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THE FOOD INSECTS NEWSLETTER

MARCH 1995

VOLUME VIII, NO. 1

Working Papers - The Human Use of Insects as Food in Uganda

For reasons explained in the Editor's Corner (page 2) Newsletter operations were at a near standstill around here the past December to there was no back-up article lying around as there had been during a couple of less extreme emergencies in the past. Thus, for this lead-off article, we resorted to bodily lifting a country summary from the "project file" which we've mentioned a time or two in the past.

The file consists of summaries of food insect use in 70-80 countries. The summaries range in length from one sentence to many pages; it would be impossible to pick any one file and designate it as "typical." We are using the Uganda summary here, not because it is typical. It includes only six species identified by scientific name, while the number of species actually used as food in Uganda is obviously much greater than that. For example, the Uganda summary states that "the larvae of many species of the larger beetles are sought and eaten," but none are identified as to species. And "moth" larvae are collected and roasted but again with no indication of species identity. In neighboring Zaire, by contrast, where intensive studies have been done, the specific identity is known for nearly 30 species of moth larvae that are eaten. Once again, the great need for better taxonomic inventorying of edible insect resources is apparent. And once again, readers who can provide such taxonomic edification, not only for Uganda but for any other country, are warmly invited to use the pages of the Newsletter for that purpose.

Uganda

Owen (1973: 132-136) provided most of the available information on insects as food in Uganda, and also provided an excellent discussion of nutrition alternatives in Africa. Relative to insects specifically, Owen stated (p. 132): "Most people in tropical Africa who are no longer dependent on wild foods collect insects for food. The habit is especially well-developed among the cultivators of the forest region whose normal diet is

Examples are locusts and other Orthoptera which at times can be extremely abundant. the winged reproductives or termites": which occur in immense numbers with the onset of the rains, and the gregarious larvae of moths, particularly members of the Saturniidae. As with some other foods there are often ceremonies and beliefs as well as discriminatory taboos built into the collecting and eating of species that are locally important. Thus almost everywhere certain segments of the community are forbidden to eat insect delicacies: sometimes the women are not allowed to eat them, sometimes the children, sometimes sick people, pregnant women, and so on. It appears that some insects are held in high esteem and are therefore reserved by custom for the more important and senior members of the community, and if someone is found eating insects that are by custom taboo there may be unpleasant consequences for that person."

Owen's information on specific insect groups is summarized below by insect order.

Coleoptera

The larvae of many species of the larger beetles are sought and eaten, but according to Owen, they are not as important as termites and grasshoppers in the diet because few species are found in large numbers.

Diptera

Chaoboridae (phantom midge)

Chaoborus sp., adult

Lake Fly (*Chaoborus*) cakes are eaten and are possibly an important source of protein in Uganda (Owen 1973)

Hymenoptera

Apidae (honey bees)

Owen states that, in addition to honey, bee larvae are collected as food although it is not clear whether his statement refers specifically to Uganda or to Africa in general.

Isoptera

Termitidae

The larger species of termites [probable species are *Macrotermes bellicosus*, *M. falciger*, and *M. subhyalinus*, all of

Meet the New Associate Editor
(See Editor's Corner, Page 2)

deficient in protein, but it is uncertain whether insects are eaten because of their nutritional qualities. In some areas there is much ritual associated with the seasonal appearance of certain desirable species of insect. The eating of insects may in some ways be compared with the European tendency to eat marine molluscs and crustaceans. The aversion to insects as human food among Europeans is probably based on nothing more than custom and prejudice; insects

are in- deed good to eat and some taste as good as the best lobster or crab. "

Owen continued: "The species utilizedare those that are locally or seasonally abundant.

Dr. G.S. Ibingira (pers. comm. 1987) stated that winged termites and cone-headed grass- hoppers (*R. nitidula*) "are great delicacies among many tribes in Uganda and other Eastern and Cenb'al African countries."

which occur in Uganda and have been reported as food elsewhere] "are much favoured as food" in many areas of East Africa. Owen states that the termite mounds are individually owned

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Important subscription information

It is essential that the Newsletter mailing list be as up-to-date as possible when it is transferred to Bozeman, Montana later this year. It was a little more than a year ago that it became necessary to adopt the policy that, henceforth, Newsletter subscribers would need to contribute at a rate averaging at least \$5 per year in order to remain on the mailing list A code was devised to show each sub- scriber's status. Check the upper right-hand corner of your mailing label. If your code designation starts with "F" your troubles are over. F stands for "Free" and is awarded to libraries, Peace Corps Volunteers, and others who have reason to request it.

If your code begins with "P" it means that you have contributed financially to the Newsletter . The first two numbers after the p show the last year when you sent a contribution (ac- cording to our records) and the next two numbers (three numbers if you have contributed \$100 or more) show the total amount you contributed up through that year. For example. if your code number is P9310. it means that your last contribution to the News- letter was sent in 1993 and that you have contributed a total of \$10 up to the present time. Minimum "paid-up" amounts for the different years areas follows: P9405, P9310, P9215, P9120 and P9025.

This system has a built-in grace period of 1-3 issues. Thus, code numbers with amounts less than those shown above for a particular year are in danger of being dropped from the mailing list. Code numbers D, CM, and those beginning with an M must be converted to either the P or F series before the July Newsletter is mailed. So, don't wait. Make sure that your subscription is up-to-date by mailing a check or requesting free status today.

Editor's Corner

It is indeed a pleasure to introduce Florence Dunkel, Associate Professor of Entomology at Montana State University (Bozeman) as the new Associate Editor and Editor- o-Be of The Food Insects Newsletter. There is an old saying that if there is a job to be done, find someone who is already busy to do it. That's the principle we followed, and, fortunately, Florence agreed to give it a try .She will take over as Editor either with the last issue of this year or the first issue of next year.

Dr. Dunkel's research has focused on developing pre- and postharvest food management systems, and improving the balance between traditional (indigenous) farm practices and scientifically-based, environmentally sustainable pest management in those systems. One of the things I like most about our new Associate Editor is her global perspective. The past 15 years have included on-farm re- search and surveys in China, Rwanda, Morocco, Mali, Montana and Minnesota. The past seven years have included identification of insecticidal

saying, "They taste like a huge sunflower seed. I think McDonalds should pick these up. It could be like McGrasshopper." (Is Dunkel simply a talented teacher, or is it possible that those Montana , grasshoppers are so good that they are the main force in driving Dunkel's course enrollment up from 24 in 1989 to 93 in 1994?)

Another event covered by TV was in 1992 when she served curried grasshoppers to about 200 entomologists at the national ESA (Entomological Society of America) meetings in Reno, Nevada. She has .also furnished background educational materials and grasshoppers for presentation by extension personnel in Montana. With this kind of action agenda, it's no wonder she was able to remark a while back that "there appears to be a genuine increase in interest in making food out of grasshoppers in Montana, not only among students but among Montanans in general."

I first knew Florence when she was an undergraduate student in my medical entomology course here at the University of Wisconsin. She went on to take three degrees at UW -Madison, B.S. (Zoology}, M.S. (double major in Zoology and Science

and insect repellent plants and development of potentially marketable materials from them. Sources of support for these various studies have included the U.S. National Academy of Sciences, U.S. Department of Agriculture, U.S. Agency for International Development (AID), Food and Agriculture Organization (FAO) of the U.N., the States of Minnesota and Montana, various foundations and several insecticidal/pharmaceutical firms. In her research, she has a great knack for interacting not only with other scientists and scientific disciplines, but at all levels from the farm producer to industry to government agencies in seeing that improved programs are implemented.

Other than lots of foreign experience, what about other credentials relative to food insects? Older readers may remember a short item in the March 1993 Newsletter called "McGrasshoppers in Montana." It included a recipe for fried grasshoppers. Florence teaches a course called "Insects and Society" in which she devotes a class period each year to raising student awareness about insects as food. In 1990 and again in 1994, the class got local newspaper and TV coverage. A student who ate four of the hoppers was quoted as

Education} and Ph.D. (Entomology). I do not know in which direction(s) she might take the Newsletter, but, having thoroughly discussed this matter with myself, - I think it is time for a change in editors. Our major objective with the Newsletter up to now (aside from networking) has been to make those of us of European descent more aware of the fact that insects are traditional foods in most other cultures, that they have played an important role in human nutrition, and that they have much to offer in the future--nutritionally, economically and environmentally. A good start has been made, and the future looks bright.

Editor's apologies for recent tardiness in responding to correspondence

My wife, Lou, underwent surgery for an extensive aortic aneurysm in early December. We were told that her recovery would be slow, and indeed it has been slow. She is doing nicely, now, though, and Newsletter operations should soon be back to just the normal kind of slow.

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In the Philippines, local press coverage of locust control efforts ..spraying and/or eating

Bill Shyne of Honolulu participated in a medical/dental project in the Philippines (mostly in rural areas) during July and August 1994. While there he clipped several articles from Manila newspapers which he later sent to us. They describe efforts to combat a destructive locust invasion. As insecticides were not successful, a movement began in some areas, apparently partly farmer instigated and partly government instigated, to harvest the insects for sale, both as food for people and as animal feed. We seldom get such a good glimpse of the local reaction to a problem in other countries, so we decided to reprint nearly the whole bundle that Dr. Shyne sent. The first article, dated July 7 and apparently the last in a series begun earlier, contained more good detailed information on the taxonomy, biology and ecology of short-horned grasshoppers (Family Acrididae) than we have seen for an insect group in a long time in a newspaper. Unfortunately, because of space constraints, we had to delete those sections of the article.

From the *Philippine Daily Inquirer*, Manila, July 7, 1994:

Special Report: Queen Locust? What's that again?

By Felix Zamora, Jr. (Conculsion)

The migratory locust species seen in the Philippines infesting vegetation through the country is the *Locusta migratoria* which has a wide distribution ranging through most of Africa, Europe, Asia, Oceania, Australia and New Zealand. The average adult measures up to five cm long, may either be yellowish or grayish in its migratory form, can fly high, and as far as 2,000 km non-stop. .

hold them upright and be moved across fields even by young people. Stored properly after use, the nets would last for years.

From the *Philippine Daily Inquirer*, apparently also July 7, 1994:

DA Taken by Surprise: Locusts invade, by Art Sampana:

Jesus De Guzman, provincial agriculture officer, said the attack took the residents by surprise, and the DA office was not able to immediately mobilize its personnel and insecticide equipment.

Locusts destroyed a *sitaw* (stringbeans) plantation in Barangay Maysilao Monday afternoon. When the DA personnel arrived the following day, the swarm had proceeded to nearby Barangay San Miguel. The insects attacked a ricefield at Sitio Malindig, destroying three-week-old palay. They went on to Sitio Dangga, wreaking havoc on coconut trees.

The agricultural workers were able to catch up with the locusts at a nearby livestock and poultry farm. But DeGuzman said the farm owner, Letty Go, prevented them from spraying the compound for fear that the chemicals would affect the 30,000 chickens and herds of cows at the compound. "All we could do was to gather as many locusts as we can, then we cooked and ate them," De Guzman said.

In Nueva Ecija, the provincial board appropriated an additional P70,000 to pay for locusts caught by residents of affected towns. Vice Gov. Oscar Tinio said the amount was in addition to the P50,000 allocated last month for locust control. He said swarms of locusts had descended on the towns of San Antonio and Cabiao.

...Farmers aided by entomologists have been fighting locust how infestations with toxic chemical pesticides to no avail. In most cases overall costs of operations from the onset of the locust infestation until it subsides generally exceed that of crop damage sought to be saved. On the whole, only the pesticide manufacturers profit from the recurring exercise,

So what's the alternative? When hordes of locusts descend from flight and devour food crops, farmers may wind up with nothing to eat but the invaders. So, why poison them, as well as the crop, the environment, and farmers themselves? Why not look at them as manna from heaven?

Modern practical farmers who have turned their attention toward locusts as food and feed supplements now use commercially available nets to catch swarms. These insect nets are now used to provide protective cover nets over high value raw crops, thereby eliminating the need for insecticides. These lightweight insect nets are made of knitted and lock stitched, ultraviolet stabilized, white, high- density polyethylene. They are supplied in mesh size 24x24 per square inch, standard width of 3.6 meters by 100 meters length per roll weighing 27 kg.

These nets can be made wider and longer by simply stitching them on the sides and edges with fine polyethylene monofilament. They can be tied perpendicularly to long and lightweight boho poles to

One control measure recommended was catching the locusts with the use of nets. The provincial government has asked the local DA office to work out a system of buying the catch and determine how much should be paid to sellers. Locusts are selling like hotcakes in San Antonio where the insects are considered a gourmet's delight. They are sold at P30 a kilo.

Reports said locusts have been wreaking havoc on bamboo trees and vegetable crops in San Antonio and Cabiao. Farmers in the two towns have been guarding their growing rice crops against locust attacks. Provincial officials believe the swarms of locusts that descended on the two Nueva Ecija towns came from Pampagna, Tarlac and Zambales, where the monsoon rains must have disturbed the insects and prompted them to go elsewhere.

From the *Star Daily*, July 10 (PNA):

Locust: special dish

San Fernando, Pampanga --Locusts have been accepted in Pampanga as a palatable special dish, cooked "adobo" style.

But, some enterprising people recently discovered that the destructive insects, which continue to plunder vast tracts of sugarcane fields and vegetation in Pampanga and Zambales, can be a rich source of nutritious supplemental feeding for animals and fish, including fighting cocks.

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Philippines (from page three)

A cattle raiser from Angeles city said that his cows gained weight rapidly since feeding them feeds mixed with grinded dried locusts about two months ago. The local rancher said he buys locusts (not those killed by pesticide) from residents who have been catching the migratory insects by net at P50 per sack.

Several backyard "tilapia" raisers from Tarlac also swore that grated locust meat proves to be a real booster to the growth of the fishcrop. They also found out that fish fed with locust dried meat tastes better and more palatable than those being nourished by ordinary commercial feeds.

A local fightcock breeder said many of his rare breed of game fowl became even much fiercer and always in "fighting mood" after giving them a small amount of locust dried meat. He said one of his cocks won unscratched in a five-cock derby after it was fed a spoonful of the insect meat a few hours before the cockfight.

Dr. Erlino Mercado, chief of the research division of the Department of Agriculture in Central Luzon, is currently undertaking an in- depth study on how the locust meat, which reportedly has a high 17.5 percent protein, can be fully utilized

Meanwhile, in a report to Agriculture Secretary Roberto S. Sebastian, Bulay noted that locust infestation is starting to wane due to sustained chemical spraying and manual control activities. Furthermore, the rains have washed away a considerable amount of locusts eggs, nymphs and hoppers, added Bulay.

As of mid-July, total locust affected area of 5,330 hectares is down to merely seven percent or about 349 hectares spread over in 28 barangays in Pampanga (224.5 hectares), Zambales (78 hectares) and Tarlac (46.50 hectares). To date, Bataan is considered a locust-free area.

From the *Philippine Daily Inquirer*, July 24.

A photo showing swarming locusts, captioned: Outnumbered. A farmer fights a swarm of locusts with a mixture ~ from a jet spray at a heavily infested field in Barangay Lawang Cupang, San Antonio, Nueva Ecija. Some farmers have resorted to eating the locusts, a local delicacy called balang, but to no avail.

The only thing we saw or heard about all of this in the U.S. press was in our own local paper, *The Capital Times*, July 23-24, a photo captioned: Luscious locusts. Children playfully

for productive uses on a large- scale commercial basis. Mercado, who recently returned from the United States where he finished his doctorate degree in agricultural engineering, said the lack of community involvement of some local government officials is greatly hampering the campaign against the locust infestation, which is fast becoming a perennial problem in Central Luzon. (PNA)

From newspaper unknown, date uncertain but may be July 10, 1994 (PAJ News Service): **Locust adobo, anyone?**

If one can't lick them, eat them! This is one of the strategies being popularized by the locust task force in Zambales to control and bring down the locust population. The task force is sponsoring a province- wide "locust cooking contest" among housewives with corresponding prizes, according to Dr. Renato Bulay, Department of Agriculture Region III director .

In effect, the cooking contest will generate various recipes and preparations to make locusts more "attractive" and palatable to non- eaters. It is hoped that demand for locusts for food would increase and thus encourage farmers and their families to gather locust manually using nets rather than spraying them with chemicals.

A popular delicacy among Ilocanos is *locust adobo*. It is prepared by detaching the wings and feet, boiling the "dressed" brown grasshoppers in water for a few minutes, and then frying them in oil. The resulting crisp locusts can be served with tomatoes, local red onions (*lasona*) and *bagoong*.

Locust is rich in protein, according to laboratory analysis. With 13.7 percent protein content, locusts can very well be used as feed for livestock and fish. In fact, Bulay said a number of farmers in Pampanga are now using chopped, dried locusts as feed for hito, broilers and cattle.

catch locusts Friday in Tarlac, Philippines. Locusts have been destroying crops on the country's Central Luzon island since last year, and the government seems helpless in eradicating the pests. Cooked locust serves as a delicacy in the area. O

Ever wonder how to cook a stick insect?

Tom Slone, Berkely, California, sent in an excerpt from Stone (1992) from which we draw the following account of the use of the giant spiny stick insect, *Extatosoma tiaratum*, as food in Papua New Guinea. Leaves of the sago palm are the main food of the insect; the leaves are also used for roof thatching and house roofs in PNG require re-thatching several times a year. According to Stone (pp. 157-158):

The women prepare a thatching feast and the men move off into the rain forest to collect large bundles of sago palm leaves. On their return, the leaves are cleaned up, dead leaves are brushed out, and at this stage many Giant Spiny Stick Insects are usually found and promptly handed over to the women for cooking. They are skewered with fine-pointed sticks pushed from the abdomen tip up through the head and spit roasted over an open fire until the legs falloff; at this stage they are ready to eat. The flesh of these large insects is pink in colour , in fact, very meaty-looking, but what it tastes like I can only guess. I have actually seen this thatching feast on film which was taken about 20 years ago. The natives also ate large spiders cooked in the same way. Whether this practice still exists today I do not know.

Stone, John L. 1992. *Keeping and Breeding Butterflies and other Exotica: Praying Mantis. Scorpions. Stick Insects. Leaf Insects. Locusts. Large Spiders and Leaf-cutter Ants.* Blandford, 192 pp.C

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Letters

A case of ingestant allergy from eating a grasshopper

From **Rick Vetter**, Riverside, California:

I thought I would pass along some information to you. Today was an Entomology Department barbecue-kickoff. After the burgers were all cooked someone threw some grasshoppers on the grill. I was given apiece to try (I think it was the head and portion of the thorax). Within 30 minutes, I felt a "puffiness" of the throat. It persisted for several hours and now 4 hours later, there is still a ticklish feeling in the back of my throat. I spoke with my sister-in-law (a nurse) and she said that both my brother and their two allergic kids would get the same reaction to foods to which they were allergic. I have no allergies except that when I was rearing moths, I developed a sensitivity to

A remark on the *ngankoy* of Zaire

From **Dr. Chris Starr**, University of the West Indies, Trinidad:

In his piece on "Insects as remedies for illnesses in Zaire," Tango Muyay mentions a wasp, the "*ngankoy*," rendered in French as *guepe maconniere*. The English translation of this as "worker wasp" is quite misleading, as it suggests that a paper wasp is used in the remedy. The nest is evidently of mud, made by a solitary sphecoid or eumenine wasp, which in English would be called a mud-dauber , potter wasp or even (in conformity with the French name) mason wasp.

I have come upon one other reference to the use of mud nests of wasps in a medical infusion, this time from the southern USA. See my comment on the late great Memphis Minnie's "Dirt Dauber Blues" in *Sphecos* No. 24, p.22, 1993.

moth scales. I thought I'd pass this information along incase you were interested in gathering data on oral allergies to insects.

Editor: In a subsequent letter, Rick gave additional information including some family history regarding allergies: "In response to your letter regarding my allergic reaction, I had not eaten any insects before ...I only ate the head and a portion of the thorax of what I was later told was *Schistocerca americana*. ...My brother lived in New York for years without allergies and then determined in later life that the olive pollen of southern California caused him real distress. Also, he got the same reaction eating some honey I had given him from the bees at UC-Riverside (I work with honeybees for my living). My niece and nephew since birth have had allergic food reactions to a variety of substances, mostly legumes {peas and especially peanut butter almost to the point of hospitalization). They describe the same 'funny feeling' in their throats as I described with the grasshopper incident."

Editor again: We have reason to hope that the long-promised article on insect allergens will be ready for inclusion in the next issue of the *Newsletter*. In the meantime, it may be of some comfort to know that insects appear to be less of a problem as ingestant allergens than as injectant (bee stings for example) or contactant and inhalant allergens. The latter two can be an occupational hazard for entomologists and others who rear and handle insects, particularly under enclosed conditions (as opposed to outdoors) and over extended periods of time. Ingestant allergy might become more common, however, if more Americans begin eating insects. According to Brenner et al (1991), cross-reactivity with shellfish suggests a possible relationship between ingested and inhalant allergens, although more studies are needed. Readers interested in more information should consult one or more of the following:

Brenner. R.J.. Barnes. K.C.. Helm, R.M., Williams, L. W. 1991.

Modernized society and allergies to arthropods. *Amer. Entomologist* 37(3): 143-155.

Wirtz, R.A. 1980. Occupational allergies to arthropods--documen-

tation and prevention. *Bull. Entomol. Soc. Amer.* 26:356-360. Wirtz, R.A. 1984. Allergic and toxic reactions to non-stinging arthropods. *Ann. Rev. Entomol.* 29:47-69.

Ed.: We looked it up in *Sphecos*. Stan mentions that "Dirt Dauber Blues" is one of two songs about stinging insects mentioned in a recent book on the blues by Paul and Beth Garon (1992, *Woman with Guitar: Memphis Minnie's Blues*, New York: Da Capo). The first verse lyrics go like this:

Everybody worrying me, want to know why I'm so crazy about dirt dauber tea. Everybody worrying me, want to know why I'm so crazy about dirt dauber tea. Because when I was young, they built their nest on me.

Garon and Garon cite several uses in southern folk medicine for mud-dauber nests and a tea prepared from them. Starr says the species must be *Sceliphron caementarium* or the organ-pipe mud dauber, *Trypoxylon politum*, both of which are common in the southern US. According to Starr: "Minnie's remark that they built their nest on her may be taken almost literally. If Minnie was bed- ridden in an unscreened house in the summertime, a mud dauber may well have taken to making a nest right on her bedpost or headboard. Lying immobile, she would have seen the wasp come and go many times, gradually building up the nest." For further interesting analysis about the song, the mud dauber's unthreatening buzz, and the easy familiarity between rural southerners and their wasps, the reader may consult Starr's commentary in *Sphecos*.

Adriaens (1951) reports that geophagy or the custom of eating earth is very common throughout much of the Kwango in Zaire. Clay is preferred, with women the main consumers, especially those who are pregnant. The custom apparently has to do with a concern for providing lime to the fetus. Among the sources used are fragments of "fly nests," called "maconnes". (or animal which builds home with dirt). The genera used are *Synagris* sp. (Family Vespidae, Subfamily Eumeninae) and/or *Sceliphron* (= Pelopoeus) sp. (Family Sphecidae).

Adriaens, E.-L. 1951. Recherches sur l'alimentation des populations au Kwango. *Bull. Agric. Congolbelge* 42(2):227-270; (3):473-552.

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Reprinted from nearly identical versions which appeared in the *Washington Post*, September 1, 1994 (sent in by Mel saunders, Odenton, Maryland) and the *San Francisco Chronicle*, September 4, 1994 (sent in by Tom Slone, Berkeley, California).

Saving the Mopane Worm

South Africa's wiggly protein snack in danger

by Anton Ferreira, Reuters News Agency

Styles said there had been a clear decrease in worms in recent years. "On a number of farms they've gone extinct." He said the worms were vulnerable to the frequent droughts of South Africa, quickly becoming dessicated if the rains failed. "In a dry year the price of worms will go up. You might get rain in localized areas; then everyone will go there to collect because that's where the worms will be. This puts tremendous pressure on a small area, and very few worms survive to provide recruitment for the next generation. A local population can be wiped out very fast.

Johannesburg: *Imbrasia belina* does not sound like an irresistible snack, much less look like one, but the people of southern Africa could be eating it into extinction. It is the emperor moth, and its caterpillar stage--known as the mopane worm--is a popular part of diets in Botswana, northern South Africa, Zimbabwe and Namibia. Possibly too popular for its own good, according to insect expert Chris Styles, who is conducting the first scientific study of the worm and its use by humans. "It's big business, all conducted on a cash basis," Styles said. "In Botswana alone I've heard it's worth \$6 million a year- -which is very big for Botswana."

He said in one part of South Africa's Northern Transvaal region about 2,000 women were involved in collecting the worms, fat multicolored slugs that get their common name from the mopane tree, whose leaves they favor. "People utilize them tremendously, both as food and as a way to make money," Styles said. "In a lean year when they are hard to come by, a kilogram (2.2 pounds) will fetch \$30 in Johannesburg or Pretoria." For the worms, having even a modest price on their leathery heads spells trouble. "One of the biggest problems is overexploitation," Styles said. "Some farmers in Botswana aim to harvest 5,000 bags a year - that means 90 million worms, It's a natural resource that's been identified as a big money spinner."

Styles said an increasing number of young women were harvesting mopane worms as alternative employment dried up in southern Africa's rural areas. "We need to find a way of utilizing the worms on a sustainable basis - preserving the jobs they provide but also ensuring their conservation."

He said research into nature conservation in South Africa had focused on the mammals like rhino and elephants at the expense of creatures like the mopane worm which were less spectacular but more relevant for rural communities. "Conservation means nothing to these communities if they don't benefit from it. We've got to use science to benefit people."

Analysis by South Africa's Council for Scientific and Industrial Research has shown that the average worm is 10 percent protein. About 15 worms a day would provide an adult's requirements of calcium, iron and riboflavin.

Styles said his dream was to find a way to farm the worms. "You'd have to get the moths to mate indoors and protect the worms from -predators like birds and baboons. Think of silkworms--why can't we = have the same success with mopane worms?"

Mopane worms are usually sun dried after harvesting which gives them a long shelf life. They are then added to stews or eaten as they are like peanuts.

Letters (from page five)

The ultimate endorsement or edible insects .

Colorado school kids eat the "worms" and leave the fritters

Signe Hartmann was one of the kids next-door who grew up with the Editor's three youngsters here in Madison, Wisconsin. Ms. Hartmann is now in Denver, Colorado, from where she wrote, Nov. 19, 1994, in part:

"...I'm working as a science resource teacher in three different elementary schools here -and my job is partially funded through a nutrition grant. So when I found out that one class was studying insects I immediately thought of you.

"The information you gave my Mom was so helpful. The finale of our insect study was cooking and eating the corn/worm fritters and I chocolate-covered crickets. I was amazed that kids were picking the mealworms right out of the fritters to eat them individually. Need- less to say it was a big success -and I'm sure we'll be doing more

insect-eating in other classrooms. Thanks again for all of your ~ information. It was also great to teach the students about different .countries who use insects on a very regular basis. ..."

Another bug dinner in the offing

From Dr. A. van Huis, Wageningen Agricultural University, The Netherlands, in part:

"As the secretary of the Section of Experimental and Applied Entomology of the Entomological Society of the Netherlands (ESN), I have a question concerning recipes of insect food. Next year the ESN celebrates their 150 years anniversary. The theme chosen for the Annual Meeting is "Insects as useful animals. " Apart from the well- known concept of natural enemies we would like to place the emphasis on commercial insect products such as honey, beeswax, pain~, shellac, dyes and medicines. As such, insects as human food also enters the picture. We had the idea of preparing insect dishes during the evening meal. ..."

Recent Articles in Professional Journals

Conway, J.R. 1994. Honey ants. *Amer. Entomologist* 40(4):229- 234, 5 col. figs., 8 refs. Department of Biology, University of Scranton, Scranton PA 18510.

This article was modified from "A honey of an ant," published in *Biology Digest* 18(4):11-15, 1991. Honey ants store nectar in the crop (an enlarged part of the foregut) of swollen workers which hang suspended in underground chambers and are called repletes. The repletes supply other members of the colony during times of food scarcity. There are several genera of honey ants, but species in the arid lands of Australia (*Camponorus inflatus*) and the southwestern U.S. and Mexico (*Myrmecocystus* spp.) have developed the largest repletes, with gasters (abdomens) expanded to the size of a marble. According to Conway only the large repletes of *C. inflatus* are eaten by the Aborigines. Repletes of other honey ants in Australia are smaller, those of *Melophorus bagori*, for example, being only about half as large as those of *C. inflatus* and they are not normally eaten.

Information on the biology and ecology of (primarily) *C. inflatus* and *M. mexicanus* summarized under the following subject headings: honey ant habitat, nest density, population size, reproductives and nuptial activity, guests and parasites, repletes, nest architecture, circadian and seasonal activity, food sources, interspecific and interspecific competition, and predators.

As to the significance of honey ants in Aboriginal culture, the author notes that Aborigines expend much time and effort digging honey ants. In a one-year study of 22 Aborigines mentioned by Conway, there were 76 excavations involving 80 hours of digging with quantities of honey retrieved per dig ranging from 45 to 250 g. The importance of honey ants in Aboriginal mythology and ancient and modern-day art is also briefly discussed.

Pemberton, R.W. 1994. The revival office-field grasshoppers as human food in South Korea. *Pan-Pacific Entomologist* 70(4):323- 327. Aquatic Weed Control Research. USdA ARS SAA, 3205 College Avenue, Ft. Lauderdale, FL 33314.

Rice-field grasshoppers, primarily *Oxya velox* (Fabr.), called *metdugi*, were formerly a common food ingredient in Korea, but their use as food declined as insecticide use increased during the 1960s and 1970s. *Metdugi* ceased being found in the Seoul markets whereas silkworm pupae (*Bombyx mori* L.) are almost always present. In Chahwang Myun (a district in Sanchung County) insecticide spraying began to decline in 1981, allowing *metdugi* populations to begin increasing. In 1982 some *metdugi* began to be collected and sold again in the local market at Sanchon.

Pemberton states: "The decline in insecticide use and the desire of some Koreans to eat pesticide-free rice led to the development of organic rice fanning in Chahwang Myun. This was economically viable because the yields of rice were the same in unsprayed fields as in sprayed fields, and organic rice

buying dried *metdugi* from fanner-collectors. In 1990, more than 600 families sold 1744 liters of *metdugi* to the Cooperative at 5000 Won per liter (US \$6.98). The Cooperative sold them for 6500 Won per liter (US \$9.08); much of the 1990 sale went to a supermarket company in Pusan which divided the *metdugi* into 0.2 liter packages and sold these for 3000 Won (US \$4.19). By 1992, the Cooperative was paying US \$9.91 per liter for *metdugi* and selling it at bulk rate for US \$12.03 per liter. In addition to selling to the Cooperative, fanners sell *metdugi* at the local five-day markets (open one day every five days) and on the street.

Metdugi are most commonly collected by older women, and usually from mid-October to early November. The collected *metdugi* are steamed or boiled, then dried in the sun for one day and in a room for two more days. For two women studied by Pemberton, the average collection rate was about 0.25 liter per hour, with a best rate of 1.0 liter per hour. During 1990, the income per hour for these women for collecting *metdugi* ranged from US \$1.75-6.98, excluding the time spent in processing and marketing.

As to food preparation of dried *metdugi*, they are sometimes eaten dried without seasoning, but they are usually pan-fried with or without oil after the wings and legs have been removed. The author describes further preparation as follows: "During or after cooking, they are flavored with sesame oil and salt, or sesame oil and sugar, or soy sauce with or without sugar. I have also seen live ones fried whole. These turn red like shrimp as they cook. Many of these preparations produce a product with good snack food essence. They are bite-sized, crispy, crunchy, and salty and/or slightly sweet. ..." According to Pemberton, many Koreans consider *metdugi* to be a health food, and, for older Koreans, it brings nostalgia -a taste of the past

A one-liter package of *metdugi* purchased from the Cooperative was found to consist of three species. *Oxya velox* (84.5%), *Oxya sinuosa* Mistshenko (14.8%) and a single *Acrida lata* Motschulsky, a large species not expected to be found in *metdugi* although it is one of the species eaten in Korea.

Peigler, Richard S. 1993. Wild silks of the world. *Amer. Entomologist* 39(3): 151-161, 6 figs., 8 refs. Department of Zoology, Denver Museum of Natural History, 2001 Colorado Boulevard, Denver CO 80205-5798.

Most commercial silk comes from the so-called silkworm or mulberry silk moth, *Bombyx mori* (Family Bombycidae). The pupae of this insect have long been a valuable high-protein food or animal feed byproduct. In this paper, the author discusses the status of silk production by about two dozen other species of moths and one butterfly for which there is documentation for past or present use of their silk by humans. The moths belong to the families Saturniidae (giant silk moths) (by far the most important), Lasiocampidae and Notodontidae; the butterfly belongs to the family Pieridae. Although Peigler does not (with two exceptions) mention food use in this paper, the pupae (or in one genus, the larvae) of about half the

sold (and still sells) for higher prices." In 1989, the Chahwang Agricultural Cooperative began

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Professional Journals (from page seven)

species discussed have been reported as human and/or animal food. Thus, the author's discussion of the past, present and future of silk production by these species is relevant in assessing their potential food importance.

The author describes one quite bizarre deviation from the normal exploitation of silk from cocoons. For centuries in southern China, particularly on the island of Hainan, mature larvae of *Saturnia* (= *Eriogyna*) *pyretorum* (Westwood) (Saturniidae) "were collected just before pupation and the silk glands were extracted, soaked in vinegar, washed, stretched more than 2 m, and made into what was hailed as very strong leaders for fishing lines. The caterpillars were sometimes fried and eaten after the silk glands were extraced." This is a food use not previously known to this reviewer. The other food use mentioned is that of *Eucheira socialis* (Pieridae) in Mexico.

Peigler, R.S. 1994. NoriCsericulluratusesofmdth cocoons in diverse cultures. *Proc. Denver Mus. Nat. Hist. Set. 3. No.5:* 1-20, 7 figs., 39 refs.

Relative to food use of *Hyalophora euryalus* (Saturniidae), Essig (1931, A History of Entomology, p. 22) indicated that California Indians ate the pupae from cocoons which they collected to make rattles. According to Peigler (p. 2), Craig Bates (Curator of Ethnography, Yosemite Museum, Yosemite National Park) doubts (personal communication) that pupae were eaten, at least not routinely, "because of the power most groups associated with the rattle made from these cocoons."

Peigler notes that, in the Denver Museum of Natural History; there is a cocoon of either *Eumeta cervina* Druce or *E. rougeoti* Bourgogne (Psychidae) from Zaire, that was part of an assortment of fetishes used by a witch doctor. The cocoon is 5 cm long. According to J>Bourgogne (personal communication to Peigler) the larvae of *Eumeta* are eaten by natives in several African countries.

Steinkraus, D.C.; Whitfield, J.B. 1994. Chinese caterpillar fungus and world record runners. *Amer. Entomologist* 40(4):235-239, 4 col. figs., 37 refs. Department of Entomology, 321 AGRI, University of Arkansas, Fayetteville AR 72701.

The authors cite a source in the sports world in saying, "Although recent statements from the Chinese attribute the athletes' success to their intense training schedules rather than to their dietary supplements, the possible stress-relieving properties of the caterpillar fungus continue to intrigue Western athletes and scientists." They cite a 1992 study (Gao et al., *Acta*

apothecary in 1993 at a price of \$18/oz which is very close to the wholesale price quoted in China (\$700/kg). The pharmacologic properties of the caterpillar fungus are said to resemble those of ginseng (*Panax quinquefolius*), strengthening and rejuvenating a system harmed by overexertion or long illness. Many other medical benefits are also attributed to the fungus. Although the incredible performances of the Chinese women's track team cannot yet be attributed to the fungal potions, the authors conclude that, "Clearly, *Cordyceps* spp. deserve more [research] attention from pharmacologists, chemists, and entomologists." Unfortunately, *Cordyceps* has its greatest diversity in rainforests and becomes much less abundant as the rainforests are disturbed and destroyed. "The loss of these fascinating insect pathogens will be especially tragic because of their potential as a source of pharmacologically active compounds."

Ed. There was a short account of the Chinese caterpillar fungus in the November 1993 *Newsletter*. In a follow-up communication (January 1994 *Newsletter*), Professor Karl Espelie (university of Georgia) gave the identity of the caterpillar as *Hepialus armoricanus*, based on a contact at Nanjing University in China. This raises a question as to whether more than one species of hepialid larvae may be used, or whether there is taxonomic synonymy involving *H. oblifurcus* and *H. armoricanus*? *Cordyceps* species appear to be host-specific, but Steinkraus and Whitfield note that this may only be apparent because more than half the described species are known only from the original collection.

News about our recent guest authors **May Berenbaum**, author of the article "Sequestered plant toxins and insect palatability" in the November 1993 *Newsletter* was elected during the past year to the National Academy of Sciences. She was also the 1994 Founders' Memorial Address Lecturer of the Entomological Society of America at its annual meeting held in Dallas, Texas. Dr. Berenbaum is Head of the Department of Entomology at the university of Illinois in Champaign-Urbana.

And, right here at home. The Department of Entomology's **Rick Lindroth** was winner of the 1994 Pound Research Award given annually to the top young researcher in the College of Agricultural and Life Sciences at the University of Wisconsin. Dr. Lindroth authored the article "Food conversion efficiencies of insect herbivores" in the March 1993 *Newsletter*.

Murray Blum (University of Georgia), author of "The limits of entomophagy: a discretionary gourmand in a world of toxic insects" (March 1994 *Newsletter*), was in Madison in December to give a public lecture sponsored by the University of Wisconsin Lectures Committee and the UW Department of

Entomol. Sin. 35:317-321) that the caterpillar fungus consists of larvae of *Hepialus oblifurcus* Chu and Wang (Lepidoptera: Hepialidae) infected with the obligate entomopathogenic fungus *Cordyceps sinensis* (Berkeley) Clavicipitales, Ascomycotina). Biology is briefly summarized for both hepialid moths and the fungal genus *Cordyceps*, as are the methods of packaging and preparing the fungus for ingestion.

The fungus has always been expensive, affordable only by the well- to-do, and remains so today. The authors ordered it from an American-Chinese

Entomology. Title of the lecture was to Sex, Slaves, and Murder: The Chemical Basis of Insect Sociality." The editor was unable to attend, but with that title, I would guess that Murray spoke to a packed house. []

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Crowley's Ridge mosquito cookies seem far out, but there are parallels in Africa

Creative chef Larry Clifford was the winner of the second annual Mosquito Cook-Off at Arkansas' Crowley's Ridge State Park with his recipe for mosquito cookies. The cook-off is part of the World Championship Mosquito Calling Contest at the park. Formerly, visitors to the park complained about being bitten by mosquitoes, so park rangers decided to turn the liability into an asset.

The recipe calls for crushing the live insects lightly to keep them from flying, then pouring a mixture of brown sugar and syrup over them before boiling them. The boiling "seasons the critters" and rids them of bacteria. The batch is then dried and cut into small chips to be added to regular cookie dough. "It tasted good," said Randy Cross, 20, of nearby Walcott "you couldn't taste the mosquitoes at all."

Now we move from Arkansas to East Africa, specifically Malawi, and back in time nearly 100 years. Bodenheimer (1951, page 194) cites a 1900 reprint by E. Daguin that D. and C. Livingstone observed the collection and consumption of immense swarms of gnats known as *kungus* along the northern shores of Lake Nyassa. They were formed into cakes about one inch thick, and the taste was compared to caviar or salted locusts. According to Fladung (1924, p. 8, the paste known as kungu is composed of the mayfly *Caenis kungu* (Order Ephemeroptera: Family Caenidae) and mosquitoes (Diptera:Culicidae).

Bodenheimer (1951, pp. 139-141) cites C.W. Harris (1940) who emphasizes that many insects are eaten regularly as part of the diet by various tribes in Tanzania. He states that Lakes Victoria and Nyassa produce untold numbers of the lakefly, *Chaoborus edulis* (Diptera:Chaoboridae). They are collected by rushing into the dense clouds of midges, swinging hemispherical baskets attached to the end of long handles. The midges are squashed into solid masses, molded into cakes and dried in the sun. According to Harris, the lakefly is an important food in the limited areas where it occurs.

should apologize to the Crowley's Ridge folks for taking their mosquito cook-off too lightly in the past. One advantage for the chaoborids as food, however, they have fewer scales than mosquitoes.

In closing this tale, the author makes two requests. 1) Can someone, maybe one of our East African readers, verify the composition of kungu as reported by Fladung, i.e., the mayfly *Caenis kungu* and mosquitoes, or was Fladung in error, possibly confusing it with the chaoborid lakeflies? I have seen no reference to it in recent decades. 2) Can someone provide the reference for the 1940 paper by C. W. Harris? Bodenheimer cited it in his text, but did not include it in his list of references cited.

Nutrient composition per 100 g of insect

Energy (kcal)	382	Ash (g)	4.2
Moisture (g)	15.7	Calcium (mg)	140
Protein (g)	48.6	Iron (mg)	65.6
Fat (g)	10.3	Thiamine (mg)	1.24
Carbohydrate	21.2	Riboflavin (mg)	3.44
(total including fiber (g))		Niacin (mg)	18.3

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- Fladung, E.B.** 1924. Insects as food. *Maryland Acad. Sci. Bull.* (Oct. 1924, pp. 5-8
- Leung, W .T .Wu.** 1968. Food composition table for use in Africa. Joint publication by U.S. Dept. Hlth. Educ.. Welfare. Bethesda. Maryland. and FAO Rome, pp.165-176.
- Odiambo, T .R.** 1978. *The use and non-use of insects*. Nairobi: Centre Insect Physiol. Ecol. .17 pp.
- Platt, B.S.** 1962. Tables of representative values of foods commonly used in tropical countries. *Med. Res. Counc. Spec. Rep. Ser.* No. 302. London: H.M.S.O.. p. 24

For information on the Crowley's Ridge Cook-Off, thanks to Nik Mistler (San Francisco CA), Jessica Dean Scott (Rogers,

Owen (1973) reported that lakefly (*Chaoborus*) cakes are eaten and are possibly an important source of protein in Uganda. Odhiambo (1978) in Kenya, reported that lakeflies are collected by many ethnic groups living around Lake Victoria and the great lakes along the western branch of the Rift Valley. They are made into large balls marketed in rural market places and provide an important source of animal protein. The data below on proximate, minerals and vitamins analyses of *Chaoborus edulis* are as reported by Leung (1968). These data are essentially identical, except for calories and carbohydrates, with those reported earlier by Platt (1962).

These nutrient values are higher than one might expect for something like an adult mosquito which appears to be almost all wings, legs and proboscis. Yet chaoborids (non-bloodsucking midges) and culicids (mosquitoes) are first cousins taxonomically. So maybe we

AR) and Linda DeFoliart (Hotchkiss CO), for sending clippings from the *San Francisco Chronicle* (Aug. 27, 1994), *Arkansas Democrat Gazette* (Aug. 30, 1994) and the *Grand Junction [Colorado] Daily Sentinel* (Sept. 14, 1994), respectively.

Gene DeFoliart

Insect cuisine

Collector desires to receive recipes in which insects (also worms and snail) are featured. If you would like to share your favorite preparations, sources, insights, anecdotes, please send them to:

Charles Garth
31 Union Square West, Suite 15D
New York, NY 10003
(212) 355-5545 tel
(212) 366-4979 fax

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Uganda (from page one)

and anyone caught collecting from a mound that he does not own is likely to be regarded as a thief. The winged sexuals emerge in enormous numbers with the first heavy rain- fall marking the onset of the wet season. Various types of traps are used. In eastern Uganda, the winged termites are induced to emerge by beating the nearby ground with sticks, simulating heavy rainfall. The termites are eaten raw or lightly fried in their own fat. Owen states that there is a considerable trade in termites in some areas and that sun-dried termites are found at the right season in the local markets in many East African towns and villages. They are some- times transported long distances to markets.

The Baganda who live around the northern shore of Lake Victoria in Uganda use termites and fried grasshoppers as snacks between the main meals, one or more of which consists each day of steamed cooking bananas or plantains (known locally as matoke or matooke) accompanied by side dishes which are mainly sauces incorporating tomatoes, beans, eggs, fish or meat when available.

it is true to say that most African habitues of the termite prefer them raw. In many Bantu speaking parts of the country boiled and dried termites are on sale in the markets at some seasons of the year, but this method of preparation in my opinion makes them rather dull and tasteless, though I have no doubt they still provide a valuable protein element in the diet "

According to Osmaston, drumming is usually timed to synchronize with the end of a heavy shower, and it appears to be a rather frequently used means of inducing swarming in Buganda and Bunyoro. The other main method involves building a dome- shaped framework of sticks or elephant grass, which is then covered with banana leaves or a blanket, leaving a single exit so that the emerging termites fall into a pit or container. If it is after dark a light is used to help lure them through the opening.

Osmaston mentions that birds, especially swallows, martins and bee-eaters are conspicuous predators of the termites. A small hawk and a kite were also seen taking their share. He notes that his dog was also very fond of them. Finally, he mentions seeing soldier termites for sale in a market near Pakwach, and that most

locust, *Locusta migratoria*; the red locust, *Cyrtacanthacris septemfasciata*; and the desert locust, *Schistocerca gregaria* (Owen, p. 91). They are usually fried but may be pounded up and added to sauces. They resemble shrimps in flavor.

Gryllidae (crickets)

Brachytrupes (=Brachytrypes) membranaceus Drury, adult
Brachytrupes membranaceus, a large, fat cricket which is destructive to root crops, is regarded as a particular delicacy and is collected by digging them up from their burrows in the ground (Owen 1973).

Gryllotalpidae (mole crickets)

Gryllotalpa africana Palisot, adult
Fladung (1924; vide Bodenheimer 1951: 193) reported that the mole cricket, *Gryllotalpa africana*, is kept for its chirping and as food.

Tettogoniidae (long-haired grasshoppers)

Rusploia (=Homorocoryphus) nitidula (Scopoli)(=nitidulus), adult
The long-homed bush cricket, *Rusploia nitidula*, occurs in immense swarms with the onset of the rains in East Africa, In

Family uncertain

Osmaston (1951) observed "drumming" to induce termite emergence near Namwnda in Bulmogi county of Busoga. The drumming was "low, rhythmical and all-pervading," and it seemed to come from the ground. The "drum," half buried in the ground of a termite mound, was a horizontal piece of wood about 20 inches long by 4 inches in diameter, while the "drumsticks" were about 12 inches long by 1 1/2 inches in diameter. Either rolled-up banana leaves or clay pipes were inserted into the exit holes. The termites crawled out through these tubes and fell into containers.

Osmaston describes the flavor of raw termites as follows: "To my surprise I found them excellent. with a delicate flavour somewhere between fried whitebait and hazelnuts. But to catch this flavour it is no good nibbling at a single insect, a fair mouthful must be chewed [as he had seen the drummers do]. Since then I have never looked back and regard them as one of Uganda's cheapest luxuries. I have also tried them boiled and fried; but these methods seemed to kill the initial delicate flavour and I think

Nilotics seemed to enjoy eating the live queens. Osmaston tried fried queens, but was not much impressed- with their flavour. He concludes, saying, 'I foresee the day in the development of Uganda when the establishment and care of vast termitaria may be an important commitment of some government department. ...'

Also see Ibingira (1987) in Introduction.

Lepidoptera

Moth larvae are collected and roasted, and may often be bought in the markets. Owen gives no clue, however, to their identity.

Orthoptera

Acrididae (short-horned grasshoppers)

Cyrtacanthacris (= *Nomadacris*)
septemfasciata Serville, adult,
Locusta m. migratoria Linn., adult,
Schistocerca gregaria Forskal, adult

The locust species that are especially injurious to crops in tropical Africa (presumably including Uganda) are esteemed as food by many people. The species are the migratory

Uganda the species is known as *nсенene* and the Abdim's stork as the *nсенene*-bird because it tends to follow the swarms. Flights of the birds herald arrival of the *nсенene* and in some areas a special watch is kept for them. The introduction of electric street lights into towns In East Africa has revolutionized *nсенene* collecting as the insects are nocturnal and attracted in vast numbers to the lights, Owen states that in Kampala, Uganda, "the streets may be completely blocked to traffic by people who come in from rural areas to collect *nсенene*,"

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The Food Insects Newsletter**Page 11****1994 was another good year for U.S. press coverage of edible insects**

The quantity and quality of press coverage are important if the United States is to eventually lose its groundless and counterproductive cultural bias against insects as food. Last year was not a record year by any means, but we did see 14 different articles in U.S. newspapers. Counting the items on the mopanie worm and mosquitoes in this issue, we have already reprinted or summarized six of those articles. The other eight are listed below. As to quality, articles are definitely more "edible insect-friendly" now than they were a few years ago. Sure, you still see quotes such as "Eeew! I just wish they didn't still have their little legs on them," by a student at Texas Tech (in the *Houston Chronicle*), but nearly all of the articles we've seen lately, including those below, make the point in one way or another that insects are rich in nutrients, they taste good and they are commonly used foods in many parts of Africa, Asia, and Latin America.

As some of the articles below were rather impressive spreads, it occurred to me that it would be interesting to see how much actual space (in column inches) was devoted to our subject If

The Washington Post, December 4, 1994, by Dave Barry (sent in by Pat York). Coming from Dave Barry, it's difficult to tell, but we believe this could be considered "edible insect-friendly."

Wisconsin State Journal (Madison, Wisconsin), January 2, 1995, by Donald J. Frederick (National Geographic News Service). Also in the *Houston Chronicle*, January 8, 1995, and the *Sun-Sentinel*, Ft. Lauderdale, Florida, January 12, 1995. We count these as 1994 since the NGNS release was dated December 14, 1994.

Magazines

The past year seemed to be somewhat of an off-year for magazine articles on edible insects, so we just briefly list the ones we saw (including one from Canada).

The Furrow (published by John Deere and Company), Summer 1994, page 17, 1 colored photo. Title: "Bugs aren't all bad," by Rex Gogerty. As the title implies, the article discusses beneficial aspects of insects, including their use as food and animal feed.

you total -them up. you'll come up With 380 column inches with 191 column inches of test (the remainder is in headings and illustrations, some colored). With totals this high, might as well talk in terms of column yards--a total of 10.5 column yards and 5.3 column yards of text. When you consider that, for example, the Sunday *Houston Chronicle* has a circulation of 607,539 and the Ft. Lauderdale *Sun-Sentinel* a daily circulation of 278,086, and when you consider that some of the articles are carried by numerous other newspapers, and that we don't see all of the articles to begin with, Americans are getting a fairly heavy exposure to information about edible insects. And we haven't said anything here about radio and television interviews and TV documentaries. All of this is bound to make a difference sooner or later!

Houston Chronicle, April 10, 1994, by Richard Stewart.

Cleveland Plain Dealer, May 29, 1994, by Brian E. Albrecht (includes recipes from Ronald Taylor's *Entertaining with Insects*)

The Kansas City Star, June 4, 1994, by Tim Engle (includes dialing information for "Bug-a-licious recipes" from *The Food Insects Newsletter*). Reprinted in the *Sun-Sentinel* of Ft. Lauderdale, Florida, June 18, 1994.

The Washington Post, June 13, 1994, by Kathy Sawyer (sent in by Luther Dietrich). Reprinted in the *Buffalo News*, June 26, 1994 (sent in by Dr. Wayne Gall).

Maryland Times-Press, about July 25, 1994, by Kent Steinriede.

The Kansas City Star, September 10, 1994, by Shirl Kasper (mostly about cicada biology, but the last few paragraphs are devoted to cicadas as food).

Audubon, July-August 1994, p.18, by Kevin Krajick. This article on use of insects for large-scale animal waste recycling is being held over for summarizing in the next issue of the *Newsletter*.

Harrowsmith (Canada's Magazine of Country Living). August 1994, pp. 28-33, 3 col. photos. Title: "Gourmet Grub, It hops, it wiggles, it chirps. Haute cuisine goes live" by Paul Quarrington. Quarrington writes with a great sense of humor and offers a recipe for Thai Cricket.

Ranger Rick (National Wildlife Federation), January 1995, pages 32-38, 12 colored photos. Title: "Extra cheese and bugs to go" by Deborah Churchman, photos by Peter Menzel. The article starts out by saying, "Turn the page to find out how incredibly edible insects can be," then discusses and illustrates examples from Japan, Mexico, Australia and Africa.

Commercial Sources of Edible Insects

Auker's Cricket Farm
Box 378
Baton Rouge LA 70821
1-800-735-8537
Crickets, mealworms

Grubco, Inc.
P.O. Box 15001
Hamilton OH 45015
For orders: 1-800-222-3563
For inquiries: (513) 874-5881
Crickets. mealworms. waxworms. "superworms".

(Two sources are listed in each issue when space permits.)

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Newsletter selected for inclusion in The Millennium Whole Earth Catalog

As you may have noticed, we like to pass along anything that indicates increasing status for edible insects and/or that *Newsletter* subscribers are getting their money's worth. According to the editors of *Whole Earth*, the hardest part of creating the Catalog was deciding what to include; reviewers typically considered anywhere from 10 to 100 items for each one they finally chose. The challenge was to "identify and celebrate the most effective, practical, and appropriate tools and ideas for thinking and acting independently for the 21st century." To selectees, the *Catalog* editors offer "best wishes for continued excellence."

. From the *Lonely Planet Newsletter* (June 1993):

Papua New Guinea is the only country whose constitution designates insects as a renewable natural resource, and the only nation that has a central agency, in Bulolo, vested with developing the "insect resource" in a renewable way. This Insect Fanning & Trading Agency sells some k300,000 worth of insects every year to collectors, naturalists, scientists and artists. It's probably the only place in the world where some of the forest insects are also worth money! Insects have traditionally been an important source of protein, with a sago palm beetle making up an estimated 30% of the I protein intake for some Sepik peoples. (Sent by Ed Dresner, Vernon, Connecticut)