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Flies of the Leptid genus *Atherix* used as Food by California Indians (Dipt.).*

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In March, 1911, as I was making plans to investigate the *Ephydras* and other insects of western salt and alkaline lakes, I wrote to the Commissioner of Indian Affairs in Washington, mentioning the well-known use of an *Ephydra* at Mono Lake as food by Indians, and asking if any information could be procured for me in regard to other places in the West where such food was used. The Commissioner obligingly sent a circular to employees of the service in the West, which elicited several responses, one of which brought the first intimation of the use of a Leptid fly as human food.

Mr. Joseph A. Garber, farmer in charge of the Yainax sub-agency, Yainax, Oregon, wrote down two statements made to him by Indians living at or near the sub-agency, which I am permitted to publish. The Indian name under which it is reported that the *Ephydra* was used was "Koo-chah-bie," and this was used in the circular of inquiry.

"Statement of Chief Ben Lawver:

"Ben Lawver, an old Modoc Indian now living at Yainax sub-agency says that this fly which was used for food by the Indians was called by the Modocs and Pitt Rivers Ha-lib-wah, but after the flies were prepared for use as food, the product was called Koo-chah-bie. There are a few of these flies on Sprague River in this county and they are still called the Ha-lib-wah fly by the Klamath Indians.

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"About forty years ago when the Indians used the Koo-chah-bie as food, they would go to Pitt River in Modoc County, California, at a point about ten miles down the river from where the little village or town of Canby now is. The time for gathering the flies was some time in the early summer. The Indians would place logs across the river in about the same manner that a present-day log or lumber boom is constructed. Then they would go up stream and shake the flies off the willow bushes growing along the banks of the river. The flies falling on the water would float down stream and lodge against the logs in great quantities. As many as a hundred bushels could be gathered in this way in a single day. The Indians used a kind of basket to dip the flies from the water and carry them to the place where they were to be prepared for food.

"A pit was dug in the ground about $1\frac{1}{2}$ to 2 feet deep and about 2 feet or more square. Then two layers of stones were placed in the bottom of the pit, each layer being about three inches thick. A wood fire was built on these stones and more stones were put around and over the fire. When the fire was burnt out and the stones were hot, all the stones were removed except the bottom layer. Then green tules or green coarse grass was spread out on the bottom layer of rocks. The walls of the pit were lined with hot rocks also, and this inclosure lined with tules or grass. The oven-like inclosure was then filled with the flies. These were covered with green coarse grass and the whole covered with more hot stones. Water was then poured on the hot stones of the walls of the pit, the hot stones converting it into steam.

"As soon as the water was poured on, dirt was hurriedly thrown over all to the depth of several inches. The flies were allowed to cook in this manner until the heat was pretty well expended. The dirt and grass were then removed from the top and the mass allowed to cool. When sufficiently cooled the product was taken from the oven and was ready for use as food. In this state it was called by the Modoc and Pitt River Indians 'Koo-chah-bie.' When cold Koo-chah-bie is about the consistency of head-cheese, having a reddish brown color and can be cut into slices with a knife."

“Statement of William Turner Jackson:

“William Turner Jackson, a Pitt River Indian now living near Yainax, Oregon, says that he saw this fly forty or more years ago, when he was a mere boy, in great quantities on a mountain side about eight or ten miles northeast from the postoffice or village of Lookout, in Modoc County, California. It seems that these flies, according to his statements, would gather at or near the head of a small canyon through which flowed a small stream of water. He never saw them at any other place in quantities and if one would go a quarter of a mile from this point in any direction there would be practically no flies. These flies gathered there some time in the month of May, and could be gathered by the tons. The trees, bushes and rocks were covered with them in places to the depth of five or six inches. Hence it was no trouble to gather them, for they could be scraped off the rocks and trees into great heaps. They would alight on the Indians until they were literally covered with them.

“The time of gathering them was in the cool of the morning when they were all settled and too cold to fly. In the heat of the day the air would be so filled with them as to exclude the sun and one could see but a short distance. (Where the flies came from and where they went to from this place is not known by the Indians who gave me this version of the incident.—J. A. G.)

“Indian Jackson also says that the flies were gathered in great quantities and prepared for food.

“A large pit was dug in the ground and the same materials used in constructing the oven as those mentioned in the Ben Lawver statement. But before the flies were put into the oven they were dumped into large baskets and mashed up and kneaded like a housewife works her paste when preparing to bake bread. The mass is made into loaves like bread and placed in the oven side by side. There may be a half dozen or more layers of these loaves in one oven with the hot stones between the layers. A great quantity could be cooked or baked in one oven in this manner. When this product was baked and dried it could be sliced from the loaf and used as food.

"The food was called at that time and place by the Pitt Rivers 'Why-hauts.' When the Indians had gotten as much of the Why-hauts as they needed for winter supply, they carried it away to their places of living. A great deal of this was used as winter food."

The two places described by the Indians are both on Pitt River in the southern part of Modoc County, the northeastern county of California, and are not much more than ten miles apart by the data given. The two Indians it will be noticed belonged to different tribes, which probably accounts for slight differences in handling the flies. I believe both accounts are truthful, although the quantity of material secured may be a little exaggerated.

The identification of the fly as a member of the genus *Atherix* is very easy. About the year 1900 I was at Logan, Utah, early in July, and joined a fishing party which drove to a point southeast of Avon, in the south end of Cache Valley, on a small stream in the mountains. I distinctly remember seeing masses of flies of the genus *Atherix* come floating down the stream, and in one spot where a stick lay partly under water they would lodge so that a handful could easily be picked up. At the time I had no place to put the insects for preservation, and did not collect any, but I recognized the genus. In the summer of 1898 also, at Hailey, Idaho, or a few miles above the town, I noticed on the underside of a wagon bridge crossing Wood River masses of old dead flies that had apparently been attached to the timbers of the bridge for several years; they were hanging over the water. Material which I collected here was afterwards destroyed by a fire in the University of Idaho, and again I am not sure of the species, but I collected *Atherix variegata* at Hailey on another occasion. It would be necessary to collect in the Pitt River region to feel certain of the species of the above account by the Indians.

The explanation of the gregarious habit of the fly is that the females deposit their eggs collectively in this manner. The female does not fly away from the egg mass, and other females gathering on the outside of the cluster and also depositing their eggs results in the formation of a mass of eggs and

flies several inches deep. An instance of this is cited by Ives, in *Entomological News*, i, 39, 1890, and Dr. Riley, commenting on the case in *Insect Life*, ii, 386, 1890, mentions something similar, but possibly not the same. The Ives material came from Pemberton, New Jersey.

This habit in *Atherix* is much better known in the European *Atherix ibis*, in which it has often been described. Verrall (*British Flies*, v, 288, 1909), quotes a condensed description of the habits of the species from Walker (*Ins. Brit. Dipt.*, i, 70)—“The female of this fly is gregarious, and attaches its eggs in large clusters to boughs hanging over streams, and there remains, and shortly dies. The cluster is generally pear-shaped, and sometimes contains many thousands of dead flies, and continually receives accessions by new comers settling upon it. When the larva is hatched it falls into the water, its future residence; it has a forked tail about one-third the length of the body, and has the power of raising itself in the water by an incessant undulating motion in a vertical plane.” Williston, in the 3d edition of his *Manual of North American Diptera*, p. 160, also refers to this habit.



