



Sun conure (*Aratinga solstitialis*) eating a mealworm.

# Insects.

John C. McMichael. PhD

There are numerous reports about wild parrots eating insects, but very few indicate the insect species. Some of those that do are listed in Table 1. Most reports just state that they take insects and that is that. I suspect that most parrots, just like my caiques (*Pionites spp.*), are very fond of insects as food and insects likely comprise one of the most important sources of protein for wild parrots. Our domestic chickens and turkeys have a requirement for essential amino acids and parrots likely do too. These amino acids are usually more readily available from the proteins synthesized by animals than from those synthesized by plants. While wild parrots do not eat large animals, except perhaps some occasional carrion, they sometimes eat snails, spiders and small crustaceans. But insects are likely the main source of animal protein. Some parrots, such as the wild Meyer's parrots (*Poicephalus meyeri*), that are well known to need insects in their diet and switch to a predominately insect larva diet during the breeding season when they are rearing chicks (10, 57). This may be the case for breeding cockatiels, budgerigars and Quaker parakeets in the wild too (3, 29). However, I suspect the only time most pet parrot owners provide a live insect is when they inadvertently feed the flour moth larvae present in infested seed.

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Table 1. List of some insect species eaten by parrots.

Insect species	Parrot species	Larval Form	Growth Stage Eaten	Ref.
<i>Aditrochus fagicolus</i>	Austral Conure ( <i>Enicognathus ferrugineus</i> )	Y	Larva	(19)
<i>Anisoura</i> sp.	Kea ( <i>Nestor notabilis</i> )	Y	Larva	(1)
<i>Artheraea eucalypti</i>	Gang-Gang Cockatoo ( <i>Callocephalon fimbriatum</i> )	Y	Larva	(44)
<i>Brachaspia collinus</i>	Kea ( <i>Nestor notabilis</i> )	N	Instars, Adult	(15)
<i>Camponotus</i> sp.	Quaker Parakeet ( <i>Myiopsitta monachus</i> )	Y	?	(3)
<i>Cartodera watsoni</i>	Quaker Parakeet ( <i>Myiopsitta monachus</i> )	Y	?	(3)
<i>Cecidomyiidae</i> sp.	Maroon-Bellied Conure ( <i>Pyrrhura frontalis</i> )	Y	Larva	(54)
Diptera <sup>a</sup> sp.	Austral Conure ( <i>Enicognathus ferrugineus</i> )	Y	Larva	(19)
<i>Heliostibes vibratrix</i>	Yellow-Fronted Kakariki ( <i>Cyanoramphus auriceps</i> )	Y	Caterpillar	(36)
Hemiptera <sup>a</sup> sp.	Rosella ( <i>Platycerus elegans</i> )	Y	Adult ?	(23)
	Austral Conure ( <i>Enicognathus ferrugineus</i> )		Larva	(19)
<i>Hyblaea puera</i>	Dusky Lory ( <i>Pseudeos fuscata</i> )	Y	Pupa	(42)
<i>Isoptera</i> sp.	Peach-Fronted Conure ( <i>Aratinga aurea</i> )	N	Alate	(18, 60, 61, 63)
Lepidoptera <sup>a</sup> sp.	Austral Conure ( <i>Enicognathus ferrugineus</i> )	Y	Larva	(19)
<i>Limacodes longerans</i>	Yellow Rosella ( <i>Platycerus flaveolus</i> )	Y	Larva	(24)
<i>Liposcelis</i> sp.	Quaker Parakeet ( <i>Myiopsitta monachus</i> )	N	?	(3)
<i>Nemonychidae</i> sp.	Austral Conure ( <i>Enicognathus ferrugineus</i> )	Y	Larva	(19)
<i>Ochrocydus huttoni</i>	Kaka ( <i>Nestor meridionalis</i> )	Y	Larva	(36)
<i>Oiketicus platensis</i>	Quaker Parakeet ( <i>Myiopsitta monachus</i> )	Y	Pupae	(48)
<i>Paropsis</i> sp.	Eastern Rosella ( <i>Platycerus eximius</i> )	Y	Adult	(39)
<i>Perga</i> sp.	Port Lincoln Parrot ( <i>Barnardius zonarius</i> )	Y	Larva	(24)
<i>Pericyma cruegeri</i>	Rainbow Lory ( <i>Trichoglossus haematodus</i> )	Y	Pupa	(8)
<i>Psitticimex uritui</i>	Quaker Parakeet ( <i>Myiopsitta monachus</i> )	N	?	(3)
<i>Spondylaspis eucalyti</i>	Red-Winged Parrot ( <i>Aprosmictus erythropterus</i> )	N	Adult, Lerp	(24)
<i>Ultracoelostoma assimile</i>	Yellow-Fronted Kakariki ( <i>Cyanoramphus auriceps</i> )	N	Scale Insect	(36)
<i>Xyleutes</i> sp.	Yellow-Tailed Black Cockatoo ( <i>Calyptrorhynchus funereus</i> ) Black Cockatoo ( <i>C. funereus</i> )	Y	Larva	(12, 24)

<sup>a</sup>These references only classify the insect at the order level.

Insect foods are not often addressed by aviculturalists, but pet parrots clearly have a craving for them. Here I try to merge what we know about parrots foraging for them in the wild, and how we can help satisfy the cravings of our companion parrots. For convenience, I have divided the insects into two groups. This first group are those that go through a larval growth stage—the homometabolous insects. The second group are those that hatch from their eggs as miniature forms that roughly resemble the appearance to their adult forms—the hemimetabolous insects.

### The homometabolous insects.

Homometabolous insects hatch from their eggs as larvae that grow by a series of molts until nearly adult size and then they form cocoons

around themselves in which they transform themselves into an adult form that looks completely different. Examples of these are mealworms, butterflies, bees, and ants. A quick glance at Table 1, suggests that wild parrots have a marked preference for insect larvae, although it may just be that ornithologists can more readily observe them catching and eating the slow moving larvae than their catching and eating the more mobile insect forms. As noted above, insect larvae appear to be critical for breeding Meyer's parrots. However larvae of unknown species have also been found in the stomachs of the Bronze-winged conures (*P. devillei*) and the Peach-fronted conure (*Aratinga aurea*) (61).

In some cases, parrots may ingest insects infesting the fruit they just happen to be eating. This is suspected in the case of the insect larvae found in the crops of the Painted conure (*Pyrrhura picta*) (61).



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However, given that some wild parrots have been observed purposely collecting larvae, this view should be regarded with skepticism. One of the skills that some wild parrots master is how to find larvae where they hide. Larvae hide in galls, under tree bark, in cocoons, and in fruit. A list of parrots that have mastered how to extract larvae just from plant leaf galls is given in Table 2. Those parrots usually pick the leaf off the tree, extract the larva from the gall, and then drop the gall and leaf to the ground. In addition to eating the larvae found in leaf galls, the Austral conure (*Enicognathus ferrugineus*) extracts the larvae of *Nemonychidae* (Coleoptera) from the male cones of the Chilean pine (*Araucaria araucana*) (19); while the Horned parrot (*Eunymphicus cornutus*) strips the bark off trees presumably seeking insects (56). The Red-tailed Amazon (*Amazona brasiliensis*) is reported to extract pupae from the old seed capsules of *Tibouchina holsericea* as well as the larvae and the milky, gelatinous exudate of this insect in the fruit of the *Attalea dubia* palm (46). In South Africa, Perrin noted that the wild Cape parrot (*Poicephalus robustus*) would forage on the bagworms hanging on wattle trees (*Podocarpus spp*) (57), and the Quaker parakeet (*Myiopsitta monachus*) does the same on the bagworms of the moth *Oiketicus platensis* (48). Unfortunately, the identification of most of these insects is unknown.

Table 2. Reports of wild parrots extracting larvae from plant galls.

Gall Source	Parrot Species	Ref.
Massaranduba Tree ( <i>Persea pyrifolia</i> )	Maroon-Bellied Conure ( <i>Pyrrhura frontalis</i> )	(47)
Rosewood ( <i>Heterdendron oleafolium</i> )	Red-Winged Parrot ( <i>Aprosmictus erythropterus</i> )	(24)
Glassywood ( <i>Astronium graveolens</i> )	Crowned Amazon ( <i>Amazona finschi</i> )	(59)
Lenga Beech ( <i>Nothofagus pumilio</i> )	Austral Conure ( <i>Enicognathus ferrugineus</i> )	(19)
Unspecified	Black Parrot ( <i>Coracopsis nigra</i> )	(20)

To mimic what parrots do in the wild, some aviculturalist collect insects and their larvae from the wild. The early English aviculturalist W.T. Green recommended cockchafer, a beetle in the *Melolontha* genus, for the Goffin's cockatoo (*Cacatua goffiniana*) when they have chicks in the nest (26). Presumably he fed the beetle and not the larva since the larva live in the soil and only emerge every few years to metamorphose into the beetle. I discovered that my caiques like the larvae of the papaya fruit fly (*Toxotrypana curvicauda*) that have infested the fruit of my doorstep papaya trees, but they only took them after I washed them with water. The larvae of the codling moth (*Cydia pomonella*) that infests apples and other fruit may also be suitable, but I never got a chance to feed them. Then, there is a report of a person who routinely fed the "common green inchworm" to her birds. However, on one occasion she gathered some that had been feeding on an azalea and fed them to several non-parrot species including Dybowski's



twinspots (*Euchistospiza dybowskii*), Black-cheeked waxbills (*Estrilda erythronotis*) and Purple Grenadiers (*Uraeginthus ianthinogaster*). These birds developed labored respiration, paralysis of the legs and feet, and other clinical signs (69). The toxin affected them for several hours before they recovered. So, while one can feed insects collected from the outdoors, you need to exercise some caution.

Most to the larval insects that aviculturalists feed their parrots are cultured and available for purchase. The most frequent choice is the meal worm because they are the easiest to culture and are readily available. However, there are other, perhaps better, choices including superworms, waxworms, rice flour beetle larvae, silkworms, and blow fly larvae. In some countries, particularly in South America, aviculturalist have bee and wasp larvae available and they feed them to their aviary birds (41). You can culture many of these insects yourself and instructions for this can be found online at such sites as the wikihow.com website. Below I summarize what I know about the homometabolous insects that aviculturalist often feed their birds.

### Mealworms.

Mealworms are the larvae of darkling beetles. Early aviculturalists fed their birds mealworms (28) and this practice continues. The most frequently encountered are the larvae of *Tenebrio molitor*. Occasionally one can find mini-mealworms, the larvae of *T. obscura*. Both are safe to feed birds and they are even on the menus of some trendy restaurants catering to adventurous gourmards. Marco Polo may have been one of the first to use them as food for captive birds (31). Legend has it that he brought several pairs of Hill tits (probably *Leiothrix lutea*) back with him on his voyage home and became distressed when they began to fare poorly. Then he noticed that the ship's biscuits were infested with mealworms. After he fed them to the tits, they returned to full health (30).

Some aviculturalists have reservations about feeding mealworms to small softbills, seed-eaters and even parrots (35). They consider mealworms to be "hard-skinned" larvae and believe their skins are a challenge to the bird's digestive system. Also, as Low notes, few parrots like them (43) and that has been my experience with my caiques (*Pionites spp.*). Because of the hardness of its coat, you should try to feed them after they have just molted. You can tell when they have recently molted because they are "whitish" and softer. You can also make them more palatable by scalding them (62). Aviculturalists have recommended feeding them to Palm cockatoos (*Probosciger aterrimus*) (13), Black cockatoos (*Calyptorhynchus spp.*) (2), Shining

parrots (*Prosopeia spp.*) (53), Abyssinian lovebirds (*Agapornis taranta*) (58) and even the Stella's lorikeet (*Charmosyna papou stellae*) when those species are rearing young (66).

If you find your birds like them, you can easily produce your own mealworms. You need a box you can seal so the larvae and beetles cannot escape, but still has adequate ventilation. Place about an inch of meal in the bottom of the box. The meal can be any grain origin product such as coarsely ground wheat, bran, oat meal, chicken meal, or even breakfast cereal. Then add a source of moisture such as a cut potato, apple, or carrot, and some live mealworms. Place a piece of cloth over the meal and set the box in a dark location. Allow the mealworms to metamorphose into beetles and let them lay their eggs. After the eggs hatch, you can collect the mealworms as needed. In time, you will have an never ending supply of mealworms. Of course, you have to replenish the meal and moisture source from time to time.

If you do not want to culture your own mealworms, you can purchase them. You can find live ones at some pet shops, especially those catering to reptiles, and online. You can also purchase killed worms. I have seen them for sale at some pet shops, shops selling seed intended for outdoor bird feeders, and even some large home supply stores. Because my caiques would not even take live mealworms, I have not tried to feed the dead ones.

### Superworms.

Superworms are similar to mealworms, but larger. They are the larvae of a different species of darkling beetle, *Zophobas morio*. While I found no references related to feeding them to parrots, their similarity

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to mealworms suggest they can be treated similarly. They are often fed to pet reptiles and can be obtained from shops catering to reptiles. Their culture is similar to that of the mealworm; however, to propagate them, you have to move the worm to a fresh container or it will not complete its metamorphosis into its beetle form.

### Rice Flour Beetles.

The rice flour beetle (*Tribolium confusum*) is yet another darkling beetle species. People also call it the confused flour beetle. This is because people often confuse it with the red flour beetle. Like mealworms, they are available commercially as a live food for amphibians and reptiles, but you can feed the beetles and their larvae to your parrot as well. To keep this beetle contained, you need to use fine mesh screening on your culture box since the beetle is quite small. Otherwise, its culture is similar to that of mealworms. This beetle causes immense commercial damage to stored starchy food products. While easy to culture, it will readily infest nearly all your stored starchy foods from pasta to rice. For this reason, you may want to avoid culturing this larva.

### Flour Moths.

There are two moth species that frequently infest the seed we feed our parrots: the Indian meal moth (*Plodia interpunctella*) and the Mediterranean flour moth (*Anagasta kubniella*). Most of the seed I have purchased recently, however, is no longer infested. The purveyors of these products have learned to control these infestations, some by adding the bacterium *Bacillus thuringiensis* whose spores infect and kill a broad spectrum of insect larvae. Having these moths fly all around one's house is unpleasant; however, parrots are very fond of their larvae. When I took care and picked the larvae out and gave them to my caiques, they were most appreciative. Even my wild caught breeders that normally would try to bite me every chance they got, would come to the side of their cage and gently take even the tiniest larvae from my fingers. There are a number of products sold for the control of these moths, including pheromone attractants in combination with glue boards. People usually do not purposely culture this moth, but because its larva feeds on the seed we normally feed out parrots they are completely safe to feed your parrots.



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### Waxworms.

Aviculturists feed two different waxworm species—the greater waxworm (*Galleria mellonella*) and the lesser waxworm (*Achroea grisella*). The lesser waxworm is about half the length of the greater waxworm. Both are major pests of domestic bee hives. Aviculturists tend to prefer feeding waxworms because they have soft bodies, and parrots usually prefer them over the hard bodied mealworms. I have fed waxworms to my caiques during breeding season, and can vouch that they are preferred over mealworms. Holmes would feed waxworms to her young Fig parrot (*Psittaculirostris sp.*) chicks as a source of protein, but then switched to the more economical meal worms as they aged (33). Like mealworms, you can usually purchase them at stores catering to reptiles. You can also culture your own waxworms (37). Karsten recommends a rearing them in a well ventilated box from which the moth cannot escape using a medium containing poultry starter (5 parts), baby cereal (2 parts), wheat bran (2 parts) and wheat germ (1 part) mixed with honey (3 parts). This is heated to about 35°C to make a crumbly mix. Some glycerin may be added to give the medium a more "moist" quality. The optimal temperature for the worms is between 27 and 29°C.

Karsten also fed the pupae to his birds. He would prepare them by removing the metamorphosing larva from the cocoon it had spun about itself. This can be time consuming, but his main purpose was to feed softbills such as Pekin robins (*Leiothrix lutea*) that do not have the skill to do this.

### Silkworms.

You can purchase silk worms (*Bombyx mori*) online, this is the caterpillar that produces silk when it forms its cocoon. Silkworms eat the leaves of most members of the Moracea plant family, but their preferred leaves are those of the white mulberry (*Morus albus*). Because they are usually cultured on a diet lacking toxins that might affect birds, they are considered safe to feed your parrots. They have a long history of culture, but the need to culture them on fresh mulberry leaves is a limiting factor for most of us.

### Maggots.

Blow fly larvae are among several insect larvae you may feed your parrots, but aviculturists more typically feed them to insectivorous birds. The larvae of these flies, members of the diptera order of insects, have long been called maggots. While there are a few references in the avian literature about feeding maggots to parrots, they usually do not provide a species name. For example, Low considered them of great value for rearing cockatoos, hanging parrots, and the Australian parakeets. She said, without naming a species, it is very important the fly larvae be well cleaned and that the dark line of its intestine visible the length of the larvae has disappeared before feeding them. A harder line against feeding maggots was taken by George Smith because of the chance of botulism (65) and he noted it is better just

to feed some meat. There are indeed reports of botulism in wild birds due to their eating blow fly larvae (21, 34). Despite these warnings, some aviculturists continue to feed maggots—specifically those of the blow fly that can be reared in a manner that reduces the chance of botulism.

There are several species that you can readily culture. The most frequently cultured are *Lucilia cuprina* and *L. sericata*<sup>1</sup>. These are common flies often found in your home. *L. cuprina* has a bronzish green color and *L. sericata* has a bright metallic green color. Blue bottle flies (*Calliphora loewi*) are not so colorful, but also feed on dead carcasses and you can culture them as well. Paul Engen describes how to culture them (22). To start a colony, you can either catch adult flies and introduce them into a well ventilated insect cage or you can set out moist dog food and collect their eggs or larvae and introduce them to the cage and allow them to grow and pupate. For the flies to lay eggs you feed them a diet of powdered milk (1 part), brewer's yeast (1 part), hot water (5-20 parts), and as much dog chow as can be softened in the water. All this is placed in a small bowl. Raw liver can be added on top as an incentive, but this is usually not necessary. After about 24 hr the flies should have laid their eggs. You then place the bowl on a bed sand. The eggs will hatch and the larvae feed on the dog chow. When the larvae mature and prepare



to pupate, they seek a drier place in the sand bed. Once in the sand you can use a kitchen sieve to collect them. To maintain the culture you need to allow some of the larvae to pupate into flies so you can continue the culture.

A bit of a warning, these larvae can be opportunistic parasites. *L. cuprinia* is a notorious parasite of sheep and blow flies have even parasitized people.

### Fruit Flies.

There are a number of varieties of wingless fruit flies that people feed their birds. The two most readily available commercially are *D. hydei* and *D. melanogaster*. Both the mature and larval forms are recommended for feeding finches (40) and they should be suitable for parrots too. Because they cannot fly, wingless fruit flies are also excellent for feeding your carnivorous plants. *D. melanogaster* has long been used in research laboratories to study genetics and animal development because of their short life span and large number of progeny. You can culture your own fruit flies using the same media

<sup>1</sup> These were formerly placed in the *Phaenicia* genus.

used in those laboratories. The basic medium is prepared with either sucrose or molasses, a starch such as cornmeal or oatmeal, yeast, and agar, all suspended in water. This is boiled to dissolve the agar and partially sterilize it, then after it has cooled, a fungicide, usually Tegosept, is added. This mixture is then dispensed into bottles that you can plug with gauze and cotton plugs to prevent fly escape. Of course you can feed your parrots the winged fruit flies too, just they can be a nuisance when they fly about your house. There are a number of supply houses that sell both the flies themselves and the media for maintaining them.

### Ants.

There are an extremely large number of ant species, but they all belong to the Formicidae family of insects. Wild quaker parakeets (*Myiopsitta monachus*) are reported to eat carpenter ants of the *Camponotus* genus (3). Most other parrot seem not to eat adult ants. Some, however, practice "anting." This is the practice of some birds, including starlings, magpies, Pekin robins, etc., of placing live or dead ants among their feathers (14). This has been reported for parrots (11), particularly the kakarikis (*Cyanoramphus sp.*) (9). It is thought that the formic acid secreted by the ants helps the birds fend off parasitic insects, mites, fungi, and bacteria.

In many parts of the world people eat ant "eggs" where they consider them a delicacy. These are not the insect's real egg. They are actually cocoons that have the appearance of a very, very small chicken egg. In other parts of the world, people eat the ant itself. While visiting the Amazon region, the compiler had a chance to eat lemon flavored ants and these ants are sometimes included in gourmet treats (5). In Denmark, the famous noma restaurant prepares gourmet offerings using ants native to that country.

Dried ant eggs were often sold in pet stores, but most no longer carry them. You can mail order them online from companies catering to the human food market. Early aviculturalists such as Greene, recommended them for Goffin's cockatoos (*Cacatua goffiniana*) when they had young in the nest (27), and Vriends suggested them as treats for lovebirds (67). Some bird food manufacturers, such as Quiko, offer foods containing ant eggs and "other dried insects" for mynas and softbills. There is no reason why you cannot feed them to parrots, especially when they are breeding. People keeping insectivorous birds often consider them essential.



### The hemimetabolous insects.

The hemimetabolous insects are a broad group of insects that do not go through a larval stage in their growth cycle. These insects hatch from their eggs into a small, but nearly similar form of the adult. As it grows the insect molts several times before becoming an adult. The intermediate forms are called instars. Examples of this type of insect are grasshoppers, crickets, aphids and termites. These insects are not used as much in aviculture.

### Termites.

There are many reports of wild parrots eating termites. In parts of the world, such as Africa, even people eat termites. You can purchase dried termites online. Wild parrots usually eat the alates, the winged form, that emerges seasonally. After noting that the Brown-throated conure (*Aratinga pertinax*) not only nested in termitaria but ate the termites as well (64), McLoughlin fed them to his pet caique (*Pionites melanocephalus*) and it greatly appreciated them too (50). The crop contents of wild Peach-fronted conure (*Aratinga aurea*), the best documented parrot known to eat termites, has revealed that they not only eat the alate, but also eat immature forms (60). The Buff-faced pygmy parrot (*Micrositta pusio*), a species never kept in aviculture, eats termites (4). Some parrots such as the Yellow-faced Amazon (*Amazona xanthops*) is thought to ingest the earth from termitaria as an alternative to visiting colpas (55). Termites are also often recommended for softbills (32).



While termites are often cultured in research laboratories; due to the potential damage some species can cause it does not seem wise to culture them in your home.

Table 3. Wild parrots that eat termites.

Parrot species	Ref.
Brown-Throated Conure ( <i>Aratinga pertinax</i> )	(50)
Black-Headed Caique ( <i>Pionites melanocephalus</i> )	(50)
Peach-Fronted Conure ( <i>Aratinga aurea</i> )	(18, 60, 61, 63)
Black-Capped Conure <i>Pyrrhura rupicola</i> )	(16)
Paradise Parrot ( <i>Psephotus pulcherrimus</i> )	(25)
Hooded Parrot ( <i>P. chrysopterygius</i> )	(7)
Buff-Faced Pygmy Parrot ( <i>Micrositta pusio</i> )	(4)

## Grasshoppers.

One of the few reports of wild parrots eating grasshoppers is for the wild kea (*Nestor notabilis*). It eats the adult grasshopper of the species *Brachaspia collinus* native to New Zealand (15). Early English aviculturalists recommended a variety of insects including grasshoppers as beneficial for parrot particularly when they have nestlings (27). They collected the grasshoppers from outdoors. There are a large number of species of grasshoppers and they may eat plants containing toxins, so you need to be careful about feeding them to your parrot.

## Crickets.

Crickets are not only eaten by human and their pets, they are also kept as pets themselves. Some are even selectively bred to fight. As people food, they are considered a treat, especially in southeastern Asia. The cricket most people are familiar with is the house cricket (*Acheta domestica*), but there are nearly 1,000 other species. They are all in the Gryllidae family of insects. Growing crickets is a big industry since they are one of the most sought after by both people and as food for pets. Owners of small reptiles, amphibians, fish, and insectivorous birds need a ready supply of them. Several websites describe how to breed and rear them, and there are even companies that sell commercial "cricket mash" of dead ground crickets. I have never tried to feed them to my parrots, but there is no reason to think they are unsafe to feed. There are two reasons I avoided them. Unlike people who have reptiles and the like who keep their pets in deep bins from which live crickets find it difficult to escape, the typical bird cage cannot keep them confined. Second, keeping a large number of live crickets can be a noisy affair.

## Aphids.

There are many species of aphids, but they all belong in the same superfamily of insects: Aphidoidea. Davis noted that his Yellow-fronted kakariki (*Cyanoramphus auriceps*) was very fond of nasturtiums leaves covered with aphids (17) and Atkinson gave her Scarlet-breasted parakeets (*Neophema splendida*) roses with aphids on them (6). Rosellas also like them (51). If you decide to feed your parrot in this manner, be sure they the aphids are from a safe plant and insecticide free. The aphids like other insects likely take up the toxic compounds of the plants they feed on as previously mentioned for insect larvae.



## Psyllids, Scale and Shell Insects.

I have lumped these insects together because they produce a sugary excretion called a lerp. A lerp is a sort of honey dew. Psyllids are small insects in the Psyllidae family of insects with the common name of "jumping plant lice." As their common name infers, they attack plants and are usually host plant specific. Lerp producing insects more frequently found on Australia and New Zealand than the rest of the world. Except for the Australian aborigines, people do not usually eat lerps. Some Australian aviculturalist collect them from the wild like McMillan did for his Rosellas (51). As mentioned above, you should take care to not provide psyllids that are feeding on plants known to be toxic.

Wild parrots are usually more interested in the lerp than the insect itself. In some cases, the lerp forms in the shape of a miniature sea scallop shell, and for this reason they call them "shell insects." Parrots known to forage on these insects and their lerps are listed in Table 4. Lerps contain 70 to 85 percent sucrose, 10 to 20 percent glucose, and 5 to 10 percent raffinose (49). Some parrots, such as the Kaka parrot (*Nestor meridionalis*) spend much of their time feeding on lerps (36).

## Ectoparasites.

In the wild, parrots are often afflicted with insect parasite that live on the outer surface of their bodies. These are called ectoparasites. In an

Table 4. Parrots known to eat psyllid-like insects and their lerps

Psyllid Species	Parrot Species	Item eaten	Ref.
Unspecified	Rosella ( <i>Platycercus spp.</i> )	Insect	(51)
Unspecified	Black-Cheeked Lovebird ( <i>Agapornis nigrigenis</i> )	Insect	(68)
Unspecified	Kakarikis ( <i>Cyanoramphus sp.</i> )	Lerp	(36)
<i>Ultracoelostoma assimile</i>	Kaka Parrot ( <i>Nestor meridionalis</i> )	Lerp	(36)
<i>Spondyliaaspis eucalypti</i>	Red-Winged Parrot ( <i>Aprosmictus erythropterus</i> ) Swift Parrot ( <i>Lathamus discolor</i> ) (36)	Manna Lerp	(24, 36)
<i>Eurymela distincta</i> <sup>a</sup>	Swift parrot ( <i>Lathamus discolor</i> ) Superb Parrot ( <i>Polytelis swainsonii</i> ) Musschenbroek's Lorikeet ( <i>Neopsittacus musschenbroekii</i> )	Lerp	(36, 38, 45)

<sup>a</sup> This insect is technically not a Psyllid, but rather a member of the Cicadellidae family of insects. It produces a more crystalline type of lerp. In this reference it is referred to as "Psyllid-like".



odd twist, it is reported that *Psitticimex uritui*, an hemimetabolous insect that mainly afflicts wild Quaker parakeets (*Myiopsitta monachus*), was fed by adult birds to their chicks (3). This may be the fate of other ectoparasites that a parrot manages to pluck off its body, but we know of few other reports of this.

### Manufactured insect diets.

Feeding insects is more important when your parrots are breeding, especially if you are not providing any protein fortified foods. For regular maintenance, this is not as critical. With the introduction of formulated diets, that is pellets, intended for breeding parrots, many aviculturalists have moved away providing any insects. Nonetheless, some commercial pet bird manufacturers include insect derived nutrients in their product. Two that I know of are Cédé and Quiko. These nutrients are usually derived from either mealworms or crickets. Some breeders recommend these products. For example, McMillan offers a food formulation made by Cédé that contains insects to his Stanley Rosellas when they are breeding (52).

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