# THE PARENTAL DEVOTION OF BIRDS

By ALEXANDER F. SKUTCH
SAN ISIDRO DEL GENERAL, COSTA RICA

Most of us who have given even casual attention to the ways of wild creatures have from time to time witnessed acts of courage in the defense of home or young that have made our pulses throb with admiration. It may have been a mother raccoon returning heroically to rescue a cub who had lagged behind when danger threatened; or a parent bird defending her nestlings from a cat or a snake; or else we ourselves were the object of attack, when our well-intentioned visit to the nest was misinterpreted. We marvel at such dauntless heroism, and question whether we would possess the valor to confront enemies so many times greater and more powerful than ourselves, even in the defense of those we most love.

Of all my adventures among wild things, no recollections are more grateful to memory than those of their heroic acts in the defense of their homes. For nothing so warms the heart, even of the timid, as the sight of courage put forth in a good cause. Most of these recollections center about birds. Once, while bathing in a tropical river, my attention was drawn to a sudden commotion among the bushes overhanging the channel. A Song Tanager (*Ramphocelus costaricensis*) had her nest there. A slender green snake, about two feet in length, had surprised her by a stealthy advance and was devouring her spotted blue eggs. The tanager, crying loudly in her nasal voice, was fluttering about, trying to fight off the serpent. If she did not actually peck the lustrous green body, she certainly came within an inch of touching it. I fear that I was more the partizan than the disinterested scientific observer, for I no sooner became aware of what was happening than I began to look for a weapon—which, as usual, was not to be found when most urgently needed. As soon as I could lay hands upon a stick that brought the snake within reach, I rushed to the bird's assistance and knocked her green enemy into the water, just too late to save her eggs.

Meanwhile, the tanager had been hovering around her doomed nest, very nearly, if not actually, in contact with its assailant. This display of courageous determination surprised me, because where man is concerned the female Song Tanager is one of the most timid of birds at her nest. The green serpent was to the tanager in size as a boa or python from fifteen to twenty feet in length to a man. (The boa which the intrepid Waterton engaged in a wrestling bout amid the Guiana forests was, if I rightly recall, of far inferior proportions; and few men, I imagine, would care to repeat his exploit.) The fact that the tanager's defense against the snake was ineffective did not prove that she had failed to inflict punishment upon it; for I once watched a serpent of another kind, a mica, mortally wounded by bullets, continue to gorge upon the contents of the nests in a colony of Lawrence's Caciques. A ravening snake appears to be insensitive to pain and almost insensible to danger.

Often I have myself been the object of attack by too-zealous parents unable to understand my benevolent curiosity. One of the vivid recollections of my boyhood is of an adventure with a parent Bob-white Quail. Riding along a winding country road on my bicycle, I saw her cross with her covey of downy





chicks ahead of me, and dismounted just in time to catch one of the stragglers. But the old bird, noticing the fate of her chick, turned and dashed toward me so belligerently that I dropped my tiny captive and retreated. An angry barnyard hen will sometimes make as fierce an attack in defense of her chicks.

Years later, a pair of Catbirds (*Dumetella carolinensis*), nesting in a thorny barberry hedge between two houses in the suburbs of a great city, gave a fine display of courage and cooperation in the defense of their nest. During the female's frequent absences from incubating her three blue eggs, her mate would almost invariably perch in a little hawthorn tree hard by the nest, where he could keep watch over it. Here he stood guard in silence; but upon the return of the female he went off to a more distant ash tree to resume his sweet music. Whenever I came near his treasures, he advanced very close to me, tail spread and wings quivering, hopped excitedly about, and uttered loud mews. If I held my hand above the nest, the female Catbird would strike it with her feet. After the eggs hatched, both grew bolder in the defense of the nestlings. The mother bird would now not only strike my hand, but actually alight upon the back of it and peck me vigorously with her slightly deformed bill. The blows were rather painful, and at times drew a few drops of blood. If I turned the palm of my hand upward, she dared not rest upon it, but pecked from the side. Meanwhile, the father would flutter about my head, sometimes striking me. All in all, this was the most vigorous mauling I have ever received from any pair of birds.

The human hand, with its five long, mobile, grasping fingers, must seem a terrible instrument to creatures with less versatile forelimbs. I imagine that they look upon it with the same degree of aversion and dread as we do the tentacles of an octopus, the fangs of a serpent, or the sting of a scorpion. The Catbird, who doubtless had enjoyed no previous opportunity to study the mode of action of a hand, seemed instinctively to know which way the thing worked, and made her attacks with due caution. While taming a filly, I found that she would take food from my hand, and nuzzle my face, long before she would willingly submit to being touched with my fingers. She appeared to have the same dread of them as the Catbird.

In the forests of Panama, a male Slaty Antshrike (*Thamnophilus punctatus*), a bird somewhat smaller than the Catbird, defended his nest with equal valor. He was standing guard beside the little moss-trimmed cup when I attempted to lift out one of the nestlings. Fluttering his spread wings, expanding his tail into a black fan tipped with white, raising the blackish feathers of his crown, and spreading the slate-colored plumage of his back to reveal the white patch usually concealed in its center, he resembled a wild Indian in full panoply of war. Then, darting forward, he bit the tip of a finger—I suppose with all the might of frenzied parental devotion, yet so lightly that I scarcely felt the nip. Twice he repeated his daring assault, then retreated a little way. Meanwhile his mate, creeping over the ground close by, tried to lure me away by the familiar "broken-wing" ruse.

Many other birds have displayed signal courage in defending their nests from my well-meant but probably terrifying intrusion. I recall a male Groove-billed Ani who forcefully buffeted the back of my head whenever I visited his nestlings in the thorny orange tree. A Verreaux's Dove, who could not easily be frightened from its overhead nest in a coffee plantation, gave a stinging wing-blow to the mirror I held up to see the contents of the shallow cup—stinging, I fear, only to its wing. Then

it dropped to the ground and gave one of the best exhibitions of broken-winged helplessness I have ever witnessed. A Short-legged Wood Pewee, one of the smallest and weakest of the flycatchers, made most spirited demonstrations whenever I visited his nest, dashing close by my ears with angry snaps of his little bill. Trespassing birds far larger than himself were treated in the same fashion.

The literature of natural history, both dryly scientific and that intended to make more exciting reading, is full of accounts of the reckless courage which birds and mammals at times display in the defense of their young. Many an egg collector has had cause to rue his climb to a hawk's eyrie defended by parents strong of talon and dauntless of heart.

Some birds display their fortitude by clinging staunchly to their nests in the face of danger, rather than by bold attack. Chiefly, these are of kinds whose coloration renders them inconspicuous; to move would be to cancel the value of their protective coloration and to catch every watchful eye. Hence they remain sitting motionless in the face of an enemy until it is almost upon them, as though hoping against hope that they had not been seen. Yet it is not always the neutrally colored bird who remains faithfully at her post of duty: a Robin and a glittering hummingbird have permitted me to touch them lightly as they sat. But the bravest and most devoted of all the incubating birds I have ever known was a tiny female Yellow-thighed Manakin (*Pipra mentalis*). Clad in dull olive-green, quite lacking the brilliant scarlet that adorns the head of the black male, she was a most inconspicuous object as she sat in her shallow nest, hardly bigger than a watch glass, in the undergrowth of the tropical forest. She clung stubbornly to her nest, and allowed me to smooth the feathers of her back, touch her breast and bill; even shaking the branch that supported the nest would not cause her to forsake it. Since she could not easily be made to leave, when I wished to learn whether her eggs had hatched, I was obliged to push my fingers beneath her breast and feel. I found her clinging to the little cup with her feet. She provided a unique object for photography; she was the only mature bird I have ever known who would allow herself to be gently pushed about on the nest into just the pose the photographer desired. Yet away from their nests, these manakins are not devoid of a wholesome caution in the presence of man.

Birds that breed in burrows often remain on their nests with incredible disregard of their personal safety. This is especially true when the nestlings have just hatched, for it is then that parental devotion is at its most fervent pitch. I have opened the burrow of a Blue-throated Green Motmot, and of a Green Kingfisher, and lifted the parent bird unresisting from its newly hatched nestlings. A big Ringed Kingfisher remained upon her eggs with equal bravery; but her powerful beak forbade familiarities. Yet all of these birds were free to escape, since I had opened their burrows at the rear, and they might have slipped down the entrance tunnel to the outer air.

But despite all the steadfast devotion of birds to their nest, their zeal in its defense, their reluctance to forsake it even in the face of enemies far larger and more powerful than themselves, less than half of all bird nests remain inviolate until the young are fledged. Studies have been made of the nest-losses of many kinds of birds in the most varied regions. Only occasionally, where sufficient nests to be statistically significant have been followed through, has the number of losses been much below 50 percent. In the North Temperate Zone,



the premature loss of from 50 to 60 percent of all open nests seems to be the rule; often the destruction is considerably greater. In the tropical forest, the loss of nests is sometimes as high as six in seven. This will not surprise us, when we remember that the enemies of birds are numerous, while the birds themselves—for all their zeal—are for the most part harmless creatures whose only defense lies in flight.

But what does seem incompatible with the parent birds' manifestation of devotion and concern is the fact that they nearly always survive the loss of their eggs or nestlings. Very infrequently one finds evidence, in the form of feathers scattered about and below the nest, that the parent bird has shared the fate of its offspring. And even this telltale sign of disaster may be misleading, for I have known parent birds to leave many feathers behind, yet survive to build another nest. Nearly always, the despoiled nest is followed by another and another, until at last a brood is fledged, or the breeding season draws to a close. I have known a pair of birds to build four, five, or even six nests in a season, yet not raise a single nestling until it was fledged.

Are we to conclude from this that the solicitude of parent birds—their cries of distress, their attacks and feints of attack, their steadfast clinging to the nest in the face of danger—is all a sham and a bluff; that in their boldest resistance to the intruder they are acting a part, just as when they flutter away over the ground feigning a broken wing? Can it be that they have no real feeling in the matter, and not the least intention to sacrifice their lives in the defense of their offspring?

Birds do in fact at times give up their lives in the defense of their nests. If Audubon's famous painting of the Mockingbird in the rattlesnake's mouth is based upon actual observation, we have here a case in point. In the defense of its nest the British Corncrake is said to attack a dog or fight a rat until too crippled to escape. I personally have never witnessed a grown bird fall a victim to the assailant of its nest; but then it is not often that the watcher is at hand at the moment the calamity occurs. Yet many a bird, defending its nest or merely remaining steadfast upon its eggs, has placed itself within my power to kill it with a stick or even my hands, had I been so inclined.

We have seen that with most species of birds the eggs or nestlings are destroyed in half or more of all nests. At times the destruction is effected by some small marauder, weaker than the owner of the nest, during an interval when both parents are absent. But usually the destroyer is more powerful than the parent birds. Were these to offer a determined resistance, the outcome of the conflict could hardly remain in doubt: the parents must die along with their offspring. Even if they succeeded in beating off the assailant at the expense of mortal wounds, the nestlings would succumb from lack of attention. In many species, if only the male died, the female might care for her family alone; and I have known male birds of several kinds to be successful in raising nestlings whose mother disappeared after they were feathered. But with most species of birds, the economy of the nest is such that if the female be lost before the nestlings are covered with plumage, the eggs must spoil or the nestlings die of exposure. Even making allowance for exceptional cases, I believe that by a policy of "resistance unto death," nearly half of the breeding adults would each year not only fail to reproduce themselves, but perish in the attempt to reproduce. The remaining half of the breeding birds would doubtless not suffice to maintain the population at a constant level; for many a fledgling that

leaves an undespoiled nest fails to reach maturity; and the adults themselves face many dangers.

Thus it appears that natural selection must itself set a limit to parental devotion. For the parents to sacrifice their lives in vain attempts to preserve their offspring, or even in the successful defense of their young, would be a heroic but futile gesture. The struggle for existence among wild creatures is too severe to allow such chivalrous renunciation of self. Among highly social animals, such as man, the social Hymenoptera, and perhaps even beavers, Brown Jays, and a few other vertebrates, the sacrifice of an adult in the defense of the young may be of positive biological value; but certainly not among creatures with which the single individual or pair is alone responsible for the care of the offspring—for they have no orphanages, and adoption is rare or unknown.

In an economy under which all or nearly all of those individuals who lose their lives in an attempt to shield their offspring fail to leave progeny, the heroic race cannot long survive. I believe that the elimination of individuals inclined to take too great risks in the defense of their offspring is going on, on a small scale, all the time in many species. Thus it would be impossible for any species or race to arise, through natural selection, in which all or the majority of the individuals fight to the last breath to preserve their eggs or young. It is not impossible that whole species may have become extinct through no other cause. This is especially apt to occur when a new predator, with whose prowess and activity the native birds are unfamiliar, invades their territory. Natural selection certainly cannot forestall the development of strong parental solicitude, nor the manifestation of that solicitude in demonstrations of anger or attempts at defense when the young are endangered, but it sets a strict limit to those demonstrations and that defense. The parents must not often endanger their own lives, nor habitually enter into conflicts of which the issue is in doubt.

Often, when we visit a bird's nest, we witness behavior which is a compromise between parental devotion and the instinct of self-preservation. Anguished parenthood would—and sometimes does—throw itself recklessly upon the intruder. But more often it is withheld by that prudence without which its kind would cease to exist. The bird may dash boldly toward us—only to swerve harmlessly aside when nearly within reach. It may hover in the air above us and utter shrill screams of distress. Or else it may shower upon some inanimate, or even animate, substitute the pecks it dare not inflict upon us. A female Great-tailed Grackle, whose nest in a coconut palm I used to visit, would alight upon one of the great fronds and give it angry pecks while I looked at her nestlings close by. When I climbed to a nest of Brown Jays in a willow tree beside a tropical lagoon, the most zealous of the attendants would administer punishment to the surrounding boughs, or else alight on a banana leaf close by and tear it to shreds with its powerful bill. Blue Jays will also hammer vigorously at a branch while a human intruder is at their nest. Under similar circumstances, Ravens behave in even more spectacular fashion. "When the young are in danger, you often see the old birds work themselves into such a temper that they pitch down and tear grass up by the roots, looking a very picture of impotent rage. On one occasion, under such conditions, we saw a bird settle on a sheep's back and tear the wool off it, to everyone's great amusement except the sheep's" (Gilbert and Brook, *Secrets of Bird Life*, London, 1924). Prairie Falcons, when their nests are disturbed by men, sometimes strike and even kill other birds in the vicinity, making them the innocent victims of outraged parental devotion (Bent, *Life Histories of North American Birds of Prey*, Washington, 1938).



It appears to be generally true that wild creatures are instinctively aware of the strength and prowess of their hereditary natural enemies, and avoid risking their lives in the defense of home or offspring against such enemies as are likely to overcome them. This principle might be briefly designated the "Law of Prudence." It applies not only to birds and mammals, but to cold-blooded animals as well. Once I watched a Red-throated Caracara (*Ibycter americanus*), a big black hawk with a white belly, attack the corrugated carton nest of a kind of large black wasp with a formidable sting. The caracara subsists largely upon the larvae of wasps, and is a master of the art of opening their hives. Attracted to the scene of impending conflict by the bird's hoarse, raucous calls, I prepared to witness a thrilling and hotly contested battle between hawk and wasps. But in this I was disappointed. From the first, the wasps seemed to recognize the mastery of the caracara. They hovered about it in a black swarm. A few apparently attached themselves to its plumage, for it shook its head, scratched its body with a foot, and appeared to pluck one or two from its feathers. But on the whole it took little account of the insects, which soon ceased their attacks and flew about in helpless anger; while the caracara, hanging back downward, proceeded to tear away the corrugated gray envelope of the nest and to devour at its leisure the contents of the brood combs.

These wasps, although they lost all their young brood, lived to establish a new nest on the wall of my house—behavior biologically more sound, if less inspiringly heroic, than losing their lives in a vain attack upon the caracara. Not long after their new corrugated fabric was completed, the house was invaded by a horde of brown army ants. These incursions were repeated at brief intervals during the course of several weeks. When the ants discovered the nest of the big black wasps, they filed in long, hurrying columns to the attack. The wasps merely lined up around the single inch-wide orifice at the top of their nest, their bodies entirely inside, their heads in a ring just within the rim. Whenever an ant passed over the edge of the doorway, it was easily pushed back by the defenders. The brown hordes picked out each weak spot in the corrugated carton walls and attempted to open a breach. But whenever a small gap was made, it was defended from within in the same manner as the permanent entrance. For two hours I watched an exciting siege, an attack upon Troy in miniature, right on the outer wall of my dining room. At length the Greeks admitted defeat and drew off their forces, leaving the Trojans in unshaken possession of their citadel. Neither attackers nor defenders, so far as I could learn, suffered a single casualty. The wasps knew, instinctively, when prudence was the better part of valor, as with caracara, and when they could put up a successful resistance.

Of all the numerous kinds of curious wasps' nests attached to my walls and rafters, none other escaped destruction that eventful afternoon; for either their occupants were smaller and weaker than the black *guitarrónes*, or else their houses were more open. And in every instance, apparently, these less powerful wasps fled without a real attempt at defense, although a few were trapped in their nests and fell prey to the Echiton ants. The chief booty, however, consisted of the soft white larvae, which in long, victorious columns the ants bore down the walls and out through the grass in the yard. In many cases, after the departure of the ants, the wasps returned

to their desolated homes, and began to fill the empty brood cells with eggs once more.

The army ants made several other afternoon attacks upon the big gray nest, but always with the same lack of success. The corrugated fortress was clearly impregnable by day. Finally, the Echitons attempted a nocturnal attack, with a very different outcome. The wasps, big-eyed, diurnal creatures, had clearly lost advantage in the face of their nearly eyeless opponents, to which night or day seem to be as one. Many fled the doomed nest and settled upon the walls of the house, or else flew in to the lamplight through the open door, and so gave me notice of what was taking place. Others were trapped inside and overpowered, and their lifeless bodies dragged out along with the larvae, each by a whole squad of toiling ants. But next day, the numerous survivors returned to their childless home, and began to fill the brood-combs anew. Here, again, the instincts of the wasps led to the maintenance of a breeding population of adults rather than to the preservation of the young brood. Biologically, an adult in the reproductive period of life is far more important than an immature individual; for, under natural conditions, the chances of any newborn animal's reaching reproductive maturity are not high. The breeding adults are a selected, and therefore more valuable, group than the infants of the species.

My experience with the wasps and ants led me to introduce a modification to the "Law of Prudence," which is that wild creatures as a rule avoid risking their lives in the defense of home and offspring against an enemy powerful enough to overcome them *under the conditions of the attack*. For it is evident that while adults may put up an effective defense under certain conditions, with altered circumstances they flee from the same enemy. Many birds' nests are despoiled during the night, possibly by enemies that the birds, which are helpless in the dark, would be able to drive away in the daylight.

These responses to attack, whether by flight or defense, are instinctive rather than rational, or based upon individual experience. The same wasps that appear to know so well what course to pursue when attacked by a hereditary natural enemy, are most stupidly blind where man is concerned. When a swarm has settled down to build a nest on a house, where they would be a menace to the inmates, it frequently happens that there is no way to discourage them short of extermination. If a few are killed at a time, the survivors return; and they must be attacked again and again until all are dead. They have not yet learned the ways of man, and appear to be incapable of learning them from individual experience. Similarly, birds upon a desert island fall easy prey to cruel, avaricious men.

THE "Law of Prudence" applies to the procuring of food no less than to the defense of offspring. Just as a wild creature's chances of rearing its young to maturity are at best so small that nature cannot afford to let it lose its own life in defending them against a more powerful assailant, so its natural enemies, whether larger animals or parasites, are so numerous that it would jeopardize the existence of its kind if it habitually preyed upon animals whose strength or weapons of defense made them a doubtful quarry. The squirrel and the jay enjoy an occasional egg, but will not attempt to steal one from a hawk's nest while the owner is present; the eagle hungers for the newborn antelope, but seeks to surprise it away from its mother rather than brave her sharp prongs. I believe that no wild animal normally obtains its food in a manner so dangerous as, let us say, the occupation of a deep-sea fisherman in



northern seas before the mechanization of the industry. Those animals who appear to win their food, or that of their offspring, in a most desperate and hazardous fashion, upon closer study are found to be so expert at their trade, or so well-provided with bodily defenses, that actually they run little risk. The caracara, which subsists largely upon the larvae of wasps, would seem to be doomed to a life of cruel punishment and distress; yet I saw that in attacking a hive of one of the fiercest wasps of this region, it had things all its own way.

Snake-eating birds, which prey upon venomous as well as nonvenomous species, would appear to lead a precarious existence; but a little reflection will show that this cannot be so. A bird like the Laughing Hawk (*Herpetotheres cachinnans*)—the *Guaco* of Central America—whose principal, if not sole, diet is snakes, needs on a conservative estimate 365 of these reptiles a year for its own consumption. At a nest I watched, the male brought a snake every morning and evening for his mate and downy nestling; whence I conclude that a breeding male must capture upwards of five hundred serpents in a year. In order to make so many successful attacks upon snakes, he must be a master of his art, not an experimenter or a bungler. He must know to a nicety which snake he can safely seize, and which is too powerful for him. Although little is known of the rate of reproduction of these hawks, it appears to be slow, indicating that the adults are long-lived. The poets delight in describing long-continued, spectacular conflicts between the eagle and the serpent it has grasped in its talons—none more thrilling than that which opens the first canto of Shelley's "Revolt of Islam." It seems a pity to cast doubt upon the factual accuracy of such stirring passages in poesy; yet in the interest of truth I must record that I have seen hawks and eagles sailing through the air with snakes in their talons more times than I can recall, and always the serpent, far from endangering the life of its captor, hung a helpless victim in his talons. We may recall that in some of the great serpentaria where antivenins are prepared, the attendant who allows himself to be struck by one of the snakes under his charge is deemed guilty of unpardonable carelessness, and suffers a pecuniary fine in addition to the painful treatment for snake-poisoning.

Those wasps which store up paralyzed tarantulas or other great spiders as provender for their larvae appear also to engage in a desperate business; but in reality, as the studies of Petrunkevitch and others have shown, the spiders are terror-stricken at the approach of these skillful huntresses, and fall almost unresisting victims. Perhaps the terror of the rabbit when cornered by the weasel, and of small birds when overtaken far from cover by a hawk, is typical of all animals when face to face with the creatures that habitually prey upon them.

But the most skilled experts at times make mistakes at their trade; so these hunters of large or dangerous creatures sometimes misjudge their prey and pay dearly for the error. An example of this is the Osprey who sinks his talons into the back of a fish heavier than he can lift, and is drawn under water and drowned by the intended meal. Once I saw a Laughing Hawk pounce down upon a large black-and-yellow mica crawling through a pasture. The snake reared up; the hawk, evidently surprised by its length, at once took flight and did not repeat the attack, not caring to risk its neck in an encounter of uncertain outcome. Such mistakes appear to be rare in the lives of hunting animals. Their slow rate of reproduction, as compared with that of the creatures upon which they prey, is proof of this.

Last October, at the edge of the forest beside my house, I saw the act of the

Laughing Hawk and the mica repeated in all its essential details, but with actors of far smaller size. A female Tyrannine Antbird (*Cercomacra tyrannina*), an insectivorous bird about the size of a sparrow, had discovered a big, brown, hairy spider in its lair between two leaves it had bound together with cobweb. When threatened by the antbird, the spider raised its four front legs, keeping the two on each side together except at their tips, where they were slightly separated, so that the legs jointly bore considerable resemblance to the pincers of a scorpion. Whenever the bird drew near, the spider waved these raised and threatening appendages, and then she would draw back. It was clear that the little antbird was tempted by this large and succulent morsel, and it was just as plain that she feared it. Perching at a respectful distance, she stretched forward her neck to seize it in the tip of her bill, but she did not stretch quite far enough. Finally prudence overweighed appetite, and the bird flew off in search of less formidable game. The spider measured possibly two inches across the spread legs, and was a big morsel for a bird only five inches long.

The prudence of the foraging Wren-tit (*Chamaea fasciata*) is described by Dr. Erickson in her monograph of this little bird of western North America:

> The attack on larger prey, such as centipedes two or three inches long, as seen in caged birds, is a prolonged process which combines dexterity and speed. The lashing centipede, to a wren-tit, is formidable and inspires obvious fear. It is circled and watched at length, and often succeeds in disappearing into the leaves. Otherwise, the bird finally recognizes an opening, there is a quick thrust, grab, and toss, the centipede lands several inches away, and the tactics are resumed. With each attack the vigor of the prey is reduced. Finally, the wren-tit dares hold it with foot or bill. . . . Once, a captive wren-tit pulled to pieces and ate in the course of half an hour a very active four-inch angleworm, an operation which was not repeated though the opportunity was often provided. It was accomplished with extreme awkwardness, both because of the obvious fear of the bird for the twisting worm and because when a grip was secured the slimy length pulled through the grasping foot.

Further evidence of the habitual prudence of birds in choosing their prey is found in the eyemarks of many caterpillars, notably those of the swallow-tailed butterflies (*Papilio*), their habit of raising their foreparts or lashing from side to side when threatened, and similar markings and attitudinizings of small creatures that are perfectly harmless and apparently quite good to eat. It would be difficult to account for the evolutionary development of such devices were they not at times effective in frightening away hungry but timid birds and perhaps other insect-eaters as well. Several observers have described the startled behavior of small birds that suddenly came face to face with the wide-eyed, serpent-like mask of the caterpillars of the Tiger Swallowtail and related species.

In times of scarcity and famine, a different story must be told. Then, half-famished animals are driven to take unequal chances to procure the means of continued life. Wolves attack villages, braving the deadly weapons of men; animals ordinarily cautious are lured into traps. But these are exceptional circumstances.

Yet occasionally, even when there appears to be no dearth of food, creatures of two species will engage in long, fierce conflicts of which food is the coveted prize. Social insects, especially ants and bees, seem most frequently to wage such deadly battles. At times bees of two kinds join in hottest warfare, one seeking to carry off the sweet stores of the other. The dead and dying bestrew the ground, opponents locked together in deathgrips. Or else ants attack a hive of bees, which valiantly defend their home, slaying many of their adversaries, but paying several lives for one. Such struggles appear at first sight to present exceptions to the "Law of Prudence," but the exceptions are more apparent than real. In all the battles of this sort that I have witnessed, the opposing hosts were rather evenly matched; and if one lost more heavily than the other, it had more soldiers to spare. Each side had a prospect of victory. If the attackers won and carried off the booty, they paid for it with many lives. But then the hive's stores of nectar are gathered only at the price of the workers which wear out their lives in quest of it. Perhaps, after all, a full storehouse won by a victory in which many lives are sacrificed, costs less per drop than nectar slowly gathered from its primary sources in pacific fashion. And if the defenders are victorious and save their hive at the expense of many of its inhabitants, the survivors carry on the work of rearing the young brood. Their situation is quite different from that of more solitary animals; comparable to that of man.



THERE are two reasons, then, why we should not expect to see birds engage often in life-and-death struggles in the defense of their nests and young. First, were they to resist habitual predators more powerful than themselves, the existence of their kind would be placed in jeopardy. Second, they are not often called upon to do more than threaten weaker animals that approach the nest, for these would jeopardize the existence of their species if they attacked stronger creatures in their quest for food. So long as more certain prey is available, animals prefer not to attack others that are an even match for themselves. Sometimes, of course, a weak marauder attempts to rob a nest in the absence of its owners, and is put to ignominious flight by their sudden return.

Some years ago, I spent many hours watching a nest of a pair of Laughing Hawks, situated a hundred feet above the ground in a cavity in the trunk of a huge tree standing at the edge of the forest. Through field glasses, I could sometimes see a single downy nestling, buff-colored with a black mask like that of the adults, as it tumbled about in its lofty nursery. The mother hawk passed most of the day sitting in the cavity beside the nestling, and during her brief absences went no farther than a tree in front of the doorway, whence she could keep an eye upon her youngster while she preened, scratched, and stretched her wings. The male hawk brought all the food, arriving morning and evening with a snake from which he had already bitten the head. Alighting upon a bough in front of the nest, he would call his mate to come out and receive the prey. Then the two would celebrate the event with a long-continued duet of loud, far-carrying cries.

One afternoon, while the female hawk rested in the tree in front of the nest, I suddenly became aware that a long, black tayra—a larger relative of the weasels—was climbing squirrel-like up the great trunk toward the eyrie. He advanced toward the cavity in a direct, unhesitating fashion, as though he had already spotted it from the ground. The Laughing Hawk failed to notice the beast, or at least gave no outward indication that she had seen him, until he was almost within reach of the wide doorway of the eyrie. I desired intensely to complete my study of the only Laughing Hawk's nest I had ever seen; but the situation was so charged with possibilities of intense, dramatic action that, waiting breathlessly for the outcome, I made no move to frighten the advancing tayra. How effective was this unremitting guard the mother hawk kept over her offspring? Only when the tayra was on the verge of entering the hole did the hawk bestir herself. Then, uttering a low cry, she darted directly toward him. But he snarled, baring

strong fangs; and she dropped away, to return to her former perch.

The hawk's resistance was so weak and ineffective that it did not give me time to prepare for my own next move. I had expected that she would at least retard the tayra's progress toward the eyrie, but he hardly altered his pace on her account. When she returned tamely to her watching post, leaving the beast at the very doorway of her nest, I felt in my situation almost as helpless as the little hawk in the eyrie. I could think of nothing to do except to shout and wave my arms. By continued noise and gesticulations, I succeeded in driving the tayra to the ground, but not before he had reached into the cavity and killed the nestling by a stroke of his forepaw.

I was disappointed in the mother hawk's fainthearted defense of her nestling. I had expected something more heroic from such watchful motherhood. Such attentive, unremitting guard, to be capped by so slight a gesture of defense! But pondering over the event at a later date, I saw clearly that the outcome could not have been other than it was. The Laughing Hawk, intrepid snake-eater though she be, is slow of flight and weak of talon, not to be compared in prowess with such winged furies as the Peregrine and the Goshawk. A marauding, voracious toucan or a squirrel might have been put to flight, but she was clearly no match for the strong-fanged, catlike tayra. She could have done nothing more than offer herself a sacrifice upon the altar of parenthood; and the offering would have been garnished by the tender body of her nestling. Nature could not permit such a sacrifice without jeopardizing the existence of the whole race of Laughing Hawks—whose loss would result in a widespread upsetting of her balance, with snakes increasing and each year destroying a larger number of birds' nests, while birds declined in numbers. It was more important for the Laughing Hawk to continue to live that she might make another attempt to increase her kind, than that she should die heroically, a beautiful sacrifice which could profit only her enemy the tayra. Among Laughing Hawks there are no bards to immortalize a glorious death for the inspiration of future generations of hawks. Natural selection had set a limit to her parental devotion.