, pp. 1-11.
- VAN BEMMEL, A. C. V., AND K. H. VOOUS
1951. On the birds of the islands of Muna and Buton, S. E. Celebes. Treubia, vol. 21, pp. 27-104.
- BOWEN, W. WEDGEWOOD
1930. Geographical variation in *Cinnyricinclus leucogaster*: seventh preliminary paper on the birds collected during the Gray African Expedition—1929. Proc. Acad. Nat. Sci. Philadelphia, vol. 82, pp. 165-167.
1931. East African birds collected during the Gray African Expedition—1929. *Ibid.*, vol. 83, pp. 11-79.
- CAIN, A. J., AND I. C. J. GALBRAITH
1956. Field notes on birds of the eastern Solomon Islands. Ibis, vol. 98, pp. 262-295.
- CHAPIN, JAMES P.
1954. The birds of the Belgian Congo, part 4. Bull. Amer. Mus. Nat. Hist., vol. 75B, 846 pp.
- CLANCEY, P. A.
1952. Miscellaneous taxonomic notes on African birds. Durban Mus. Novitates, vol. 4, pp. 31-56.
- CLANCEY, P. A., AND C. S. HOLLIDAY
1951. A systematic revision of the races of *Lamprocolius nitens* (Linnaeus) endemic to the South African subcontinent. Ostrich, vol. 22, pp. 111-116.
- DANIS, V.
1938. Etude d'une nouvelle collection d'oiseaux d'île Bougainville. Bull. Mus. Natl. Hist. Nat., Paris, ser. 2, vol. 10, pp. 43-47.

DEIGNAN, H. G.

1945. The birds of northern Thailand. Bull. U. S. Natl. Mus., no. 186, 616 pp.

1954. The glossy starlings (*Aplonis*) of Borneo. Sarawak Mus. Jour., vol. 6, pp. 129-132.

DELACOUR, JEAN

1943. A revision of the subfamily Estrildinae of the family Ploceidae. Zoologica, vol. 28, pp. 69-86.

DELACOUR, JEAN, AND DEAN AMADON

1949. The relationships of *Hypocolius*. Ibis, vol. 91, pp. 427-429.

1951. The systematic position of *Picathartes*. *Ibid.*, vol. 93, pp. 60-62.

DELACOUR, JEAN, AND ERNST MAYR

1945. Notes on the taxonomy of the birds of the Philippines. Zoologica, vol. 30, pp. 105-117.

FRIEDMANN, HERBERT

1937. Birds collected by the Childs Frick Expedition to Ethiopia and Kenya Colony, part 2, Passeres. Bull. U. S. Natl. Mus., no. 153, xii+506 pp.

GARTHWAITE, P. F. (ASSISTED BY C. B. TICEHURST)

1937. Notes on some birds recorded from India. Jour. Bombay Nat. Hist. Soc., vol. 39, pp. 552-560.

GILLIARD, E. THOMAS

1949. A study of the Coletto or Bald Starling (*Sarcops calvus*). Amer. Mus. Novitates, no. 1429, 6 pp.

GRANT, C. H. B., AND C. W. MACKWORTH-PRAED

1942. A new race of Violet-backed Starling from Arabia. Bull. Brit. Ornith. Club, vol. 63, p. 7.

1943. Notes on East African birds. *Ibid.*, vol. 63, pp. 49-56.

HARTERT, ERNST

1904. The birds of the South-west Islands: Wetter, Roma, Kisser, Letti and Moa. Novitates Zool., vol. 11, pp. 174-221.

1929. Birds collected during the Whitney South Sea Expedition. VIII. Notes on birds from the Solomon Islands. Amer. Mus. Novitates, no. 364, 19 pp.

HOESCH, WALTER, AND GÜNTHER NIETHAMMER

1940. Die Vogelwelt Deutsch-Südwestafrikas. Jour. f. Ornith., Sonderheft, 404 pp.

KEMP, ROBIN

1905. On the birds of the south-eastern part of the protectorate of Sierra Leone. Ibis, pp. 213-247.

KOELZ, WALTER N.

1954. Ornithological studies. Contributions from the Institute for Regional Exploration, no. 1. Ann Arbor, Michigan, 33 pp.

LYNES, HUBERT

1924. On the birds of north and central Darfur with notes on the west-central Kordofan and the north Nuba provinces of British Sudan, part 2. Ibis, pp. 648-719.

MARIEN, DANIEL

1950. Notes on some Asiatic Sturnidae (birds). Jour. Bombay Nat. Hist. Soc., vol. 49, pp. 471-487.

MAYR, ERNST

- 1931. Birds collected during the Whitney South Sea Expedition. XVII. The birds of Malaita Island (British Solomon Islands). *Amer. Mus. Novitates*, no. 504, 26 pp.
- 1933. On a collection of birds, supposedly from the Solomon Islands. *Ibis*, pp. 549-552.
- 1934. Zur Nomenklatur einiger *Aplonis*-Arten. *Mitt. Zool. Mus. Berlin*, vol. 20, pp. 334-336.
- 1942. Systematics and the origin of species. New York, 334 pp.
- 1943. The genera of the family *Prionopidae*. *Ibis*, pp. 216-218.
- 1945. Birds of the Southwest Pacific. New York, xx+316 pp.

MAYR, ERNST, AND A. L. RAND

- 1937. Results of the Archbold Expeditions. No. 14. Birds of the 1933-1934 Papuan Expedition. *Bull. Amer. Mus. Nat. Hist.*, vol. 73, pp. 1-248.

MEINERTZHAGEN, R.

- 1937. [Six new races from Mt. Kenya.] *Bull. Brit. Ornith. Club*, vol. 57, pp. 67-70.
- 1954. Birds of Arabia. London, 624 pp.

MEYER, A. B., AND L. W. WIGLESWORTH

- 1898. The birds of Celebes. Berlin, vol. 2.

NEUMANN, OSCAR

- 1904. [On the red-winged starlings of Africa.] *Jour. f. Ornith.*, vol. 52, pp. 567-569.
- 1920. Neue Gattungen und Unterarten afrikanischer Vögel. *Jour. f. Ornith.*, vol. 68, pp. 77-83.
- 1941. Neue Subspecies von Vögeln aus Niederländisch-Indien. *Zool. Meded. R. Mus. Natuurlijke Hist. Leiden*, vol. 23, pp. 109-113.
- 1944. A hitherto unnamed glossy starling from East Africa. *Auk*, vol. 61, pp. 288-289.

OBERHOLSER, HARRY C.

- 1926. Descriptions of nineteen new East Indian passerine birds. *Jour. Washington Acad. Sci.*, vol. 16, pp. 515-522.

PARKES, KENNETH C.

- 1952. The races of the Bald Starling of the Philippines. *Condor*, vol. 54, pp. 55-57.

RAND, AUSTIN L.

- 1942. Results of the Archbold Expeditions. No. 43. Birds of the 1938-1939 New Guinea Expedition. *Bull. Amer. Mus. Nat. Hist.*, vol. 79, pp. 425-516.
- 1951. Birds of Negros Island. *Fieldiana, Zool.*, vol. 31, pp. 571-596.

RENSCH, BERNHARD

- 1928. Neue Vogelrassen von den Kleinen Sunda-Inseln. 2. *Ornith. Monatsber.*, vol. 36, pp. 47-49.

RILEY, J. H.

- 1921. Four new birds from Celebes. *Proc. Biol. Soc. Washington*, vol. 34, pp. 55-58.
- 1929. A review of the birds of the islands of Siberut and Sipora, Mentawi Group (*Spolia Mentawiensia*). *Proc. U. S. Natl. Mus.*, vol. 75, pp. 1-45.

RIPLEY, S. DILLON

1944. The bird fauna of the West Sumatran Islands. *Bull. Mus. Comp. Zool.*, vol. 94, pp. 305-430.

1946. Comments on Ceylon birds. *Spolia Zeylanica*, vol. 24, pp. 197-241.

1955. Anatomical notes on *Zavattariornis*. *Ibis*, vol. 97, pp. 142-145.

ROBINSON, HERBERT C., AND CECIL BODEN KLOSS

1921-1924. The birds of south-west and peninsular Siam. *Jour. Nat. Hist. Soc. Siam*, vol. 5, pp. 1-397.

ROTHSCHILD, WALTER, AND ERNST HARTERT

1914. The birds of the Admiralty Islands, north of German New Guinea. *Novitates Zool.*, vol. 21, pp. 281-298.

SALOMONSEN, FINN

1952. Systematic notes on some Philippine birds. *Vidensk. Meddel. Dansk Naturhist. For.*, vol. 114, pp. 341-364.

DE SCHAUENSEE, RODOLPHE MEYER

1932. A collection of birds from southwestern Africa. *Proc. Acad. Nat. Sci. Philadelphia*, vol. 84, pp. 145-202.

1940. The birds of the Batu Islands. *Ibid.*, vol. 92, pp. 23-42.

SCLATER, PHILIP LUTLEY

1917. The birds of Yemen, southwestern Arabia, with an account of his journey thither by the collector, Mr. G. Wyman Bury. *Ibis*, pp. 129-186.

SCLATER, WILLIAM LUTLEY

1924. Remarks on the races of the Red-Winged Starling (*Onychognathus morio*). *Bull. Brit. Ornith. Club*, vol. 45, pp. 5-7.

1924-1930. *Systema avium Aethiopicarum*. London, 922 pp.

VAN SOMEREN, V. G. L.

1945. Notes on East African birds. *Bull. Brit. Ornith. Club*, vol. 66, pp. 9-13.

STANFORD, J. K. (WITH NOTES BY ERNST MAYR)

1941. The Vernay-Cutting Expedition to Northern Burma, part 4. *Ibis*, pp. 353-378.

STEINBACHER, JOACHIM

1954. Die Typen der Vogelsammlung von F. H. von Kittlitz. *Senckenbergiana*, vol. 34, pp. 301-305.

STRESEMANN, ERWIN

1912. Ornithologische Miscellen aus dem Indo-Australischen Gebiet. *Novitates Zool.*, vol. 19, pp. 311-351.

1922. Neue Formen aus dem papuanischen Gebiet. *Jour. f. Ornith.*, vol. 70, pp. 405-408.

1925. Ueber einige *Lamprocolius*-Arten. *Ibid.*, vol. 73, pp. 147-161.

1940. Die Vögel von Celebes, Teil 3. *Ibid.*, vol. 88, pp. 1-135.

VINCENT, JACK

1952. A check list of the birds of South Africa. Parow, Cape Province, 122 pp.

