



THE FOOD INSECTS NEWSLETTER

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Toward Filling in Some Gaps in the Global Inventory of Edible Insects

The editor first became acquainted with A.E. ("Amos") Akingbohunge in about 1970 when Amos was a PhD candidate in the Department of Entomology at the University of Wisconsin. After completing his graduate studies, this affable young man returned to his homeland, Nigeria, where he became a professor at Obafemi Awolowo University in Ile-Ife.

During some correspondence with Amos in 1988, I mentioned my interest in insects as food, and enclosed the write-up on Nigeria from our project's global file. It was a short write-up, drawing mainly from Ene (1963) who discussed two species of caterpillars of the family Thaumetopoeidae, *Anaphe infecta* and *A. imbrasia*, and mentioned termites, crickets, scarabaeid beetle larvae and pupae and locusts. Barth (1857) had mentioned the use of winged termites known as *kanam galgalma* or *Tsutsu* and roasted dragonflies or *fara*. And Portia Gage, a returned Peace Corps Volunteer who served from 1967 to 1969 in Western State had furnished information (personal communication 1987) on the use of winged termites and what (from her description) were probably *Rhynchophorus* beetle larvae. That was it. Obviously, a variety of insects had long been used as food in Nigeria, but only two species were identified by scientific name.

Amos responded with the following information based on personal observation and experience:

a) Termites (*Macrotermes bellicosus* Smeathman) are eaten in several parts of Western Nigeria. The winged adults are usually caught while on their nuptial flight or collected from the ground after they have shed their wings, and then roasted for eating. The queen termite is also eaten but rather infrequently largely because of the difficulty in procuring it from its protected custody (earthen reticarium). The winged termites are called *Esunsun* in Yoruba.

b) Caterpillars of African silk moths, *Atiaphe* spp. (Lepidoptera: Thaumetopoeidae) are fried dry and eaten as such and used in preparing soup just like dried lobsters are used. This is especially common in several parts of Ondo State.

c) Grubs of the palm weevil, *Rhynchophorus phoenicis* Fabricius (Coleoptera: Curculionidae) are fried and eaten in several parts of Western Nigeria and in Bendel State (old Mid-Western Nigeria) where active marketing of the fried grubs takes place. The grub is called *Itun* by the Yorubas.

d) Grasshoppers and crickets are also eaten though rather infrequently and largely by young children. The variegated grasshopper, *Zonocerus variegatus* Linnaeus (Orthoptera: Pyrgomorphidae) which has a large dry season population in southern Nigeria (i.e. from November to April) is reportedly roasted and eaten in Akoko area of Ondo State. The cricket eaten by young folks who can take the trouble of digging it out of its abode in the soil is *Brachytrupes membranaceus* Drury (Orthoptera: Gryllidae). The grasshopper is termed *Tata* by the Yorubas while the cricket is termed *Ire*.

Just like that, Amos had increased the number of edible insects with known specific identity in Nigeria from two to six species (known to me personally, that is, but not yet to the larger scientific community because the information had not yet been published). My purpose in telling this story is to point out that similar caches of unpublished knowledge probably exist in many other countries having long traditions of food insect use, but about which almost nothing has been published in modern times. While research will be needed to solve many of the species identity problems, we want to open the pages of the *Newsletter* for publication of information such as that furnished above by Dr. Akingbohunge for Nigeria. These can be sent in the form of brief notes, letters or short articles. Longer articles inventorying food insect use or updating information can also be submitted, but please discuss in advance with Editor.

Before leaving Nigeria, we should report that research is currently adding to the knowledge of edible insect use in that country. Ashiru (1988) provides valuable data on the food value of *Anaphe venata* caterpillars and points to the reduced availability of the larvae as the result of logging of the host tree, *Triplochiton scleroxylon* (see November 1989 *Newsletter*). Dr. Ashiru is located at the Forestry Research Institute of Nigeria at Ibadan. Dr. J. O. Fasoranti and D.O. Ajiboyi are the authors of a paper, soon to be published in *American Entomologist*, which discusses the food use of seven insect species in Kwara State (four of which are reported by Akingbohunge above). Fasoranti and Ajiboyi are in the Department of Biological Sciences at the University of Ilorin. Also at the University of Ilorin (where he recently completed PhD studies) is Dr. A.T. Ande who has produced two manuscripts on the caterpillar of *Cirina forda*.

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Recent Technical Paper

Jones, Kevin T., Madsen, David B. 1991. Further experiments in native food procurement. *Utah Archaeol.* 1991:68-77. Utah Division of State History, Antiquities Section, 300 Rio Grande, Salt Lake City, Utah 84101-1182.

Resource return rates, the amount of food or energy that could be obtained in a given amount of time, were undoubtedly affected by variations in abundance, nutritional content, ease of harvesting, individual gathering and processing ability (such as influenced by age, etc.) and other factors present at any given time and locality. To determine the range in return rates that might apply to the Mormon cricket (*Anabrus simplex*), the authors report on experimental gathering of the insects near Vernal, Utah. Ethnographic and ethnohistoric data suggest that *A. simplex* was the most commonly collected insect resource in the eastern Great Basin. Collection strategies varied, but included driving them into trenches, brush corrals, or streams, or less efficiently, picking them by hand.

At the time of the study, the crickets were in a "near-adult instar" and migrating in bands. In the samples taken, average weight per cricket was 2.77 g. Analyses yielded energy values of 1212 cal/kg (live weight) and 3450 cal/kg (dry wt.) (ave. of 2 analyses in each case). The average weight of 2.77 g and the energy value of 1212 cal/kg were used in subsequent calculations.

In the experiment involving picking crickets from the ground and vegetation, the average return rate was 2245 cal/hr with a range from 618 to 4875 cal/hr based on five tests of 15 minutes each involving three people. In the experiment involving picking crickets from the water's edge, the average return rate was 20,869 cal/hr with a range from 10,475 to 33,156 cal/hr based on three tests of 5 min each involving two people. Although the test durations and number of replicates was obviously low, the authors concluded that efficiency appeared to increase with experience.

In applying their experimental data to two published reports

In experiments, two methods were compared, picking them from the ground and vegetation in mid-day when they were quite active, and collecting them in shallow water where they had concentrated in a 3 in wide band of low <i>Juncus</i> along the margin of a small reservoir.	pertaining to quantities of crickets, the authors estimate that return rates sometimes may have exceeded 100,000 cal/hr when mass collection techniques were used. None of the above return rates included processing time for consumption or storage, but the estimated rates place Mormon crickets well above most other gathered food resources.
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EDITOR'S CORNER

More letters - Who will write the field guides?

From Ms. Annie Rovelstad of Willow Springs, Missouri, dated August 23rd: "I tried my first grasshoppers and katydids this morning; thanks to *The Food Insects Newsletter* for giving me the courage and permission. I was raised like most others that even the thought of eating bugs was a total 'gross-out.' It's just a general thing parents teach little kids, like don't eat wild berries and don't play with snakes and spiders."

"Now that I'm doing organic gardening and homesteading and trying to be very practical and efficient, I wondered if there was any predator for the numerous grasshoppers in my garden. Seeing none and having heard they were eaten in other countries, I enthusiastically subscribed to your newsletter, which said in effect it is OK to eat 'bugs.' You have now created an efficient 'grasshopper predator!' These were rather small 2-inch grasshoppers and not much to them except abdomen, but I was quite pleased to find it didn't taste strong or exotic or strange of texture. Just rather creamy, mildly sweet, definitely protein with a bit of oils and a slightly chewy outer layer."

Annie also had some questions, one of which was whether insects can be eaten raw thus preventing nutrient loss which might occur during processing. In a postscript dated one day later, the second day of her new life as a "grasshopper predator," she partially answered her own question; she had collected a nematode-infested grasshopper. This was an unsettling experience to say the least, and about the only thing I could tell her was that an army survival manual

that I have seen recommends cooking grasshoppers precisely for the reason that some may contain nematodes.

This is a question for which I hope one of our readers who is knowledgeable about grasshopper parasites will provide some detailed information. I presume they are harmless to humans, but, like finding a "worm" in your apple, just the thought of finding a nematode in your grasshopper isn't necessarily so great. What is the geographic distribution of the nematodes, what can infection rates amount to locally and can one recognize an infested grasshopper without breaking it open, what is the seasonality, is there species specificity, etc.? The need for information is urgent. Otherwise, the grasshopper predator population in Missouri will undergo a reduction. Or, as Annie put it, "What an icky start to my consumption of the bug population!"

In a letter dated May 25th, Ms. Diana Young of Bangor, Maine, wrote: "Could you suggest to me a basic book on how to catch local insects for eating. I live in Maine. I'm particularly interested in grasshoppers, ants and grubs. I am quite afraid of wasps, but perhaps you could give me ideas on other insects I could find in northern New England that would be good to eat. Thank you."

In a second letter, dated August 22nd, Diana wrote: "The photocopies from Ronald Taylor's book were very welcome. They will give me the courage and confidence to start looking for edible insects. One of my goals for the summer is to get over a very visceral reaction to the thought of eating them. I was very afraid of them as a child and their fascinating forms still make me a bit nervous. I have ordered the Peterson guide to insects to further this goal. I am, convinced we will need to view and accept insects as food within a

SEE EDITOR'S CORNER, P. 11

Cutworm Moths Aid in the Comeback of the Threatened Grizzly Bear

In a fascinating article in the September 7 issue of *Newsweek*, author Daniel Glick describes studies by Steven and Marilyn French, two self-trained bear researchers who have chronicled what they call "an important step back" for the Yellowstone grizzly -- back to ancestral habits that experts thought had been lost forever. The title of the article is "Grizzlies Come Back. By relearning old behavior, the great bears may yet avoid extinction."

The scene opens at 12,000 feet, above tree line in the rugged Absaroka Mountains east of Yellowstone National Park, where eight grizzlies are grazing "purposefully" in a barren glacial amphitheater, all of the bears within 150 yards of each other. Glick reports: "At first glance (through a high-powered spotting scope) the grizzlies seem to be feeding on rocks. But no. The great bear: *Ursus arctos horribilis*, is slurping up moths - thousands of delectable, nutritious army cutworm moths - gobbling them like so many diaphanous-winged M&Ms."

The Frenches began studying grizzlies in 1983. From their studies, Glick reports: "Although outfitters had occasionally reported bears eating 'bugs,' no one had appreciated how important moths could be to grizzlies. The Frenches have observed more than 100 bears for whom moths serve as a major summer food source. The moths, natives of the Great

The Bogong Moth of Australia

The Newsweek story (summarized above) about the importance of cutworm moths (Family Noctuidae) in the survival of the grizzly bear served as inspiration for pulling together a bit of information about the famous *bogong* or *bogong* moth, *Agrotis infusa* (Boisd.), which was an important food for certain aboriginal groups in Australia. Globally, many species of moth larvae are used as food, but the *bogong* is one of the very few moth species in which it is the adult stage that is eaten. That there are only a few is not surprising because of the scales which clothe the bodies as well as the wings of moths. There is a voluminous literature on the *bogong* moth, but, to keep the Literature Cited short, I have drawn on only two accounts here.

In an early account, Bennett (1834, I, p. 265-73) describes a trip to "Bugong Mountain" to see for himself the multitudes of moths which congregate on the granite walls and are called "Bugong" by the aborigines. "The months of November, December, and January, are quite a season of festivity among the native blacks, who assemble from far and near to collect the Bugong; the bodies of these insects contain a quantity of oil, and they are sought after as a luscious and fattening food." Bennett's observations indicated that the moths congregate only where there are massive granite outcroppings, one such location being known as "Warrogong" by the natives. Mr. Hamilton Hume is credited by Bennett for the information that Bugong is found also in the Snow Mountains by the aborigines

Plains, migrate to the mountains in summer to feed on the nectar of alpine flowers by night and to cluster in the cool, protected rock formations by day. Improbable as it sounds, moths are a perfect food for the bears during the critical summer, when they put on fat for winter hibernation. Composed of 72 percent fat and 28 percent protein, these flitting morsels are a better energy source, ounce for ounce, than deer meat or cutthroat trout. Of course, it takes a lot of moth wings to see a grizzly through winter. But the bears can consume hundreds of thousands of moths per year, the Frenches find, by feeding six hours a day for a month or more."

Glick notes that some 50,000 grizzlies once roamed the Lower 48 states, but fewer than 1000 remain today. Even in Yellowstone Park, the grizzly was almost lost in the 1970s after the park closed access to the open dumps there containing up to 4800 tons of garbage per year. By 1975, the U.S. Fish and Wildlife Service listed the grizzly as threatened, meaning that the population faced extinction. Yellowstone is one of seven "recovery zones" designated by the federal government. Preservation efforts by the park service include steps taken to increase the elk herd and the trout population.

(Editor. Thanks to Dr. John Medler, Honolulu, and also Dr. Matthew Kinzelman., M.D., Destin, Florida, for calling attention to this article. We would appreciate hearing from any of our readers who can furnish more precise information on the taxonomic identity and biology of the cutworm species mentioned above. The moth belongs, of course, to the Family Noctuidae. The famous *bugong* or *bogong* moth, *Agrotis infusa*, of Australia is also a noctuid and played a rather similar role for certain aboriginal groups on that continent (see following story).

living to the southward and forms their principal food during the summer.

To collect the moths from the surfaces and crevices of the granite masses, the natives build smokey fires at the base. They are swept from the walls by the bushels-full. Bennett describes the preparation of the moths as follows: " A circular space is cleared upon the ground, of a size proportioned to the number of insects to be prepared; on it a fire is lighted and kept burning until the ground is considered to be sufficiently heated, when, the fire being removed, and the ashes cleared away, the moths are placed upon the heated ground, and stirred about until the down and wings are removed from them; they are then placed on pieces of bark, and winnowed to separate the dust and wings mixed with the bodies; they are then eaten, or placed into a wooden vessel called a 'Walbun, or Culibun,' and pounded by a piece of wood into masses or cakes resembling lumps of fat, and may be compared in colour and consistence to dough made from smutty wheat mixed with fat. The bodies of the moths are large, and filled with a yellowish oil, resembling in taste a sweet nut. These masses (with which the 'Netbuls' or 'Talabats' of the native tribes are loaded, during the season of feasting upon the 'Bugong'; will not keep above a week, and seldom for even that time; but by smoking they are able to preserve them for a much longer period. The first time this diet is used by the native tribes, violent vomiting and other debilitating effects are produced; but after a few days they become accustomed to its use, and then thrive and fatten exceedingly upon it."

SEE BOGONG MOTH, P. 9

Chinese Scientists Say Eat Your Ants

BEIJING A handful of ants a day keeps the doctor away, according to Chinese scientists.

Some 40 entomologists, or ant experts, and medical workers met recently in Nanking to discuss the health benefits of eating *polyrhachis vicina roger* - the country's most common ant - as crunchy morsels, or taking a sip of essence of ant.

"In some regions of southwestern China, local people regularly eat ants," the Chinese news agency Xinhua reported. "As a result, the locals enjoy good health."

Ants were especially effective against rheumatism, said Zhang Zhilin, the vice chairman of the Chinese entomological society. The formic acid and other mineral traces in the insects were also effective in the treatment of hepatitis-b and other immunity disorders, the agency reported.

(As carried in *The Capital Times* [a Madison, Wisconsin newspaper] of October 22, 1992.)

May we have a third opinion, please

You may remember the *Newsletter* article (Vol. III, No. 2, 1990) suggesting that palm weevil larvae might be given greater promotion to tourists as traditional cuisine in countries where the larvae have been considered a delicacy, not only by the local people but by Westerners who sampled them. In regard to *Rhynchophorus bilineatus*, the famed sago grub, however, a European was quoted saying, "the taste of the grub is fatty and oily and is no delicacy for the palate of a European."

In the October 1992 issue of *Outside* magazine (page 188) author Tim Cahill offers only the second "Western" opinion we have seen on the flavor, texture and other characteristics of sago beetle grubs as an item of food. Cahill describes his experiences far upriver in the Asmat region (Indonesian half) of New Guinea: "... we traded a length of fishing line and a dozen hooks for what William assured us was the local culinary treat: two pounds of fat sago beetle larvae wrapped in sago leaves and secured with a thin strip of rattan Stef [an Asmat] cooked a dinner of fried catfish along with a healthy

Fried grasshoppers at the Utah State Fair

Extracted from an article by staff writer Marjorie Cortez in the *Desert News* (Salt Lake City), September 16, 1992.

Angie Hunsaker pursed her lips, took a deep breath and popped the high protein, low fat snack in her mouth. "It tastes like a Lay's potato chip with a salty taste to it," Hunsaker said, after sampling a fried grasshopper Tuesday at the Utah State Fair. "The wing I didn't try, so I don't know about that."

Hunsaker was among hundreds of fairgoers who dared sample Utah State University extension entomologist Jay Karren's insect cuisine, served daily in the 4-H Pavilion. It's a simple menu, just stir-fried grasshoppers at a nickel per bug, but Karren also provides recipes for fried locusts and grasshopper fritters. Grasshopper legs are free for the taking.

The fried grasshopper booth is part of an educational display on the insect world. "It's been very popular," Karren said, noting that he's run out of grasshoppers every day of the fair. Admitting the grasshopper snacks are an odd enticement, Karren said he catches the insects in a pesticide-free environment, feeds them bran and starves them for a day before freezing them for frying.

Thanks to *Newsletter* reader Steve Jones of SLC for sending this item. Dr. Karren is also a *Newsletter* recipient. The article doesn't mention whether the grasshoppers won any blue ribbons.

We sadly report that Dr. Charles L. Hogue died suddenly and unexpectedly at home on 20 July 1992, while recovering from surgery. Dr. Hogue was Curator of Entomology at the Natural History Museum of Los Angeles County. He was interested in all aspects of cultural entomology, including entomophagy.

A memorial fund has been established to help protect and manage the lowland rainforest resources of the Pacaya-Samiria National Reserve in Peru. Contributions should be made to "Hogue Memorial Fund," payable to The Nature Conservancy (Attn: Dan Quinn), 1815 North Lynn Street, Rosslyn, VA

portion of sago beetle. The larvae were fried brown in the pan. They were crisp and sort of fishy tasting on the outside, probably because they had been sauteed in fish oil. Inside, they were the color and consistency of custard. They were unlike anything I'd ever eaten before; the closest I can come to describing the taste is 'creamy snail.'" Ed.: I think the above is an endorsement, but am not certain. I have eaten snail and enjoyed it, but I don't know whether it was "creamy snail" or not. Thanks to daughter Linda S. DeFoliart of Hotchkiss, Colorado, for alerting her father to this article.	22209. Information furnished by Dr. Julian Donahue, Acting Head, Entomology Section.
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Mexican Insect Delicacies as Seen Through the Eyes of a Campesino Some time ago, reader Prentiss Riddle sent an article by Mark Smith which was published in the <i>Houston Chronicle</i> of July 4, 1991. It was titled "Mexican gourmets pay big for rich taste of ant eggs," and subtitled "Odd delicacy provides both food, income." The article notes, as have others reprinted in the <i>Newsletter</i>, that insect delicacies are served in some of the finest Mexican-cuisine restaurants and customers include top Mexican government officials and socialites. Below, however, we have extracted mainly portions of the article that describe the importance of the insects to those who collect and sell them: Actopan, Mexico -- Angry red ants began climbing up the arms and back of Candido Aviles Hidalgo as he smiled and showed off his day's find, a handful of ant eggs. [Ed.: The so-called ant "eggs" are actually pupae.] Aviles Hidalgo quickly offered the white mushy eggs to onlookers and then scooped several into his mouth, giving out a long sigh. For <i>campesinos</i>, or poor farm workers, like Aviles Hidalgo, 29, who live in the state of Hidalgo some 120 miles north of Mexico [City], <i>escamoles moles</i> (ehs-cah-MOH-lehs) are a source of pocket money. In a country where the unemployment rate may range higher than 30 percent, money is scarce. Aviles Hidalgo, like many of his neighbors, lives in a one-room, 35 foot-by 15- foot, dirt-floor, cinder block house at the rocky base of the Cero Alto and Puerta de la Cruz mountains. They eke out a meager living. But despite rocky land, little income and a few goats, chickens and cattle, Aviles Hidalgo said he has been blessed with a rich supply of agave desert plants, known in Mexico as the <i>twaghey</i> (mah-GAY). "If I moved to Mexico [City] and lost my job, I wouldn't be able to eat," Aviles Hidalgo said, sitting next to his wife while baby chicks roamed below, picking at scraps on the home's dirt floor. "At least on my farm, I'll always be able to eat. Also, where else would I be able to find such a delicacy like <i>escamole</i>," <i>mole</i>," he added with a smile. Aviles Hidalgo said the thick, leathery, gray-green <i>maguey</i> has a diverse array of uses. Juices from the heart of the <i>maguey</i> are distilled into <i>pulque</i> (POOL-keh), an alcoholic drink related to mescal and tequila. Along the <i>maguey</i>'s roots are often colonies of ants, serving as a source of <i>escamoles</i>. From February through spring, Aviles Hidalgo, like many of his neighbors, weaves along cactus-lined, winding trails and through rocky ravines in search of the <i>maguey</i> and the treasured <i>escamoles</i> below. Using a crowbar, <i>campesinos</i> dig below the <i>maguey</i> into ant colonies. Then they carefully scoop out the eggs with their bare hands and dump them into duffel bags that they shake to remove any lingering ants. Also, inside the <i>maguey</i>, <i>campesinos</i> carve out two types of butterfly larvae, or <i>gusanos</i> (goo-SAH-nohs), which are also sold and served as delicacies in Mexican restaurants. [Ed.: Actually, one of the two types is a moth larva.] White <i>gusanos</i>,	which are abundant in June and October, are carefully removed from the <i>maguey</i> with a hook by grabbing the worms' heads. <i>Campesinos</i> sell the <i>escamoles</i> and <i>gusanos</i> to distributors in a Pachuca market some 20 miles away for a handful of dollars. The distributor then sells the <i>escamoles</i> and <i>gusanos</i> to restaurants that charge as much as \$25 per plate. The food is served fried or roasted in butter, chili or garlic sauce. [At the Fonda Don Chon restaurant in Mexico City's historic district], the plates range in cost from \$20 for a load of 500 to 1000 <i>escamoles</i>, to \$6 for a plate of 200 to 300 <i>jumiles</i>. Across town, the Riscal Restaurant serves 30 to 40 orders each of <i>escamoles</i> and <i>gusanos</i> every day. How To Prepare Larvae of the Wasp Known as Chukti' or Ek <i>U T'an Yik El Kab El Kab</i> is a Spanish-language newsletter published out of Yucatan. It is devoted to preservation and promotion of traditional Mayan techniques for keeping honey-making insects, with emphasis on stingless bees of the genus <i>Melipona</i>. The editors can be contacted at: Yik'el Kab A.C., Apartado Postal 249, Merida (Itzimna), Yucatan, Mexico 97000. The following is a translation by Chris Starr of a recipe appearing in issue no. 5 (February 1992) by Ada Mex de Canche and Manuelita May. Wasps of the genus <i>Brachygastra</i> (Vespidae: Polistinae) are quite common in our area. They build large, round nests of a carton-like material. These wasps are valued by local people for their honey, which is tasty and aromatic, although rather strong. The larvae are roasted in a pan and then mixed with sour orange juice and hot red peppers. Finally, they are made into little tacos, ready for eating. Request for Information Peter Menzel is an award-winning photojournalist who shoots for <i>National Geographic</i>, <i>Time</i>, <i>Life</i>, <i>Geo</i>, <i>Smithsonian</i>, etc. He is currently shooting a worldwide photographic essay on entomophagy. He is seeking information for an upcoming trip to Japan, Samoa, Thailand, Australia and Africa. He needs specific information and/or tips leading to good photo opportunities, including: -What insects are eaten in these countries, when, where and how are they harvested/gathered? -Are any commercial industries involved in the packaging and selling of insects? -Are there any ceremonies/ celebrations connected with eating insects? -Any other useful information that would help in creating great photographs? This is a serious book/magazine project with publication scheduled for next year. If you can contribute, please call collect: (707) 255-3528, or fax: (707) 255-4720.

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Need Mealworms, Waxworms or Crickets for Your Next Party?	

All of the dealers listed below were contacted and affirmed their listing in this issue of the *Newsletter*. We believe that each can be counted on to provide good service. All except Waxworms, Inc. and Rainbow Mealworms accept MasterCard and Visa

Armstrong's Cricket Farm P.O. Box 125 West Monroe LA 71294-0125 For orders: 1-800-345-8778 For inquiries: (318) 387-6000 Crickets	Grubco, Inc. P.O. Box 15001 Hamilton OH 45015 For orders: 1-800-222-3563 For inquiries (513) 874-5881 Crickets, mealworms, waxworms, "superworms"	RainbowMealworms P.O. Box 4907 126 E. Spruce Street Compton CA 90224 1-800-777-9676 or (310) 635-1494 Crickets, mealworms, waxworms, "superworms"
Bassetts Cricket Ranch 535 North Lover's Lane Visalia CA 93292 1-800-634-2445 Crickets, mealworms, "king mealworms" Crickets	Hurst Cricket Farm Attn: Mike Young P.O. Box 212 Savannah TN 38372 (901) 925-4019	Waxworms, Inc. P.O. Box 333 Cameron WI 54822 (715)924-2777
Fluker's Cricket Farm - Box 378 Baton Rouge LA 70821 1-800-735-8537 Crickets, mealworms		

¹It was a new one on us, the last minute before going to press, that "king mealworms" and "superworms" are not just oversized ordinary mealworms, *Tenebrio molitor*. They belong to the same family, Tenebrionidae (darkling beetles), but are a different genus and species, *Zophobas morio*. They are two-three times larger than. *T. molitor*. Thanks to Bassetts, Rainbow, Grubco and to Steven Krauth (UW Entomology Department Insectarium) for what little we know about *Zophobas* at the moment. We would like to hear from anyone who has tried them in recipes or has other information about them.

Letters

Already, a crime problem. Dr. Ludwig Naegel recently moved from the University of the Philippines at Los Banos where he was associated with the farming Systems Institute to a new research post in Mexico. Before leaving the Philippines, he wrote in part:

"My special interest is beekeeping and one of the problems here in this area is the frequent theft of combs filled with brood, which are considered by some people as a delicacy."

Recipe - A golden oldie for Europeans! Dr. Vratislav Richard Bejsak, in notifying us of his new address in New South Wales, added the following:

"I never read or heard about eating insects in Europe, but suddenly I have seen cartoons about eating of chafers, and later I discovered it is true! There is an old (perhaps medieval) recipe from old East Bohemia (around the famous beer town, Pilsen) for "Cock-Chafers Soup" [may beetle larvae]. The soup was cooked from spring vegetables and common chafers (*Melolontha melolontha* Linne, 1758).

"Ingredients: Make one onion soft on hot butter. Add 1 liter water, 1 cut parsley root, 1cut carrot, 1 cut celery root, 3 cut potatoes and a handful of barley. When barley is soft, add light-fried handful of cockchafers (may-bug). Add freshly cut parsley and basil leaves."

See additional letters in the Editor's Corner.

Buffalo Museum of Science will sponsor public lecture on edible insects

"Backyard Monsters: The World of Insects" will be on exhibit at the Buffalo Museum of Science from January 15 to April 19,1993. The 7000-square-foot exhibit, which is entered by passing through 8 foot-tall blades of grass, has been a tremendous hit in cities such as San Antonio and Philadelphia (at the Franklin Institute) since opening last April. The stars of the exhibit are seven huge robotic insects, the creation of Creative Presentations, Inc., known for its project work on "E.T." and the "E.T.'s Great Adventure" rides at Universal Studios theme parks in Hollywood and Orlando. Among other attractions are interactives, or hands-on displays you can push, pull, crank, spin and study. For example, you can see how a mosquito feeds by turning a crank and watching the stylets pierce human flesh, or look through 2-foot-diameter plastic eyes to observe how insects view the world through compound eyes. Other displays will include more than 1000 different exotic specimens, and life-like scenic settings showing unusual insects, beneficial and harmful insects, fossil insects, camouflage, life cycles, etc.

As part of the promotion for the exhibit, the Museum will sponsor a public lecture (free), "Insects: An Overlooked Food Resource," on Saturday, March 13, at 7:30 pm with your *Newsletter* editor as the speaker. Tentatively, insect hors d'oeuvres will be served following the lecture. More information, if desired, can be obtained by writing or calling Mr. Wayne K. Gall, Associate Curator, Division of Invertebrate Zoology, Buffalo Museum of Science, 1020 Humboldt Parkway, Buffalo, NY 14211-1293; Telephone (716) 896-5200.

Coming up in Volume VI... A series on potential health hazards associated with insect consumption. Dr. Murray Blum, Department of Entomology (Laboratory of Chemical Ecology), University of Georgia, will focus on insect defensive secretions. Dr. May Berenbaum, Department of Entomology, University of Illinois, will focus on sequestering of phytotoxins. A third article will focus on insect allergens. Also in Volume VI, Dr. Richard Lindroth, Department of	Bogong Moth (from page three) Bennett continues, "These insects are held in such estimation among the aborigines, that they assemble from all parts of the country to collect them from these mountains." Bennett notes that the crows are also very fond of the <i>Bugong</i> , so fond, in fact, that they try to steal it even while it is being prepared by the natives. More recently, Common (1954) conducted studies on the ecology and behavior of the <i>bogong</i> , shedding new light on the origin of the vast number of the moths that congregate on the granite outcroppings in the mountains. Moths of the spring
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Entomology, University of Wisconsin, will discuss the food conversion efficiency of herbivorous insects.	generation migrate to the mountains where they aestivate gregariously from early November until early April, the months when the "moth camps" are occupied by the aborigines. In the late summer and autumn, the moths migrate back to their breeding grounds at lower elevations in New South Wales and southern Queensland. During autumn they disperse widely to mate and lay eggs in the pastures where dicotyledonous annuals suitable as larval food are now available in place of the unsuitable grasses that dominated the pastures during the hotter months. Common notes this as an excellent example in which a combination of migration and diapause enable a species to survive each year over a period when environmental conditions in the breeding grounds are unfavorable. The fat-body of aestivating moths during summer and autumn was well-developed, the average fat content of the abdomens of males exceeding 61 % and of females 51 % of their dry weight.
The Newsletter goes to 73 countries.	
The July 1992 mailing of the Newsletter totaled approximately 1900 copies, with approximately 1500 going to U.S. addressees. Canada ranked second with 124 copies. Nigeria ranked first among African countries with 28. Thailand topped Asia with 15, closely followed by India and the Peoples' Republic of China, each with 14. Brazil and Colombia topped Latin America, each with 5. The United Kingdom led Europe with 23.	
	Literature Cited Bennett, G. 1834. <i>Wanderings in New South Wales, Batavia, Pedir Coast, Singapore, and China; being the Journal of a Naturalist</i> . 2 vols., London: Richard Bentley, I, pp. 265-273. Common, I.F.B. 1954. A study of the ecology of the adult bogong moth, <i>Agrotis infusa</i> (Boisd.) (Lepidoptera: Noctuidae), with special reference to its behaviour during migration and aestivation. <i>Austral. J. Zool.</i> 2:223-263.

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Global Inventory (from page one)	Editor's Corner (from page 2)
Finally, in wrapping up this brief summary relative to Nigeria, both of the species names used by Ene (1963), <i>Anaphe infracta</i> and <i>A. imbrasia</i> , are apparently now considered to be synonyms. According to Medler (1980), there are three species of <i>Anaphe</i> in Nigeria, <i>A. panda</i> Boisduval (= <i>infracta</i> Walsingham), <i>A. reticulata</i> Walker (= <i>ambrizia</i> Butler) and <i>A. venata</i> Butler.	few years due to the population explosion if for no other reason. Thanks again."
In Mexico, Thailand, and a few other countries, much is known about the specific identity of the insects used as food. In many countries, however, the situation remains more like it has been until now in Nigeria. So the invitation is extended to make more use of the <i>Newsletter</i> . Local scientists, familiar with local faunas, should be able to contribute information of value that is not now generally accessible to the scientific community at large.	Many, and probably the majority, of <i>Newsletter</i> readers in the U.S., Canada and other "Western" countries are primarily interested in the global nutritional and ecological implications that result from the traditional use of edible insects in many cultures. But, some readers are also interested in a more personal involvement. The <i>Newsletter</i> regularly receives letters similar to those of Ms. Rovelstad and Ms. Young. Other letters come from teachers who want to lead their students on field forays after edible insects (in part to stimulate in the students a more personal interest in biology). A significant number of those who request the <i>Newsletter</i> identify themselves as readers of magazines like <i>Backpacker</i> or otherwise mention an interest in wilderness survival. In addition to their interest in personally acquainting themselves with the edibility of insects, this great diversity of people have one other thing in common - little or no entomological background.
Gene DeFoliart, Editor	
References Cited	
Ashiru, M.O. 1988. The food value of the larvae of <i>Anaphe venata</i> Butler (Lepidoptera: Notodontidae). <i>Ecol. Food Nutr.</i> 22:313-320. Barth, H. 1857. <i>Travels and Discoveries in North and Central Africa 1849</i> . 55. 5 vols. (1857-1858) London, III, p. 4. Ene, J.C. 1963. <i>Insects and Man in West Africa</i> . Ibadan Univ. Press, pp. 16-26. Medler, J.T. 1980. Insects of Nigeria - Check List and Bibliography. <i>Mem. Amer. Entomol. Inst.</i> No. 30, p. 348.	A significant market seems to await the entomologist or entomologists who will provide field guides that can be of help. A list of some 60 species of insects used by North American Indian tribes was published in the November 1991 <i>Newsletter</i> . The list as such is of no use to the non-entomologist. For the entomologist however, the list is a starting point in identifying the insect genera of interest. Hopefully, there are entomologists among us who are already developing plans to meet this need. GRD

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High-Calibre Journalism on Edible Insects in High Gear	
Using the New York banquet as a take-off, there has been a recent spate of magazine articles of exceptionally high quality. They are recent enough that you might still be able to beg, buy or borrow a copy. One, titled "The Joy of Cooking Insects," by Robert H. Boyle appeared in the September/October issue of <i>Audubon, Magazine of the National Audubon Society</i> (pages 100-103). It is beautifully illustrated with photographs from the New York event, and from Uganda and China. Another, titled "An Acquired Taste," by Patrick Huyghe, appeared in the November/December issue of <i>The Sciences</i> (pp. 8-11), which is published by the New York Academy of Sciences. A third, titled "Bug Seasoning: When insect experts go in search of six-legged hors d'oeuvres," by Marialisa Calta, appeared in the November/December issue of <i>Eating Well, The Magazine of Food and Health</i> (pp. 22-25), published by a partnership consisting of Telemedia Eating Well, Inc. and Telemedia	Although the articles take off amidst the glitz and glitter of the New York event all four range far beyond that, examining the use of edible insects in other cultures and their nutritional importance in many countries. Each article, exhibits painstaking journalistic research. We hope you'll excuse us if our pride is showing, but we can't help but mention that all four of these talented, resourceful writers are longtime subscribers to <i>The Food Insects Newsletter</i> . To use the lingo of our presidential candidates after listening to a solid year of campaigning, we need <i>change</i> and articles like these will change attitudes in America. It's called the <i>vision thing</i> . Entertaining With Insects Newly-reprinted Recipe Book

Communications (USA) Inc. Even the children are being clued in. The cover of the November issue of <i>3,2,1 Contact</i>, published by the Children's Television Workshop, shows a cheerful white-clad chef offering a colorful tray of insect edibles, accompanied by the legend, "Dinner is Served! Why People Eat Insects." The article (pp. 6-10), titled "Jiminy Crickets! They're delicious & nutritious, say bug experts," is accompanied by photographs from New York, Mexico and Botswana. The author is Elizabeth Vitton.	How to order the book: Price per copy is \$14.95. Send order to: Salutek Publishers 5375 Crescent Drive Yorba Linda CA 92687 (California residents add sales tax (State &, if any, local and transit) Shipping and handling: U.S.: \$ 4.05 U.S. Money Order (delivery expected in 7 business days) Check (allow 6 weeks for delivery) Foreign: \$ 9.05 International Money Order in U.S. dollars
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