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THE EFFECT OF NATURAL ENEMIES ON THE NESTING HABITS OF SOME BRITISH HONDURAS BIRDS

By MORTON E. PECK

WITH FOUR PHOTOS BY THE AUTHOR

DURING some two years of scientific investigation in British Honduras, the writer had occasion to study somewhat the nesting habits of the birds of that region, and was strongly impresst as any observer might well be, by the great variety and ingenuity of the devices employed evidently to baffle the attacks of natural enemies. Considering the great abundance of food, the absence of destructive storms, and other obviously favorable conditions, we might expect the birds of that section to be correspondingly plentiful; nevertheless, while species are sufficiently numerous, individuals are much less so than in most temperate regions where the numbers have not diminisht thru the operation of artificial agencies. Taking these facts into account, we must conclude that enemies are far more abundant and destructive in the tropics than in higher latitudes, and that the struggle for existence is even sharper, tho of a somewhat different nature. Let us consider the subject more in detail.

It would be but a moderate estimate to say that thru two seasons of observation by the writer one-half of the nests found while being built were robbed by natural enemies before the incubation period was half over. These enemies may be divided into four classes: first, predatory birds, which comprise a comparatively large proportion of the avian fauna; second, reptiles, of which species and individuals are extremely numerous; third, small mammals, of perhaps a dozen species; fourth, insects, especially several species of ants. These four classes differ greatly in degree of importance, the reptiles—snakes and lizards—being probably the most destructive.

As regards their structure and location, the nests of birds may be placed under four groups as follows: First, open above and supported from beneath, on the ground, in grass-tufts, bushes or trees; second, in cavities of trees, rocks or banks; third, open above and pendant from a horizontal branch or leaf tip; fourth, roofed

over, that is, entered by a hole at the side, either on the ground, on a horizontal branch, in an upright fork, or pendant from some support. The first group is the simplest in form, the last most highly specialized.

For the sake of illustration we may compare the nests of the birds breeding in one of our more northerly states—Iowa will do as well as any, as presenting about an average set of conditions—with those of British Honduras birds, so far as the latter are known, making the comparison in accordance with the above classification. Placing it in tabular form, and letting the numbers express the per cent of the total number of species whose nests fall within each group, we have the following:

LOCATION	Nests open above supported from below	Nests in cavities	Nests open above, pendant	Nests with side entrance
Iowa	69	20	6	5
British Honduras	54	28	7	11

These per cents, it is true, are not exact, as the nesting habits of a considerable number of British Honduras birds are totally unknown. It is doubtful, however, if a knowledge of the life history of all would materially affect the proportions given.

If now we leave out of account the nests of Raptorial, Gallinaceous and Anserine birds, the Herons and a few other large forms whose size, warlike disposition or nidifugous habit place them largely out of danger of such enemies as smaller and weaker species must provide against, we obtain still more suggestive results:

LOCATION	Nests open above supported from below	Nests in cavities	Nests open above, pendant	Nests with side entrance
Iowa	65	21	8	6
British Honduras	43	32	10	15

It is evident that nests of the first type, tho the most numerous, are more exposed to danger from enemies than any of the others; therefore, the much smaller proportion of nests of this form in the tropics than in temperate regions doubtless indicate that the abundance of these enemies has brought about numerous instances of modification of what is plainly the most primitive type of nest.

Protective adaptations in nests of the first class are numerous among British Honduras birds, as they are also among ours, and in many cases there is strong similarity; this class, therefore, calls for little comment. The following may be noted: the nests of many flycatchers and hummingbirds are covered with lichens in imitation of the branches on which they rest; those of certain tanagers are made to resemble masses of green moss; the curious Manikin *Scotothorus veraepacis* builds a nest that closely resembles a small mass of half-decayed leaves lodged in a tussock of sedge; the large Rail, *Aramides albiventris*, builds a loose nest of shreds of palmetto leaves and coarse sedges, and places it on a low branch over a stream, so that it can hardly be distinguisht from a quantity of such material left there by a freshet; and many more examples might be given.

Several birds that build nests of the ordinary type frequently choose a situation that is inaccessible to reptiles and small mammals. For example, the two tanagers, *Phoenicothraupis salvini* and *Eucometis spodocephala*, and the grosbeak, *Cyanocompsa concreta*, favor certain small palms which are densely clothed with long, slender, needle-like spines.

Nothing need be said in regard to nests placed in cavities, either natural or

excavated by the birds, except in those curious instances where the nest of a species of termite or "white ant" is used for this purpose. These nests are conical to nearly spherical in form, and from a few inches in diameter to the size of a barrel. They are commonly built on large branches some distance from the ground. In these structures, which are composed mainly of fine particles of wood cemented together to form the walls of small, intricately winding passages, the two trogons, *T. massena* and *T. melanocephalus*, excavate holes for their nests. The hole is begun near the bottom and leads upward to about the center of the cone, where it expands into a large chamber. The birds are absolutely dependent on the insects for their nesting sites, which are remarkably safe from the attack of enemies. Without some such fortunate means of securing a rapid increase it is difficult to see how birds so feeble and of such low intelligence as these trogons could long survive. The nest of the same species of termite also furnishes homes occasionally for certain parrots and apparently always the Paroquet, *Conurus aztec*, tho these species excavate from the top instead of the bottom of the nest, and it is doubtful whether they do not sometimes occupy holes made in the termite's nests by other animals.

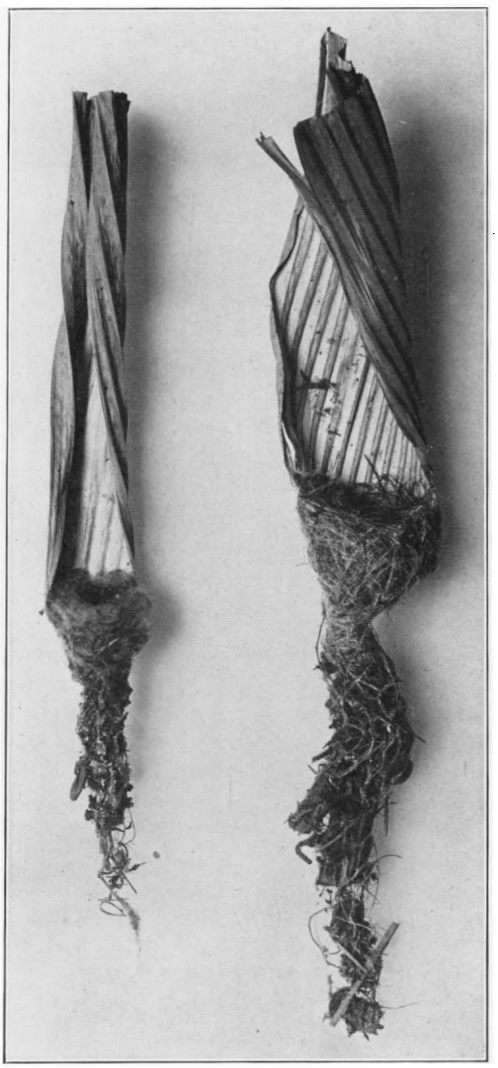

Fig. 17. NESTS OF HUMMINGBIRDS, *PHAETHORNIS ADOLPHI* ON THE LEFT, AND *P. LONGIROSTRIS* ON THE RIGHT

Most nests of the third type, such as those of the *Vireonidae* and species of *Icterus*, require no special mention. Tho not precisely of this type, we may place here the wonderful nests of the Oropendolas, *Gymnostinops* and allied genera. Perhaps no birds' nests of tropical America are better known than these; it is, therefore, sufficient to say that probably they are absolutely untroubled by enemies if we except the parasitic Rice Grackle, *Cassidix*.

Manikins of the genera *Manacus* and *Pipra* make small, shallow nests of extremely slight structure, and in the case of *P. mentalis* several dry leaves are hung loosely on the outside, which serves as a very effectual disguise. In both instances the nest is usually suspended near the end of a long, slender branch, inaccessible to most reptiles.

Two hummingbirds of the genus *Phaethornis* suspend their nest from the

under side of a drooping palm leaf near the tip of one of the terminal pinnules. These are somewhat concave, so that the nest is attacht by about one-half its circumference along one side, the other side remaining free. In such a position even the nimblest lizard would find it very difficult to reach; yet a further precaution is taken by attaching to the bottom of the delicate structure, by means of spider webs, shreds of coarse bark, dry leaves, bits of rotten wood, etc., so that the

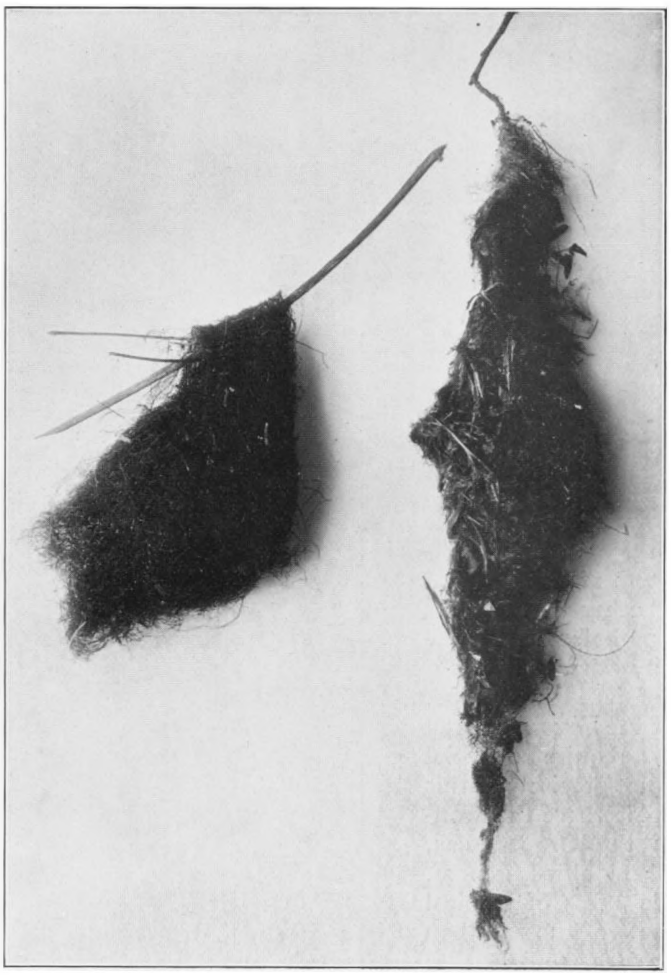

Fig. 18. NESTS OF TROPICAL FLYCATCHERS, *RHYNCHOCYCLUS CINEREICEPS* ON THE LEFT, AND *TODIROSTRUM CINEREUM* ON THE RIGHT

whole nest is sometimes more than half a foot long, and closely resembles a bit of loose rubbish caught on the end of the leaf. (See Fig. 17.)

It is in nests of the fourth class that we find the most striking examples of protective adaptation, and these for the most part in the great family of *Tyrannidae*.

The nest of the splendid Royal Flycatcher, *Onychorhynchus*, is no less remarkable than the bird. It is a fusiform structure, sometimes two feet in length suspended by the top from a long drooping branch or trailing liana, usually over a

stream, from four to fifteen feet from the water. The greatest diameter is a little below the middle, and at this point the cavity is situated, which is entered by a small hole. The nest is composed of coarse fibrous material and covered over the outside with dry leaves, leaf stems, and large twigs, some of the last a foot or more in length. The whole affair in almost every detail so closely resembles a small mass of debris left by a retreating flood, as to deceive the keenest enemy. Furthermore, the location assists greatly in the disguise, the nest appearing to be but one among thousands of such masses entangled in the vegetation overhanging the stream. Add to this the difficulty any reptile or mammal would experience in reaching it, even were its nature known, and we have a most striking example of protective adaptation.

Todirostrum cinereum and some other *Tyrannidae* make nests of precisely the same style as that of *Onychorhynchus*. That of *T. cinereum* is much less frequently built over a stream and is composed of finer material, often with so much cottony substance interwoven as to give it the appearance of a colony of "tent-caterpillars." (See Fig. 18.)

The nests of two other small flycatchers, *Todirostrum schistaceiceps* and *Oncostoma cinereigulare*, are also suspended by the top from small branches and entered by a hole at the side, but are somewhat pear-shaped. They are built but two or three feet from the ground, and if they are as inconspicuous to the reptilian as to the human observer, they are comparatively safe. (See Fig. 19.)

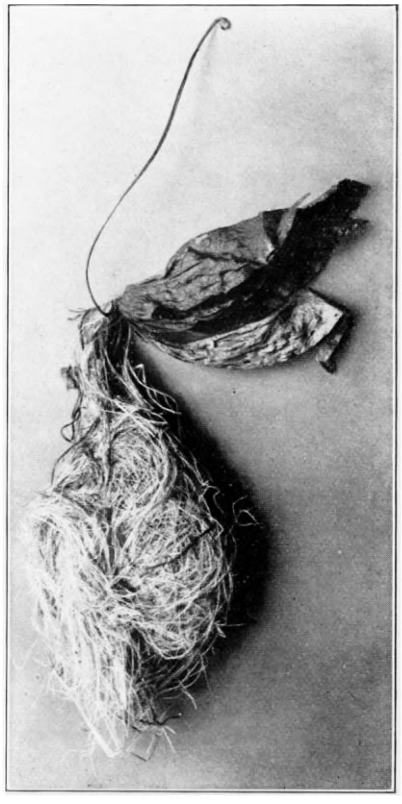

Fig. 19. NEST OF THE SLATE-HEADED TODY FLY-CATCHER, *TODIROSTRUM SCHISTACEICEPS*

Rhynchocyclus is a genus of small flycatchers of obscure coloring and ordinary habits, noteworthy only for their curious nests, which are perhaps among the most remarkable examples of protective adaptation known. The nest of *R. cinereiceps* is built from ten to thirty feet above the ground, or water, as it frequently overhangs a stream. In shape it resembles an old shoe, or rather moccasin, suspended by the top with the entrance at the toe, and a narrow passage leading over the instep to the heel, where the main cavity is situated. It is composed of some kind of aerial roots—long, fine black fibers resembling horse hair. It usually hangs from a long, slender branch of one of those myrmecophilous acacias, whose stout double spines are hollow and inhabited by ants. The thorns are very numerous and the ants are extremely irritable and armed with formidable stings, equal in effectiveness to that of the bumble bee. The thorns alone would make the ascent of the tree by an animal of any size very difficult, but the presence of the ants renders it absolutely impossible. But this is not all. A species of hornet frequently makes its nest, a large conical or oval structure, in the same tree, and

the nest of the bird and that of the insects may often be found within three or four feet of each other. The protection, however, is not always so complete. A curious variation of the situation occurs when a tree with leaves closely resembling those of the acacia is selected, and the nest is placed beside that of a species of ant, which at first sight would probably be mistaken for a hornet's nest, so similar are the two in appearance. (See Fig. 18.)

The nest of the Beardless Flycatcher, *Camptostoma imberbe*, is built in a small species of palmetto, in the upper angle formed by the juncture of a leaf-stem with the trunk. The trunk is very shaggy with the frayed margins of the fibrous sheaths, and the nest can be reacht without difficulty by any climbing animal. The danger from such enemies, however, is greatly reduced by the structure and material of the nest. Except for the soft cottony lining it is composed entirely of fibers obtained from the trunk of the palm, which are deftly interwoven with those fringing the sheaths, so that one might easily mistake the whole structure for a mere tangled tuft of loosened fibers. The small hole at the side by which the cavity is entered is turned directly away from the trunk and would not be likely to attract the notice of any reptile climbing it.

Many other instances might be cited of similar adaptations in nests of this class, as in the case of the wood wrens, *Pheugopedius*, the Passerine genus *Arremon*, the Cotongine genus *Pachyramphus*, a small Rail, *Creciscus ruber*, etc. but further illustrations are unnecessary.

Most of the protective adaptations thus far considered are characteristic of species inhabiting forests or dense thickets, where the principal enemies to be guarded against are reptiles or small mammals. In the more open sections of British Honduras, known as pine ridges—flat, grassy tracts with a scant sprinkling of low pines—the case is quite different. Here the chief enemies are jays, especially *Psilorhinus*, hawks and probably vultures. Several of the common species inhabiting these localities have adopted a means of protection eminently suited to their circumstances. In studying the nesting habits of the bird fauna of the pine ridges, one of the first phenomena noticed is the tendency of several species to nest in close proximity to each other. The colonies thus established are composed of widely separated forms, mostly tanagers and flycatchers, which may be found nesting peacefully within a few yards of each other. If a number of the colonies are examined it will invariably be found that the nests of the other species are grouped about that of the splendid Derby Flycatcher, *Pitangus*. This bird is one of the most powerful and warlike, as it is one of the handsomest of the great Tyrannine group. It is never known, however, to molest weaker species, permitting them to make their nests undisturbed within a few yards of its own.

Doubtless the courage and "magnanimity" of this species have caused it to become the unconscious protector of its weaker neighbors. The most common of these are the two tanagers, *Tanagra abbas* and *T. cana* and the flycatchers, *Myiozetetes similis*, *Legatus albicollis*, *Elaenia martinica subpagana*, and even the large but weak and sluggish *Megarynchus*. It is worthy of note that those forms that gather about *Pitangus* to nest are such as would be most likely to become the victims of hawks, jays, etc., both on account of their weakness and the exposure and conspicuousness of their nests. Many of the common pine ridge forms, for example, *Tyrannus melancholicus*, and species of *Myiarchus*, do not regularly associate themselves with these little communities, for the obvious reason that a strong and pugnacious species like *T. melancholicus* is amply able to defend its own, while those that nest in cavities of trees, like *Myiarchus* are beyond the reach of most of the common enemies. Whenever the location of one of these

colonies permits of such a choice, *Myiozetetes* and *Legatus* invariably and even *Pitangus* occasionally build their nests in one of the small acacias with hollow thorns inhabited by stinging ants; it is, therefore, not unusual to see the nests of two or three species of flycatchers in a single small tree.

A few words may be added here regarding the relation of ants to the nesting habits of British Honduras birds. In several instances referred to their presence is employed by the birds as a means of defence from larger enemies, but they are by no means always beneficial. The writer once found a nest of *Myiarchus*

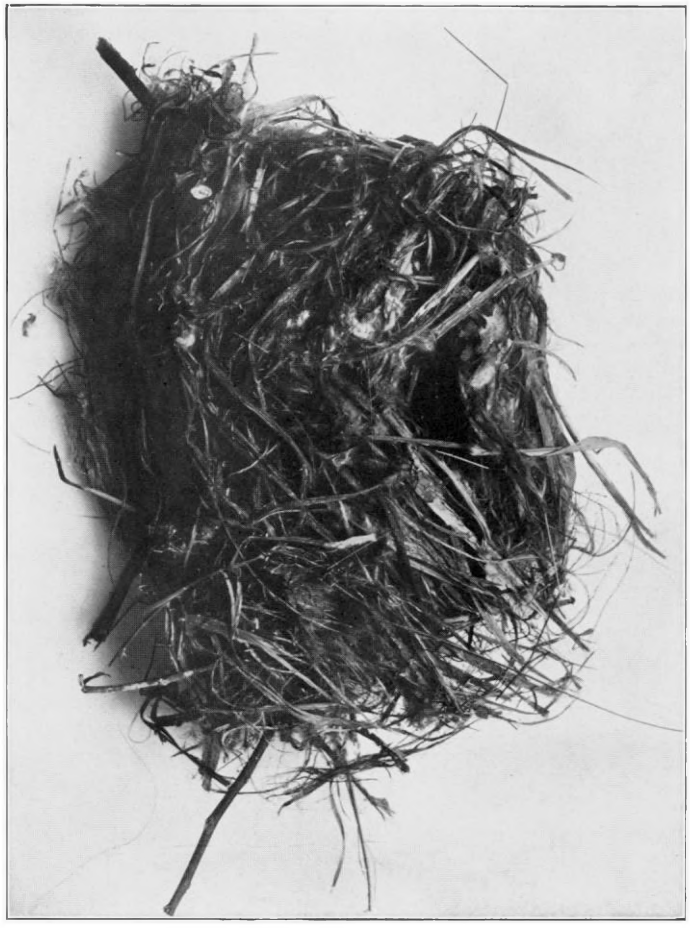

Fig. 20. NEST OF THE CINNAMON BECARD, *PACHYRHAMPHUS CINNAMOMEUS*

mexicanus containing a newly hatcht bird just breathing its last and covered with small red stinging ants that had evidently attackt it as their prey. Such cases are doubtless common. The fierce driver ants of the genus *Eciton*, which move in vast hosts thru the forests, destroying every living creature that remains in their path, can not fail at times to come upon nests that are placed on or near the ground. These ants do not usually ascend far into the trees nor go out to the ends of long branches; it may be partly for this reason that some of the manikins and

other small birds nesting near the ground place their nests on long, slender twigs.

To some of the foregoing examples as illustrativc of protective adaptation, it may be objected that individual cases occur where the very element is wanting which renders the peculiar structure or location of the nest protective. For instance the nest of *Onychorhynchus* does not always overhang a stream, and may even be placed far above the level of the highest flood; the nest of *Rhynchocyclus* is not always in a thorny acacia; *Myiozetetes* and *Tanagra cana* sometimes build their nests far from that of *Pitangus*, etc. It can only be answered that in analogous cases of adaptation thruout nature we will find the same sort of exceptions; and that the positive evidence is so largely in preponderance of the negative as to be obvious to any ordinary observer.

Anyone who has given the slightest attention to the breeding habits of birds is familiar with the fact that there is a wide range of individual variation within the limits of almost any species; and it is no less true that in cases where highly specialized nonstructural adaptations of any kind occur, the range of individual variation is likely to be still wider. We cannot in any of the foregoing cases regard the protective adaptations as dependent on perfectly rigid and definite laws of action, as in the case for instance with the migration of birds. Natural selection is still, doubtless, pre-eminently operative in compelling conformity to a set of peculiar conditions, whose very complicity implies immense variations in the effort, conscious or unconscious, to meet them. Whether these variations are dependent on slight structural differences, age, mere accident, or some other circumstances, is a matter very difficult to determine.