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THE FOOD INSECTS NEWSLETTER

JULY 1992 VOLUME V, NO. 2

The New York Bug Banquet - A Day to Remember

The event: **The 100th Anniversary Dinner of the New York Entomological Society**
The date: Wednesday, May 20th, 1992
The place: The paneled Tudor splendor of the Explorers Club in Manhattan
The caterer: New York Parties

The action began at 5:00 pm with interviews and a photo-op session for the press and other media, cocktails and hors d'oeuvres at 6:30 pm, dinner at 8:00 pm. The after-dinner speaker was your editor, with the title, "Insects are Food. Where has the Western World Been?" Actually, the bar was in place along with the Peppery Delight Mealworm Dip (delicious!) long before 6:30 pm, so conviviality got an early start.

The organizing committee did a great job, Durland Fish and Richard Falco, both of the New York Medical College, and Louis Sorkin, American Museum of Natural History, the president, vice-president and treasurer, respectively, of the New York Entomological Society. During a brief ceremony after the dinner, President Fish presented Lou Sorkin with a plaque in appreciation for all of his hard work in implementing this historic event

Everything - the hors d'oeuvres, the buffet dinner and the desserts was great. One item not listed on the menu, live honey ants, also proved popular with guests. About 100 live ants were brought by Raymond A. Mendez. Watching the line form for the honey ants, I thought about the old Roman epicures and how they would have loved to have something like live honey ants at their food orgies, to go with the cerambycid larvae which they "fattened" for the table on flour and wine. Table centerpieces included live tarantulas and scorpions (some with impressive dimensions), various insects, plant and floral arrangements, and origami insects both among the flowers and as napkin rings.

Rooms other than the dining room were adorned with larger than life wood and brass insect sculptures by Patrick Bremerand and Adam Pasamanick, respectively, living stick and leaf insects (some of these also with impressive dimensions) brought by Jane McEvoy who is Head Keeper of the Arthropod Exhibit at the Columbus, Ohio, Zoo, and insect dioramas furnished by Henry Galiano and Andrey Sharkov of Maxilla & Mandible, Ltd., New York. With more than 100 people in attendance, who had paid either $45 (society members), or $65 (non-members) for the privilege, the venerable old Explorers Club was both sedate and rocking. Droves of media people were there, making sure that none of this would go unrecorded.

According to the Associated Press story, Diners found the crickets crunchy with a taste like that of mushrooms. The mealworms were chewy and tasted like fish. The ants tasted peachy. The wax worm fritters

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Banquet (from page 1)

were nutty." After trying her honey ant (only one per guest, please), "It's good. It's really good," said Leah Frank, a society member. The AP story, as it appeared in *The Daily Sentinel* of Grand Junction, Colorado, was headed, "Waiter, there's a bug in my dinner, and it's delicious!"

Ken Ringle's story in the *Washington Post* was titled, "Bless This Grub - Let's Eat!' Some descriptions of flavors: "The mealworms taste like the sort of honey-roasted peanuts they used to serve on Eastern Airlines just before it folded....The font in a bruschetta with mealworm ganoush tastes mushroomy. The wild mushrooms in mealworm flour pastry project a burnt, nutty flavor. The waxworm sushi with tamari dipping sauce is acclaimed for its insouciant flavor." I looked up "insouciant" in the dictionary; it means "gay heedlessness" or "lighthearted unconcern." According to Ringle, people were asking what kind of wine goes with insects. Fish suggested "Honey wine would be good. But we didn't get any. Maybe chardonnay."

*U.S. News & World Report (*June 1), in a story by Dana Hawkins and Jo Ann Tooley also reported some taste assessments by guests. "A fruity aftertaste, like ripe pears," proclaimed one. "Tasty. Crunchy like potato chips," said another. Of the honey ants, "It's like eating a piece of candy," said Nancy Bennett, a seventh-grade biology teacher from New Jersey. Commendably, none of the press accounts that I have seen overlooked the real significance of the occasion -- to promote a better understanding of the role insects play in the diets of other cultures, in some of which they are of considerable nutritional and economic importance. I didn't see the results of CNN's coverage, but have heard that it was handled well.

To participate in all of this, my wife, Lou, and I arrived at LaGuardia Tuesday afternoon and took a cab to our hotel, the first time that Durland Fish, not CBS, had instigated the idea of eating insects on the show, and Durland, not the banquet caterer, would be the cook. Durland had cooked only two insects in his whole life, two giant waterbugs which were part of a shipment that had arrived two days earlier from Thailand via Berkeley. He pronounced them good, but I remembered reading somewhere that Thai water bugs are a rather complicated piece of culinary art. They have thick hulls for one thing. Up to now I had been quite sanguine about this whole affair. I didn't sleep well that night

The car from CBS arrived promptly at 6:00 am for the short run to the studio. It took about five minutes to meet the program hosts, see the set where the interview would take place and who would stand where. It took another five minutes in makeup. That left two hours to kill. With about 30 minutes to go, I first noticed a strange kind of nervousness which may be unique to people who are about to go for the first time live on national television. You aren't worried about the millions of people who may be watching and listening, but you are acutely conscious of the two dozen people back home, friends and relatives, who are sitting there with their fingers crossed hoping you don't bomb out so badly that you embarrass them in front of all their friends and neighbors.

Finally, we were on. I envied Durland fiddling with his skillet, giving him something to look at and something to do with his hands. He was cooking three giant water bugs and three of the Australian kurrajong grubs which looked like huge segmented french fries. Neither of us had ever eaten one. Durland offered Harry one of the water bugs. Paula was acting like she wasn't there, trying her best to be invisible. Who could blame her. She was portraying perfectly the average American. She was why we were there. Suddenly, there seemed to be some confusion at the other end of the line. Oh no! Harry was spitting out the giant water bug - in front of a national TV audience. I had only one thought- we hadn't been there five minutes, but had managed to set the field back 100

Radisson Empire which turned out to be nicely located on Broadway, and across the street from the Lincoln Center. Upon checking in, the woman behind the registration desk said, "I understand that CBS is paying for the first night," I said, 'That is correct." With registration completed, she said, "There are some messages for you. One from CNN .... One from *U.S. News & World Report*. . . . One from Nickolodean Television.... One from *The Philadelphia Inquirer*. . . ." At this point, I couldn't resist lookng around to see how many people were enjoying finding themselves unexpectedly in the presence of a celebrity. Unfortunately, only two other people were waiting to register, and both seemed preoccupied with their own thoughts. In the elevator I turned to Lou and, unable to come up with anything original, borrowed a line from a beer commercial: "Life doesn't get any better than this. This is as good as it gets." She gave me that look she sometimes does, so I decided to cool it.

We were to meet Durland Fish at 6:00 pm in the hotel dining room. He got hung up at the airport, however, waiting for a shipment of kurrajong (cerambycid beetle) grubs from Australia, and we didn't sit down for dinner until 9:00 pm, our first food since breakfast. Durland and I were to be on the CBS *This Morning* show with hosts Harry Smith and Paula Zahn the next morning. Now I learned for the years.

Harry Smith deserved a medal for handling it as gracefully as he did. As soon as we were off the air, I picked up a water bug and gave it a slight nibble. It was much worse than medicinal, it was awful! The cook hadn't a clue as to what had gone wrong. We should have offered Harry a kurrajong grub. Durland and I tried them upstairs after the show. They were superb! The taste was like a lean, high-quality sausage.

At the Explorers Club, the bar was set up on a large terrace adjoining the dining room. Tuxedo-clad waiters were serving round after round of hors d'oeuvres, all of them attractive and all of them delicious. It was a beautiful evening, cloudless sky and a light breeze. I was out there, at one end of the terrace, reminding myself that, as speaker of the evening, I was going to have to nurse this one drink through the entire proceedings. A sort of impromptu press conference gradually convened until at least 20 journalists were gathered around with 4 or 5 microphones thrust forward and 4 or 5

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Large-scale Feed Production from Animal Manures with a Non-Pest Native Fly

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The black soldier fly, *Hermetia illucens* (L.), is an attractive manure management agent that can produce large quantities of high-quality animal feedstuff, control house flies and reduce manure residue by half. Based on a 480 hen pilot scale test (Sheppard *et al* 1992) a modest-sized 20,000 hen caged layer facility could collect over 13 tons of larvae from June through December. Sixty thousand hens per house is now the preferred size and farms usually have multiple houses. This 13 ton production estimate from a small commercial unit is probably low. Future systems will be managed better than this first trial. Early season collections were not measured, and a late summer manure clean-out lowered production. Deeper manure basins in future systems should allow utilization of manure collected during the winter.

Prepupal soldier flies were self-collected as they sought pupation sites and crawled out of the manure basin. A 40° slope on one wall of the basin directed these mature larvae. They crawled into a 1/2inch slit in a 6-inch diameter PVC pipe at the top of this slope. Then they continued to crawl to a container at the end of the pipe. In the experimental facility they easily negotiated a 40-foot length of pipe. The masses of exiting prepupae sometimes clogged a 4-inch pipe, which was used at first, but the 6-inch pipe worked well. The opposing 12-inch wall was vertical and kept the masses of larvae off of the house's central walkway. If not contained, these masses of larvae can cause aesthetic problems.

Newton *et al* (1977) found that manually collected soldier fly larvae contained 42% crude protein and 35% fat. Self-collected prepupae should be of higher feed value since they average larger, have emptied their gut and have more stored fat. Tests are underway to determine the feed value of the self-collected prepupae. Manually collected larvae have been studied, and show promise as a feed ingredient for swine (Newton *et* al 1977), poultry (Hale 1973) and fish (Bondari and Sheppard 1981). Swine relish the fresh larvae.

Little is known about adult biology. The only adults commonly seen are newly emerged adults and ovipositing females. Eggs are laid in batches of about 500 in dry cracks or crevices above the chosen larval media. Other adults apparently live in a wild environment and their habits are largely unknown. They do not try to enter houses and are usually not **a** problem. In 15 years of investigating this insect, I can remember only one complaint about adults entering a residence.

house fly larvae that do attempt to compete with dense populations of soldier fly larvae usually die. In the pilot scale manure management test mentioned earlier no house fly breeding occurred from June to December. Many Georgia egg producers use this insect for house fly control without any management to contain the soldier fly larvae.

The economics of this manure management system are attractive. Construction costs should be less than the currently popular flush systems and resource recovery is greater.

The only insecticide able to approach the level of control achievable with this system is *Larvadex*, when house flies are susceptible. With low levels of *Larvadex* resistance, soldier fly larvae provide house fly control superior to *Larvadex (*Sheppard et al 1989*). Larvadex* costs an egg producer 10 cents per hen if used for 6 months. Thus a conservative value to place on house fly control with this soldier fly system is 10 cents per hen per year.

Manure removal and surface application costs 65 cents per hen, per year in shallow pit houses (Ritter 1992). Assuming 50% reduction in manure build-up through soldier fly activity (Sheppard 1983) for half the year gives a 25% reduction on an annual basis. Actual reduction may be much more if manure basins deeper than 12 inches are used, and soldier fly larvae can digest manure from the previous winter. At any rate, the conservative 25% reduction estimate produces an economic benefit of 0.25 x 65 cents = 16.2 cents per hen per year. This assumes the manure is a liability, which it generally is in high production areas.

Value of the dried larval feedstuff has been estimated at $340-400 per ton. At 44% dry matter, the fresh larvae are worth about $160 per ton or 8 cents per pound. So. the 1.32 pounds of larvae produced per hen per year are worth 10.6 cents. Adding the easily measured economic benefits of this system yields a total value of 36.8 cents per hen per year. This would net our small hypothetical 20,000 hen egg producer an extra $7,360.

This system should easily adapt to swine waste management, and a trial is currently underway. Soldier flies could be used to degrade many other organic wastes. They have even been found breeding in ketchup and formalin preserved tuna (May 1961), and can eliminate house fly breeding in privies (Kilpatrick and Schoof 1959).

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Bradley Susan W., and D.C. Sheppard. 1984. House fly oviposition inhibition by larvae of *Hermetia illucens*, the

Besides offering a potential feed source, soldier fly larvae provide two other significant benefits: house fly control and about a 50% reduction in manure volume (Sheppard 1983). The larvae repel ovipositing female house flies (Bradley and Sheppard 1984) and

black soldier fly. *J. Chem. Ecol. l.* 10:853-859.
Hale, O.M. 1973. Dried *Hermetia illucens* larvae (Diptera: Stratiomyidae) as a feed additive for poultry. *J. Ga. Entomol. Soc.* 8:16-20.

SEE FEED PRODUCTION, P. 6

***Eucheira socialis* - Another edible insect which indigenous people are trying to protect from ecological destruction**

(From Ron Cowen's report in *Science News* 141(15): 236 on the annual meeting of the Society of Ethnobiology in Washington, D.C. Thanks to Katharine Totto of Punahou School in Honolulu for alerting us.)

The larvae of this butterfly feed on the leaves of madrone trees in the pine-oak forests of the Sierra Madre Occidental and the TransNeovolcanic Mountains of Mexico. Ethnobotanist Robert A. Bye and colleague Peter G. Kevan have studied the butterfly for years in its haunts in northwest Mexico. The larvae are quasisocial and spin large silken bags in which they pupate in late spring. There may be as many as 20 bags per tree [each of which contains many pupae, all of which are the same sex, according to Ramos-Elorduy and Pino, 1989; see *Newsletter* 5(1):3]. The pupae, called *iwiki*, are collected and roasted by the Tarahumara Indians who sometimes mix them with corn gruel. This serves as a nutritional supplement as late spring is traditionally a time of food shortage between the end of the dry season and the beginning of the main agricultural cycle.

Snacking on *iwiki* now appears limited to the elders of the Tarahumara tribe because the butterfly is threatened by lumbering of its pine-oak habitat. Bye and Kevan found evidence, however, that some tribe members now practice animal husbandry, taking silken bags from madrone trees that contain many of them, and retying them with leather straps on trees that lack them. This may promote repopulation of the butterfly. Redistribution of cocoons has been observed only in localities where people eat the pupae.

As madrone leaves contain glycosides, chemicals that can affect the heart and are considered poisonous to humans, the authors plan to determine whether they are partially neutralized by the larvae or pupae, and whether cooking the pupae may detoxify them. Tarahumara who eat large numbers of the pupae sometimes vomit or develop headaches.

Book Notice

Ecology and Management of Food-Industry Pests
J.R. Gorham (ed). FDA Tech. Bull. 4. Arlington, Virginia: Associ. Off. Anal. Chem., 595 pp., 1991.

Although this book is not about insects as food, it is an up-to-date treatise on another important aspect of insects in relation to food. Insects and other pests attack food every step of the way as it moves from the farm to the consumer, causing losses that amount to tens of billions of dollars per year. Top experts review current data on techniques for managing and controlling these pest populations, with chapters on ecology, prevention, survey and control, health considerations, regulation and inspection, and management (For comment on federal regulations as they pertain to insects as food, see the article by Paris M. Brickey, Jr. and Gorham in *The Food Insects Newsletter* 2(l):l, 7, March 1989.)

From South Africa:
Don't forget traditional foods!

Primary Health Care Booklet. By A.B. Cunningham and S.J. Pieser. 1991. Working Paper No. 75. Institute of Natural Resources, University of Natal, P.O. Box 375, Pietermaritzburg 3200. (In Zulu and English, 10 pages each plus 28 colored photographs.)

This attractive booklet begins with a question, "Why have a booklet?": "Malnutrition is a major problem. One of the reasons for this is a lack of a MIXED BALANCED DIET. Wild foods were a common part of our forefathers' diet and played an important role in a balanced diet. People lernt about these valuable foods from their parents and grandparents. Knowledge of these plants and of traditional recipes is being lost as it is rarely taught in modern schools. This booklet provides this information for use by Primary Health Care workers and teachers."

Foods are divided into four groups: main foods, building foods, extra energy foods and disease-preventing foods, with examples listed for each group. It is noted that food is provided from three main sources: the veld, cultivation and the store, and advises, "Do not forget about wild foods which are available at no cost." A list is given of the Zulu, scientific, English and Africaans common names of 10 species of wild spinaches, 22 fruits and nuts, 4 beer types, 8 staples and 5 meats.

The insects are included in the meat group: *amacimbi*, or emperor moth larvae.(Saturniidae), mostly *Microgone cana*, *Brunea alcinoe*, and *Cirina forda;* and *izinhlwalbusi*, winged adults of the ant, *Carebara vidua*. The *amacimbi* are noted as a good source of protein and thiamin and an excellent source of riboflavin and calcium. As meat, *amacimbi* can be prepared by either sun-drying or roasting, and salt may be added. For adding to soups, *amacimbi* should be cleaned, boiled for approximately 2 1/2 hours, steamed dry and fried.

The booklet was based on research done in the Ingwavuma district, 1980-1984, by Cunningham for his Ph.D. thesis, "The value of indigenous plants to rural people in a low agricultural potential area." It reminds of the conclusion reached more than 30 years earlier by P.J. Quin in his study of the ecological and acculturation factors whereby the coming of 'civilization" had wreaked havoc among the Pedi in the northern Transvaal.: "The recognition and encouragement of their traditional foods [which included 11 species of edible insects] and feeding habits could be the means of alleviating, and perhaps even solving, the great problem of malnutrition and disease among these people."

Quin,P.J. 1959. *Foods and Feeding Habits of the Pedi.k. I* Johannesburg*:* Witwatersrand Univ. Press.

GRD

Yellowjackets Anyone? A new, easily collected taste treat

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The obvious cautions? Wear a bee suit with a sewn-in veil during the collecting foray, and do not extract any larvae. Yellowjacket meconia taste absolutely terrible, and the meconia are not voided until just prior to pupation.

Additional reading.

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"First collect the yellowjackets," states the recipe, but how? I use a vacuum apparatus we designed to capture workers alive so that colonies could be transported to new locations and re-established inside glass-bottomed nest boxes. Later, a pharmaceutical company approached me to establish a protocol for collecting yellowjacket workers and their nests for venom extraction. Obviously no chemical could be used as the company wanted to dissect poison glands to obtain the venom to be used in treating humans for severe sting allergies. The answer, of course, was a portable vacuum that could be run off a portable generator (small shop vacuum), or a small deep-cycle marine battery (a Bon Aire works well). We designed an "End Apparatus" that would stop the vacuumed workers from going down into the vacuum, and as one filled with workers it was capped, and we replaced it with another. Soon workers could no longer be enticed from their nests even with vigorous agitation, and the nest can then be snipped from the tree branch (aerial nests) or dug from the ground (subterranean).

Aerial yellowjackets such as *Dolichovespula maculata* (boldfaced hornet) or *D. arenaria* (aerial yellowjacket) usually contain fewer than 300 workers, and the number of larvae are also few. However, subterranean nests such as those of the eastern yellowjackets, *Paravespula maculifrons*, the common yellowjacket, *P. vulgarist* the western yellowjacket, *P. pensylvanica*, and the German yellowjacket, *P. germanica*, are quite populous, with up to or even greater than 5,000 workers, with a corresponding number of larvae.

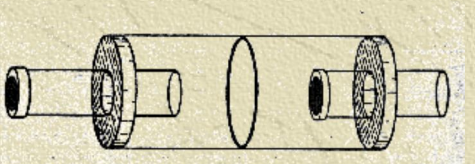
The nests are collected into stout (4-15 mil) plastic bags, placed into coolers with ice for return to the lab, and these nests are frozen as soon as possible. The End Apparatuses can also be placed into the freezer, and the workers can be discarded as soon as they are frozen. Later, the nests are removed, thawed, and the prepupae and pupae are removed by hand with forceps from under the white pupal caps into a clean container. It is best if the extracted critters are deep fat fried as soon as they are extracted, but if necessary, they can be refrozen for later use.

I find light oil such as sunflower or peanut oil to be excellent for the frying, and after a very brief immersion in the hot grease, the, pupae are removed with a strainer spoon and placed onto absorbent paper toweling. The toweling, of course, absorbs the excess grease, and at this time the pupae can be lightly dusted with garlic salt. Eat them before they cool too much. Absolutely superb! For those who would rather disguise their food, the fried pupae can be mixed with refried beans to be placed into a tortilla shell along with all the other necessary condiments.

Akre, R.D., W.B. Hill and J.F. MacDonald. 1973. Artificial housing for yellowjacket colonies. *J. Econ. Ent.* 66:803-805.

Akre, R.D., A. Greene, J.F. MacDonald, P.J. Landolt, and H.G. Davis. 1981. *The yellowjackets of America north of Mexico. USDA* Handbook No. 552. 102. p.

Akre, R.D., C.A. Ramsay, and L.D. Hansen. 1989. Inexpensive portable vacuums used in collections of ants in the field and laboratory. *Pan-Pac Ent.* 65:352-356.



End Apparatus for YJ

Entertaining With Insects: It's really out-of-print now but wait! There's good news!

By the time calls started pouring in to BioQuip following our announcement in the last *Newsletter* that the book was available, BioQuip was down to the last 17 copies. So, a lot of readers were disappointed. We regret that more couldn't be accommodated - and I received similar regrets from Louise Fall, book manager of BioQuip. They were inundated with calls and letters. But here's some good news. Author Ronald Taylor is arranging for the book to be reprinted, probably in an edition of 1000 copies. It will probably be at least two or three months before it comes off the press, and it will cost more - everything costs more now than it did in 1976 when the book was first printed. So, don't order yet, but if you want to get your name on the list you can write to:

Dr. Ronald L. Taylor
5375 Crescent Drive
Yorba Linda CA 92687

Letters

Traditional conservation of wild fruit trees (and associated larvae) endangered in Africa

From Dr. Tony Cunningham who recently shifted from South Africa to the University of Namibia:

For your interest, I enclose a primary health care booklet, in Zulu and English, which we produced for use by community health workers in the area where I did my PhD thesis, which incorporates nutritional information on gathered and cultivated food resources that provide nutrients deficient in the starch staple diet of the region.

As you are no doubt aware, the traditional conservation practice of not felling edible wild fruit producing trees when clearing fields is widespread in Africa, and is a major reason for maintenance of woody plant cover outside of conservation areas. Some of these trees (e.g., *Sclerocarya birrea* (Anacardiaceae) are also important sources of edible insect larvae (e.g. *Cirina forda* (Saturniidae)) feeding on *Sclerocarya* leaves, and cerambycid larvae from dead *Sclerocarya* trees). What is also increasingly widespread is the social stigma against gathering of wild food resources,

P.S. [We] are both fish extension agents and would be interested in using insects as a supplementary food source for *Talapia*, the subtropical fish we work with here. Termites and ants seem to be a favorite of these otherwise vegetarian fish - and are plentiful [but would insects be likely to increase or decrease growth rates?] Would appreciate any comments you might have.

Wanted: Postdoctoral appointment in entomophagy

Dr. A.T. Ande, who recently completed his doctoral studies at the University of Ilorin, would like to hear of any postdoctoral fellowships in entomophagy which may exist in the U.S. or elsewhere. His research dealt with the taxonomy, harvesting, processing and nutritional quality of *Cirina forda*, one of the most widely eaten of the saturniid caterpillars in Africa. He can be contacted at:

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Feed Production (from page 3)

which is locally viewed as "primitive" compared to buying food from the local store. The result is removal of the incentive to conserve wild fruit bearing trees, and neglect of a nutritionally important food resource in marginal agricultural areas by often poor communities. The aim of this booklet was through the local primary health care programme, to promote the continued use of wild food resources and traditional conservation practices.

The service that your newsletter provides is a very important one, particularly as literature on edible insects is often spread through diverse journals which are often not easy to obtain in developing countries. It also has important practical application in conservation and development issues such as that outlined above. (Ed. The primary health care booklet is summarized elsewhere in this issue.)

Peace Corps Volunteers in Congo

Laura Bissmeyer and Bruce Dury wrote as follows:

As we sit here eating yellow palm grubs, wondering and arguing about their nutritional value, we realize how nice it would be if we received *The Food Insects Newsletter*. We are Peace Corps volunteers in Congo, Central Africa, until December '93 and have eaten many insects we might otherwise have ignored. Why are insects so taboo in America?; they make quite tasty snacks. It would be appreciated if we could receive [issues at each of the addresses below] as we are located at different posts .... I look forward with anticipation to my first *Newsletter*. Much thanks in advance.

Kilpatrick, J.W., and H.F. School. 1959. Interrelationship of water *and Hermetia illucens* breeding to *Musca domestica* production in human excrement *Am. J. Trop. Med. Hyg.* 8: 597-602.

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The Chefs' View of the New York Banquet

The following is excerpted from Andrew Maykuth's report in the *Philadelphia Inquirer.* Thanks to Sandra Cadwalader for sending it. Maykuth mentions that few (probably meaning none) of the cookbooks familiar to the chefs addressed insects, so, armed with Ronald Taylor's *Entertaining with Insects* and *Butterflies in my Stomach*, Tony Mininno and the head chef, Sharon Elliot, marched off into uncharted territory.

If eating insects seems daunting, it was even more of a challenge to the kitchen staff at New York Parties, the Greenwich Village caterer chosen to prepare the meal at New York's famed Explorers Club.

Tony Mininno, the account executive who devised the insect menu, said the chefs had never knowingly cooked bugs before and knew nothing about their culinary properties. How are they cleaned? How are they prepared? How do you keep them from squirming off the counter? 'What I did was go through our own repertoire of hors d'ouevres and dishes and I made adjustments to the recipes to make the appropriate insects work," Mininno said.

Much of the fare was based on relatively common species, the sort of meat and potatoes of the insect world.- mealworms (beetle larvae) , wax worms (moth larvae) and crickets. But the menu also included such exotic fare as sauteed Thai water bugs (a rather large creature that eats small fish) and roasted Australian kurrajong grubs.

Most of the livestock that went into the meals came from breeders that supply bait shops and pet stores. Mininno said that when the 10,000 worms and 10,000 crickets arrived in cardboard boxes, the kitchen staff erupted. "'I wish I had a video," said Mininno. "There were people shuddering in horror, screaming and closing their eyes, walking out of the room." The crickets came packed in a box. "They sat here on my desk for half a day and they were serenading me as I was conducting my work," said Mininno. One evening, hundreds of the crickets escaped from the box, creating a panic and two hours of work to collect them.

But the chefs overcame their initial revulsion and began to regard the bugs like any other ingredient - one that had an appetite of its own. They fed the bugs diced apples and potatoes to purge the insects of any paper wrappings they ate in transit.

fashion as one would clean a shrimp. "It's very tedious. actually," said Mininno.

The, worms require less work. "There's nothing you have to do to them except purge them and wash them," he said. After they're dry, you can either roast them or you can boil them. Once they're in that state, you can freeze them and then use them later on."

"Boiled worms work well in fillings or spreads. We're doing a crudite dip for the vegetables in which the boiled worms are pureed with pepper. We did a mushroom pastry made with flour and roasted ground worms .... It was actually very good. It looked like whole wheat."

"...We're doing corn fritters with worms, and the worms do protrude out of the fritters in various curls and configurations. Obviously they look like something, like worms. We're doing a chocolate cake that contains chopped-up crickets in the filling and will be garnished with whole candied crickets."

"We're also doing a trail mix on the bar, which will be an assortment of worms and crickets that will be flavored with a chili flavoring, so it will be good with drinks. Those will be very obvious what they are. They'll be crispy fried."

Elliot, the chef, said cooking with insects was not much different from using any other ingredient "Once you get over them visually, then they taste like anything else," she said. The kitchen staff swirled around her, carrying containers with masking-tape labels such as "cream cheese mealworm dip" and "bug grub." Behind the stove, a cockroach scurried up the wall. " Yike's," said Elliot, taking a swat at it with a rag. "That's not one of ours."

Worm Fritters

1/3 cup creamed corn
1/3 cup canned corn
3 to 4 tablespoons corn meal
1 large egg
3 tablespoons all-purpose flour
1/4 teaspoon baking powder
1/8 teaspoon salt

Mininno described the critters. "The wax worm, well, it looks like a big maggot,' said Mininno. "It's a beige color and it doesn't have any legs. And we had the super mealworms, which are about three inches long, and those have kind of a hard skin and they do have little legs on the bottom, and they're very active, they really crawl around. And they bite - nothing terribly painful, but they do nip."

The first task was to clean the insects, which must be kept alive until they are ready to prepare. The crickets were dunked in ice water to lose some spring in their step, then flash-frozen in plastic bags. Afterward, their heads, entrails and legs were removed in the same

pinch nutmeg

pinch pepper
3 1/2 tablespoons butter
1/2 cup corn oil
3/4 cup fried whole mealworms or wax worms

Beat egg until light and add corn. Add flour, corn meal, baking powder, salt, pepper and nutmeg. Melt butter and mix together. Fold in worms. Ladle 1/2 ounce portions into deep fryer containing hot oil. Serve hot with plum sauce. Makes 25 very small fritters.

From Sharon Elliot, head chef, New York Parties.

Sky Prawns and Other Dishes: The Food of the Future

From *Expat World,* "the newsletter of international living" (Vol. 4, No. 1, January 1992, P.O. Box 1341, Raffles City, Singapore 9117.)

In Thailand "sky prawns" (grasshoppers) "are a very popular and expensive dish." This front-page article in *Expat World* begins by reporting that: "As we approach the 2lst century, you have expatriates and locals the world over eating foods, insects in particular, that some would categorize as strange, exotic, disgusting or even in stronger terms. INSECT CUISINE has not hit New York, London, Los Angeles, but is coming on strong in many less developed areas of the world.

Several examples of insect cuisine are given and mention is made of Bruno Comby's *Delicieux Insectes* as well as *The Food Insects Newsletter.* Editor Gene Wasosky, a former Indonesia resident of many years, also describes his own first-hand experience in insect eating. "About twice a year termites hatch in the zillions over all parts of Java Island. The city dwellers of Jakarta are not spared this coming of life of so many termites that if you're out at night the wings of the newly hatched termites flutter like snowflakes in the cars' headlights. Many houses having wood roof framing or wood window frames also release thousands of termites into the air of the living room on any given evening. When this happens, the household help, which every expatriate has almost by decree of law, rush into the house, turn off all the lights and place in the middle of the room a large plastic wash-pan or bucket with two or three inches of water in the bottom and a lit candle in the middle. This draws the flying termites to the flame where they singe their wings and drop into the water where they are helpless to escape. After a relatively short time, the thousands of termites that have been flying about the house are now nicely collected and without the use of *Raid* or some other insect killing spray. If you attempt to use an insect spray the household help will quickly mob you with cries of *Jangan, Jangan, Kand tidak bisa makan!* (Don't, don't, we can't eat them!) The editor found out the next morning at breakfast what this phrase meant when he was offered a huge omelette, loaded not with mushrooms or ham, but filled with the visitors of the night before. Not bad either!"

Finally, an update is provided on the collection of grasshoppers begun by Thai farmers in 1983 as an alternative to government-sponsored control efforts that were ineffective: " . . . grasshoppers, once the scourge of Thai corn fields have risen in price from 12 US cents per kilogram in 1983 to US $2.80 a kg in 1992. At your local restaurant, once deep fried, they cost about US $6.00 per kg. A small farmer can earn up to US $120 per half-acre--twice as much as he can from corn. The trade in grasshoppers averages about US $6 million per year. Because of the obvious advantages in containing the grasshopper population the Thai government publicised a number of grasshopper recipes including curried grasshopper and grasshopper sauce."

Recent Technical Paper

Larde. G. 1990. Recycling coffee pulp by *Hermetia illucens* (Dipera: Stratiomyidae) larvae. *Biol. Wastes* 33:307-310. Instituto Salvadoreno de Investigaciones del Cafe, Final Primera Avenida Norte, Nueva San Salvador, El Salvador.

Author's Abstract. The digestion of coffee pulp by larvae of the soldier *fly Hermetia illucens* (L.) was studied in a small-scale experiment to obtain preliminary data pertaining to this method of treating the waste. After 13 days the coffee pulp was converted into a slurry-like material and lost 29.8% of the initial dry matter, the pH increased from 7.6 to 8.85, the odour was reduced significantly, and the total weight of the larvae was 6.2 times that at the beginning. It was concluded that *H. illucens* larvae could be utilized in recycling coffee pulp under controlled conditions.

Ed. The gain in weight as related to the initial dry matter was low, as shown in a table. The author notes that low yields also resulted in an earlier test under more practical conditions because of difficulties in separating larvae from substrate (Larde 1989; see review in *Newsletter* 3(2):5, 1990). He cautions that this should be taken into account if the use of larvae as feedstuff is to be considered. Coffee pulp poses a noxious waste problem in El Salvador where this research was done and in other coffee-producing zones in the tropics.

When will the next Directory be published?

That depends on how rapidly new additions accumulate. There are currently about 60 people awaiting inclusion in the next Directory. If, as we enter 1993, that number is approaching 100, we will probably publish a supplement to the 1992 Directory. If, say, it's approaching 200 or more, then we would publish a new Directory. Only one of every four people who receive the *Newsletter* were listed in the first edition of the Directory. If a supplement only s published, it will be sent to everyone listed in either the supplement or the 1992 Directory. Those listed in the supplement will all receive a copy of the 1992 Directory. Check your mailing label. If the letter to the right of your name is a "D' you are automatically included in any future Directory, and you need do nothing more. If the letter is not a "D" and you wish to be listed, return the Address Form (see page 9). Do it now. The sooner we hear from 200 of you, the sooner there will be a new completely updated Directory.

Banquet (from page 2)

cameras grinding away in the background. It crossed my mind that I should be running for president. Wasn't this the fearsome New York press corps that had torn apart the likes of President George Bush, Governor Clinton and Jerry Brown in the recent primary? Here they were, eating out of my hand.

It was fun meeting several newsletter readers. Out-of-staters included Sophie Coe of Vermont, Jane McEvoy of Ohio and Joe Skulan of Madison, Wisconsin (brother Tom Skulan of Averill Park, N.Y. was also there). Among New Yorkers, Judith Newman of the *New York Times* had started the press ball rolling with a long and well-done article in the morning edition, and Scott Hamilton of the Explorers Club was of course there. I had met Kathleen Finch of CBS *This Morning* earlier in the day but had forgotten to ask her if she ever actually read the *Newsletter* between occasions such as this.

During dinner, I tried another giant water bug. This one was good, but it was still difficult to handle the chitinous outer covering. I hope some of our Thai readers will give us their insights on how you are supposed to eat this insect. I also ate another kurrajong grub. They should be eaten while hot. This one had cooled off and was just okay.

In my opening remarks after dinner, I mentioned that, except for passing through the airport, I hadn't been in New York City since 1949, and Lou hadn't been there since attending the World Fair at a very young age in 1939. I wouldn't say there was an audible gasp from the audience, but New Yorkers clearly had difficulty comprehending how two people could live a combined 96 years without finding it necessary to come to New York. Actually, I was in error. Lou reminded me afterward that I was in New York in 1956 so the total span was only 89 years. We stayed on for three extra days just soaking up the feel of the city. New Yorkers are right, there is no other place quite like it. The last I saw of Durland Fish, Richard Falco and Lou Sorkin, they couldn't wait until Friday when they could go home and put their feet up and forget about the First Annual Bug Banquet. But I hear they may try it again next year.

Gene DeFoliart, Editor

(Thanks to the many readers who sent newspaper and magazine clippings from around the country.)

We're thinking of changing our name

We heard from a new reader, a resident of Richmond, Virginia, that after reading about the New York banquet in *U.S. News & World Report*, he called them to ask how he could obtain a copy of *The Newsletter.* He had a hard time getting them to comprehend that he was asking about *The Food Insects Newsletter,* not The Food and Sex Newsletter. Think what a title like that would do for our circulation!