

VI. FISH REMAINS FROM COPROLITES AND MIDDEN DEPOSITS
AT LOVELOCK CAVE, CHURCHILL COUNTY, NEVADA

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INTRODUCTION

This is a report on the fish remains from a collection of archaeological materials obtained at Lovelock Cave, Churchill County, Nevada, during June 1965, by Dr. Robert F. Heizer and his associates of the University of California Archaeological Research Facility.

Lovelock Cave is situated in a limestone outcrop of the Humboldt Range, at an elevation of about 4200 feet, some two miles eastward from the bed of Humboldt Lake (the terminus of the Humboldt River) and 15 miles south-southwest from the town of Lovelock.

More than 13,000 remains, representing at least 306 small fish, were recovered from a series of 30 human coprolites. Sixteen of these coprolites--the interior lot--were collected from refuse in the dry interior of the cave; 14--the entrance lot--from refuse in the dry and protected outer shelter formed by the cliff face. Radiocarbon dates obtained by the University of California, Los Angeles, are 1210 ± 60 years (756 A.D.) for the interior lot, and 145 ± 80 years (1821 A.D.) for the entrance lot.

Some 123 remains, representing at least 37 fish, were obtained directly from midden refuse in the dry interior of the cave. This material has been estimated to date from about 1000 to 1500 A.D.

Catalogue numbers are those of the University of California Lowie Museum of Anthropology, Berkeley, in which the collection is deposited.

I wish to express my appreciation to Mr. Richard D. Ambro, Mr. Richard A. Cowan, and other members of the University of California Archaeological Research Facility for their expert preparation of the delicate remains of small fishes; to Mrs. Lillian J. Dempster, of the California Academy of Sciences, for assistance with the manuscript; to Mr. Maurice C. Giles, of the California Academy of Sciences, for enlargements of the photographs; to Dr. Robert F. Heizer, of the University of California Archaeological Research Facility, for permission to report on these fish remains; to Mr. John D. Hopkirk, of the University of California, Berkeley, for unpublished data on the tui chub; and to Dr. Carl L. Hubbs, of the University of California at San Diego, for advice.

FISHES REPRESENTED

Of the numerous skeletal elements recovered from the coprolites, many are identifiable to species with reasonable certainty, but since the lower pharyngeals are the most distinctive, they have been selected as the basis for identification and measurement of the coprolite material.

In this paper, "length" of fish indicates total length (straight-line measurement from tip of snout to end of longest caudal ray). The weights of fish are necessarily approximate: they are computed from the length of the fish (as determined from the length of the pharyngeals or other skeletal elements), and fish (of the same species) of identical length may differ considerably in weight.

Fishes of two families, four genera, four species, and three subspecies are represented in this collection of coprolite and midden material:

Minnows--Cyprinidae

Tui chub, *Gila (Siphateles) bicolor* (Girard)¹

This species (pl. 5) was known to the Northern Paiute as "tui-pagwi" (Loud and Harrington 1929:156), whence the vernacular "tui chub" (cf. Shapovalov and Dill 1950:386 and American Fisheries Society 1960:17).

The tui chub of the Lahontan Basin, though reported from streams, is known principally from lakes. Large individuals are 300 to 350 mm. in length (Snyder 1917:62)--exceptionally as much as 480 mm.,² and more than 700 g. in weight (Kimsey 1954:405, 407).

Both the subspecies *Gila bicolor obesa* (Girard)³ and the subspecies *Gila bicolor pectinifer* (Snyder) are recognizable (from gill-raker counts) in the midden material.

Coprolite material: 474 pharyngeals (230 complete, 244 incomplete; pl. 1 shows 101 pharyngeals from a single coprolite), ranging from 2.6 to 17.2 mm. in length (measured as by Uyeno 1961:332, fig. 1A), representing at least 298 fish about 38 to 239 mm. in length and about 0.2 to 164.0 g. in weight (467 of these pharyngeals are less than 10 mm. in length; they represent at least 292 fish less than 142 mm. in length and less than 28 g. in weight). Twenty-one pharyngeals were taken from 7 coprolites of the interior lot (table 1) and 453 from 12 coprolites of the entrance lot (table 2).

¹ See p. 107 for end notes.

Of the 224 pharyngeals from coprolites 10D and 56D, 199 are in such good condition that the teeth can be counted: 103 left pharyngeals have each 5 teeth (3 have 4); 87 right pharyngeals have each 4 teeth (6 have 5). Perhaps these series represent the subspecies Gila bicolor obesa, in which the pharyngeal teeth have been said to be modally 5-4 (Snyder 1917:62, as Siphateles obesus).⁴

Midden material: 3 mummies (incomplete), representing fish about 52, 57, and 130 mm. in length and 1.2, 1.6, and 20.8 g. in weight (the largest, No. 2-39667); 8 desiccated heads (1 complete, length 28 mm., from a fish about 145 mm. in length and 30 g. in weight;⁵ 1 complete, length 31 mm., and 6 incomplete, length 27 to 35 mm., No. 2-39411, from fish about 140 to 170 mm. in length and about 24.8 to 52.0 g. in weight;⁶ 5 lower pharyngeals (1 complete, 4 incomplete; length 11 to 28 mm.), from 4 fish about 155 to 380 mm. in length and 40.3 to 550 g. in weight; 2 pectoral fins and parts of both cleithra, connected by skin; 4 skin fragments (length 23 to 53 mm.); 1 caudal fin (incomplete), No. 2-39411; 252 vertebrae (226 articulated in 32 series of 2 to 12 each; 18 conspicuously charred; 65, No. 2-39411), from 8 fish about 139 to 300 mm. in length and about 24.3 to 350 g. in weight. The midden material represents about 22 fish about 52 to 380 mm. in length and about 1.2 to 550 g. in weight (table 3).

Records from other archaeological sites: Lovelock Cave (Loud and Harrington 1929:11, as "small dried fish"; material later identified by W. I. Follett); Humboldt Cave (Hubbs and Miller 1948:41, as Siphateles; Heizer and Krieger 1956:33); Stick Cave (Orr 1952:12, fig. 4, as chub); Fishbone Cave (Orr 1956:6); Tommy Tucker Cave (Riddell 1956:18, as Siphateles obesus); Falcon Hill vicinity (Follett 1963:33, as Siphateles bicolor).

Lahontan speckled dace, Rhinichthys osculus robustus (Rutter)⁷

This is the small minnow (see Rutter 1903:148, fig., as Agosia robusta) to which the Northern Paiute name of "kow-pagwl" was referred by Loud and Harrington (1929:156).

It inhabits streams and the shallow water of lakes (Snyder 1917:68). Large individuals are more than 85 mm. in length and 9 g. in weight.

Coprolite material: 5 lower pharyngeals (2 complete, 1 shown in pl. 3; 3 incomplete), 4.0 to 4.7 mm. in length, representing 5 fish about 68 to 79 mm. in length and about 4 to 7 g. in weight; from interior lot (table 1).

Midden material: none.

Records from other archaeological sites: I have found no previous record of archaeological material of this minnow.

Suckers--Catostomidae

Tahoe sucker, *Catostomus tahoensis* Gill and Jordan

This sucker (see Snyder 1917:fig. 1, as *Catostomus arenarius*, which was synonymized with *Catostomus tahoensis* by Hubbs and Miller 1951:299) was known to the Northern Paiute as "awago"⁸ (Loud and Harrington 1929:156).

It inhabits streams and lakes. In the larger lakes it attains a length of more than 610 mm. (Snyder 1917:43), but in Humboldt Lake, only about 150 to 250 mm. (Loud and Harrington 1929:156).

Coprolite material: 3 lower pharyngeals (incomplete; 1 shown in pl. 4), representing 3 fish about 150 to 210 mm. in length⁹ and about 35 to 120 g. in weight; from interior lot (table 1).

Midden material: 1 opercle (complete, height 25 mm.), No. 2-39467, from a fish about 260 mm. in length and about 192 g. in weight; opercle and subopercle (both complete) and preopercle and interopercle (both incomplete), articulated in a single series, No. 2-39411, from a fish about 260 mm. in length and about 192 g. in weight; quadrate, hyomandibular, preopercle, interopercle, epihyal, ceratohyal, and mesopterygoid (all complete) and opercle, subopercle, and palatine (all incomplete), articulated in a single series, from a fish about 215 mm. in length and about 127 g. in weight; 50 vertebrae articulated in 8 series of 4 to 7 each, representing 4 fish about 195 to 250 mm. in length and about 105 to 177 g. in weight.

Records from other archaeological sites: Falcon Hill vicinity (Follett 1963:33).

Cui-ui, *Chasmistes cujus* Cope

This fish (see Snyder 1917:fig. 2) was known to the Northern Paiute as "couia," according to Cope (1883:149). The name was said by Snyder (1917:50) to have been pronounced "kouie-wee," although corrupted to "kwee-wee" by the whites. Ichthyologists now follow Snyder in spelling the name "cui-ui" (see American Fisheries Society 1960:17), but anthropologists have generally used the spelling "kuyui" or its equivalent (see Kroeber 1925:584) suggesting that the aboriginal pronunciation was probably nearer "cooyuwee," as the name was rendered by Powers (1877:450).

The cui-ui occurs only in certain remnants of ancient Lake Lahontan. According to Snyder (1917:50, 52), this species

is restricted to Pyramid and Winnemucca Lakes, where it lives in deep water beyond the reach of ocular observation, except during the brief spawning period, when a migration is made for a short distance up the Truckee River.... It appears in large numbers at the great bend of the Truckee, and it certainly ascends the river somewhat beyond the confines of the ancient Lake Lahontan. It never quite approaches the swift water above Reno.¹⁰

The largest specimen recorded by Snyder (1917:52) was 670 mm. in length; a 628 mm. female weighed 2.7 kg. (6 pounds). Apparently on the basis of these data, La Rivers (1962:364) stated that this species "attains lengths of about 2 feet and weights of about 6 pounds." A specimen in the California Academy of Sciences (No. 25839), 654 mm. in length, weighed 3.5 kg. (7-3/4 pounds). Statements that this species attains a weight of 15 pounds (Stewart 1941:425) may be questioned.

Coprolite material: None.

Midden material: 3 cleithra (1 right, complete, pl. 2, from a fish about 480 mm. in length and about 1.2 kg. in weight; 2 left, incomplete, from fish about 580 and 650 mm. in length and about 2.3 and 3.2 kg. in weight) and 82 vertebrae (60 articulated in 13 series of 2 to 9 each; 9 conspicuously charred), from 8 fish about 510 to 650 mm. in length and about 1.5 to 3.2 kg. in weight; all No. 2-39411. The midden material represents 8 fish about 480 to 650 mm. in length and about 1.2 to 3.2 kg. (2.6 to 7 pounds) in weight.

Records from other archaeological sites: Humboldt Cave (Hubbs and Miller 1948:41; Heizer and Krieger 1956:32); Fishbone Cave (Orr 1956:6, as Chasmistes); Falcon Hill vicinity (Follett 1963:33).

DISCUSSION

The present collection from Lovelock Cave provides evidence of the utilization of small minnows, and evidence of the transport of cui-ui from relatively distant waters. Remarkably, it provides no evidence of the utilization of trout.

Small Minnows

Nearly all the fishes represented in the coprolite material (both interior and entrance lots) were small: 292 of the 298 tui chubs ranged from about 38 to 139 mm. in length, and 5 speckled dace, from about 68 to 79 mm. Minnows of the same species, approximately of these lengths, are reported to have occurred in Humboldt Lake (Loud and Harrington 1929:156). The proximity of this lake to Lovelock Cave suggests that these small fishes were captured in Humboldt Lake or the lower Humboldt River. The Kupa-dökadö, who lived on the lower Humboldt River and near Humboldt Sink, caught minnows in their own territory, according to Stewart (1941:363, 370).

A pharyngeal of a tui chub about 380 mm. in length, from the midden material, represents a fish that may not have been taken in the vicinity of Lovelock Cave. Under primitive conditions, Humboldt Lake was apparently a shallow, variable lake with extensive stands of tules (Heizer and Krieger 1956:4). It seems unlikely that, in such a restricted habitat, tui chubs would have so nearly approached the maximum size attained by this species. More probably, the largest tui chubs represented in this collection had been captured at Pyramid Lake or Winnemucca Lake, where large individuals of this species abounded. A size differential between the tui-pagwi of Humboldt Lake and those of Pyramid Lake was noted by Loud and Harrington (1929:156), although the size attained by this species in both those lakes was understated.

The tui chubs of intermediate sizes (and all the Tahoe suckers, the largest of which were scarcely more than half-grown) from both the coprolite and midden material must be regarded as of indeterminate provenience. They may have been caught in Humboldt Lake or the lower Humboldt River, or they may have been transported from Pyramid Lake or Winnemucca Lake. (The Kupa-dökadö were said by Stewart [1941:370] to have caught minnows and suckers in their own territory and also to have obtained them in a neighboring area.)

Numerous scales of the tui chub, especially from coprolite 28F, have a broad band of widely spaced circuli outside of the annulus, suggesting that the fish was captured during late summer or early autumn.

The nets from Hidden Cave that were described in detail by Ambro (1966) would have been effective for the capture of the small minnows. Nearly all the nets from Lovelock Cave that were described by Loud and Harrington (1929:87-89) were of mesh too large for effective use in the capture of the small minnows, but some might have been used for the capture of the chubs of intermediate sizes (and the suckers).

Of the 224 pharyngeals of the tui chub from coprolites 10D and 56D,

140 are complete. This is a remarkable circumstance, since the pharyngeals of small individuals of this species are delicate and their teeth are readily dislodged or broken. The conclusion seems inescapable that at least the heads of these fish had been swallowed whole. A number of the remains appear to have been cooked, and a cleithrum from coprolite 48D is conspicuously charred at its lower end.

Loud and Harrington (1929:35) noted that "the human excrement in the [Lovelock] cave reveals, on the part of the ancient inhabitants, an incredibly coarse diet of seeds, hulls, and tough plant fibers." To these items may be added several large pharyngeals, up to 17.2 mm. in length, from coprolite 26D.

Cui-ui

There is little reason to doubt that during the last high stage of ancient Lake Lahontan, cui-ui were widely distributed in the Lahontan Basin, and probably were to be found in that part of the ancient lake, then approximately 500 feet in depth, that now constitutes Humboldt Lake (see Russell 1885:pl. 5). Jones (1925:47) estimated that Lake Lahontan reached its maximum depth and extent about 1,000 years ago. If this estimate were accurate, the cui-ui represented in the present midden material might have been taken in the vicinity of Lovelock Cave.

But three independent radiocarbon series, based on lithoid tufa from near the 4,400 foot level of Anaho Island in Pyramid Lake, indicate that the last high stage of Lake Lahontan occurred more than 11,000 years before the present: 11,800 \pm 200 years, by Broecker and Kulp (1957:1332); 12,050 \pm 400 years, by Rubin and Alexander (1958:1484); and 11,700 \pm 200 years, by Broecker and Orr (1958:1016, 1027). That the lakes of the Lahontan Basin have stood at a relatively low level during the last two millenia is indicated (1) by radiocarbon dates of 1,100 \pm 200 years and 2,100 \pm 200 years, obtained from material only 60 feet and 50 feet, respectively, above the present-day level of Pyramid Lake (Broecker and Orr 1958:1016), and (2) by the Sequoia curve published by the dendrochronologist Huntington (1914: fig. 50). The rate of response of the ancient lake to climatic change was probably rapid: "If Lake Lahontan were filled to its maximum level today, calculations based on present evaporation and rainfall rates for Pyramid Lake show that within 200 years the lake would have returned to close to its present size" (Broecker and Orr 1958:1030).

All this evidence indicates that, from 1000 to 1500 A.D., Humboldt Lake was a shallow, intermittent lake, probably with dense growths of tules, as it was during the mid-1800's. Such a habitat would surely have been

inadequate to maintain a population of the cui-ui. We may therefore conclude that the cui-ui remains found in Lovelock Cave represent fish that had been captured within the present-day range of this species: Pyramid Lake, Winnemucca Lake, or, most probably, the lower Truckee River, where this fish was highly vulnerable to capture during its spawning migration. Such transport of cui-ui, presumably during the 19th century, is revealed in the following statement (Loud and Harrington 1929:156):

As soon as the willows began to put forth their leaves, the Northern Paiute went to Truckee river. At just about the same time that the young birds began to fly, the kuyui fish that wintered in Pyramid lake went up the river as far as Reno.... During the entire summer the Indians stayed on Truckee river and Pyramid lake and dried large quantities of fish to take to their homes at Humboldt lake.

From Lovelock Cave, the nearest locality where cui-ui occurred was Winnemucca Lake, some 40 miles distant, but a direct route to that lake would have entailed the crossing of mountainous terrain. The most readily accessible locality was the great bend of the Truckee River, at Wadsworth, about 17 miles above its mouth, well within the limits of the cui-ui migration, and some 55 miles from Lovelock Cave—with no intervening mountain ranges (see Broecker and Orr 1958:fig. 3). Cui-ui are known to have been utilized by the Northern Paiute at Surprise Valley (Kelly 1932:97), which was approximately twice as far from the lower Truckee River as Lovelock Cave.

Stewart (1941:425), discussing the manner in which this species was utilized by the Kuyui-dökadö, stated that "the meat was stripped from the backbone so that from each fish two almost boneless pieces were prepared." Once when I had captured several cui-ui at the mouth of the Truckee River, an Indian cut a lengthwise strip of flesh from each side of the back of one of my fish, between the head and the dorsal fin. He then handed me the strips and suggested that I have them cooked. I found that when baked these strips were boneless and exceedingly palatable (cf. Snyder 1917:53).

Trout

La Rivers (1962:294) expressed the opinion that the Lovelock Cave people had obtained trout at Humboldt Lake:

The Indian occupants of prehistoric Lovelock Cave netted and hooked fish in Humboldt Lake and the lower Humboldt River several thousand years ago, as attested by artifacts dug from the cave floor. While they undoubtedly took any and all fish that came to hand, trout must have constituted a majority of these, particularly during the spawning runs.

But the present collection, like the earlier collections from Lovelock Cave (cf. Loud and Harrington 1929), includes no remains of trout.

The absence of trout in these collections is perplexing, since the Northern Paiute are known to have utilized trout. At the Falcon Hill sites, remains of the Lahontan cutthroat trout, Salmo clarkii henshawi Gill and Jordan, were nearly equal in number to those of all other fishes combined (Follett 1963:33). A vertebra presumably referable to this species was recorded from Tommy Tucker Cave (Riddell 1956:17).

The absence of trout remains from the Lovelock Cave collections, and apparently from the Humboldt Cave collections as well (see Hubbs and Miller 1948:41; Heizer and Krieger 1956:32-33) suggests the possibility that, even under aboriginal conditions, trout did not ordinarily inhabit Humboldt Lake or the lower Humboldt River. Early reports mentioned Humboldt Lake as a shallow lake with extensive marshes and dense stands of tules (Heizer and Krieger 1956:4). The summer temperatures of such a shallow lake may have been intolerably high for cutthroat trout, though not for minnows or suckers.

In the upper Humboldt River and its tributaries, Lahontan cutthroat trout undoubtedly occurred under aboriginal conditions (cf. Miller and Alcorn 1946:175).¹¹ Floods of unusual magnitude, such as those mentioned by Antevs (1938:43, 45), may have carried trout from the upper Humboldt River into Humboldt Lake, where they may have survived for a time. If so, this might explain two reports of the occurrence of trout in the region of Humboldt Lake: Loud and Harrington (1929:129) noted that "some Indians said that formerly there was a small mountain trout [in Humboldt Lake] similar to the one now found at Elko." Stewart (1941:363, 370) was informed that the Kupa-dökadö, who lived on the lower Humboldt River and near Humboldt Sink, caught trout in their own territory.

However, the conclusion that trout did not ordinarily occur in Humboldt Lake or the lower Humboldt River does not fully explain the absence of trout remains from the Lovelock Cave collections. Cui-ui did

not occur in Humboldt Lake or the Humboldt River, yet the Lovelock Cave people obtained cui-ui. The cui-ui could have been captured only in the lower Truckee River, Pyramid Lake, or Winnemucca Lake—where large trout were then unquestionably abundant. The account by Snyder (1917:52) of numbers of cui-ui forced ashore by their own multitudes suggests that cui-ui were more readily captured than trout. But large trout ascending the lower Truckee in the "incredible numbers" described by Snyder (1917:71) must have been extensively utilized by the aborigines. It has been said that the Indians professed to like cui-ui better than trout (Snyder 1917:41). But this may not have been true of all aborigines of the Lahontan Basin. The Lovelock Cave people may have eaten the trout immediately and carried home only the cui-ui. Or, if the Lovelock Cave people acquired cui-ui solely by trade from the aborigines of the lower Truckee River, those aborigines may have refused to part with their trout.

I have found no indication that the Northern Paiute, or their predecessors, ground up fish bones or disposed of them ceremonially, as certain aborigines of coastal northern California may have done (cf. Elsasser and Heizer 1966:8). The abundance of trout remains at the Falcon Hill sites affords an indication to the contrary.

On the basis of present information, an explanation of the absence of trout remains from the Lovelock Cave collections would therefore be conjectural.

TABLE 1
 Weight of Fish Remains and Size of Pharyngeals and of Fish Represented in Coprolite Material
 of Interior Lot (Age 1,210 ± 60 Years)

Coprolite	Total fish remains		Pharyngeals		Fish represented by pharyngeals			
	Weight (g.)	Number	Length (mm.)	Number	Length (mm.)	Range	Weight (g.)	Total
					<u>Tui chub (<i>Gila bicolor</i>)</u>			
5E	0.2	-	-	-	-	-	-	-
6E	0.6	-	-	-	-	-	-	-
14D	0.9	-	-	-	-	-	-	-
20E	0.2	-	-	-	-	-	-	-
22E	0.1	-	-	-	-	-	-	-
26D	3.9	6	5.0-17.2	3	86-239	6.3-164.0		179.8
27E	0.1	-	-	-	-	-	-	-
28D	1.5	4	10.0-11.0	4	142-156	28.0-41.0		135.0
28F	1.5	-	-	-	-	-	-	-
30E	0.3	3	6.2-8.1	2	101-116	10.3-15.2		25.5
34E	0.6	3	7.5-9.7	2	108-138	12.5-24.0		36.5
36F	0.1	-	-	-	-	-	-	-
39D	0.2	-	-	-	-	-	-	-
40E	0.8	2	6.3-7.0	1	101	10.3		10.3
50D	0.1	2	6.0-8.0	2	86-114	6.3-14.5		20.8
55D	0.1	1	4.5	1	65	2.3		2.3
Total	11.2	21		15				410.2
					<u>Tahoe sucker (<i>Catostomus tahoensis</i>)</u>			
26D		3	frag.	3	150-210	35.0-120.0		275.0

TABLE 2
 Weight of Fish Remains and Size of Pharyngeals and of Fish Represented in Coprolite Material
 of Entrance Lot (Age 145 ± 80 Years)

Coprolite No.	Total fish remains		Pharyngeals		Fish represented by pharyngeals				Total Weight (g.)
	Weight (g.)	Number	Number	Length (mm.)	Number	Length (mm.)	Range	Total	
10D	8.5	123		2.6-8.4	69	42-120	0.5-16.8	315.4	
11F	0.1	1		7.2	1	104	11.3	11.3	
16D	0.7	22		4.0-8.6	16	58-123	1.7-18.0	106.3	
17D	1.6	20		3.5-7.0	17	58-101	1.7-10.3	89.2	
19D	0.8	37		3.6-8.5	22	52-122	1.2-17.6	119.3	
23E	1.3	49		2.6-9.0	35	39-129	0.3-20.4	183.0	
29G	1.2	40		2.6-8.5	27	42-122	0.5-17.6	130.3	
33D	0.8	11		4.1-9.8	8	59-139	1.7-24.3	78.8	
46D	0.1	2		3.6-4.0	2	52-58	1.2-1.7	2.9	
47E	0.7	22		3.0-8.4	13	48-120	0.9-16.8	64.6	
48D	1.6	25		2.6-11.0	18	38-156	0.2-41.0	127.6	
52D	0.1	-		-	-	-	-	-	
56D	5.8	101		2.8-8.3	55	48-119	0.9-16.3	208.4	
Total	23.3	453			283			1,437.1	
Lahontan speckled dace (<u>Rhinichthys osculus robustus</u>)									
10D		1		4.4	1	74	5.8	5.8	
16D		2		4.0-4.7	2	68-79	4.1-7.1	11.2	
17D		1		4.5	1	76	6.2	6.2	
29G		1		4.3	1	73	5.3	5.3	
Total		5			5			28.5	

TABLE 3

Fish Remains in Midden Material (Estimated Age 1,000 to 1,500 Years)

Remains	UCMA Cat. No.
Tui chub (<u>Gila bicolor</u>)*	
1 mummy, incomplete	2-39667
2 mummies, incomplete	-
1 head, complete	-
7 heads, 1 complete, 6 incomplete	2-39411
5 pharyngeals, 1 complete, 4 incomplete	-
2 pectoral fins and parts of both cleithra, connected by skin	2-39411
1 caudal fin, incomplete	2-39411
65 vertebrae, articulated in 11 series of 4 to 8 each	-
187 vertebrae (161 articulated in 21 series of 2 to 12 each)	-
4 skin fragments	-
Tahoe sucker (<u>Catostomus tahoensis</u>)**	
4 head bones, 2 complete (opercle and subopercle), 2 incomplete (preopercle and interopercle), articulated	2-39411
1 opercle, complete	2-39411
10 head bones, 7 complete (quadrate, hyomandibular, preopercle, interopercle, epihyal, ceratohyal, and mesopterygoid), 3 incomplete (opercle, subopercle, and palatine), articulated	-
50 vertebrae, articulated in 8 series of 4 to 7 each	-
Cui-ui (<u>Chasmistes cujus</u>)***	
3 cleithra, 1 right, complete, and 2 left, incomplete	2-39411
82 vertebrae (66 articulated in 13 series of 2 to 9 each)	2-39411

* Twenty-two fish represented.

** Seven fish represented.

*** Eight fish represented.

END NOTES

1. In recent decades, this species has generally been called Siphateles obesus, as by Snyder (1917:60) and Hubbs (1961:13), or Siphateles bicolor, as by Harry (1951:129) and Kimsey (1954:395). More recently, however, it has been called Gila (Siphateles) bicolor, the genus Siphateles Cope being regarded as a subgenus of Gila Baird and Girard (cf. Uyeno and Miller 1963:15; Bailey and Uyeno 1964:239).

2. The largest individual recorded by Kimsey (1954:405) was 409 mm. in standard length (tip of snout to base of caudal fin), which would correspond to a total length of about 480 mm.

3. Originally described from the Humboldt River (Girard 1856:183, as Algansea obesa).

4. In the subspecies Gila bicolor pectinifer, the pharyngeal teeth have been said to be "invariably 5-5" (Snyder 1917:65, as Leucidius pectinifer). But on the basis of more extensive material, it has been found that in this subspecies the pharyngeal teeth are occasionally 5-4 (John D. Hopkirk, personal communication).

5. This specimen, with gill rakers 37, represents the subspecies Gila bicolor pectinifer.

6. Two specimens, with gill rakers 31 and 36, represent the subspecies Gila bicolor pectinifer; one specimen, with gill rakers 18, represents the subspecies Gila bicolor obesa.

7. The identification to subspecies is presumptive.

8. The name was spelled "auwá-go" by Snyder (1917:43) and "awagu" by Stewart (1941:425).

9. These pharyngeals agree better with those of Catostomus tahoensis than with those of Pantosteus lahontan Rutter: the teeth are wider distally and more nearly truncate, and have a less prominent apiculus.

10. Freed (1966:80) was surely correct in questioning a report that "the Washo occasionally caught cui-ui" at Lake Tahoe near Cascade Lake.

11. The following statements probably referred to the upper Humboldt:

During the day, 3 of our men went out to an Indian encampment, where they saw 50 or more of these Diggers...[who] had several hundred of the finest trout, a fish about 12 inches in length. A number of the Indians were fishing in the [Humboldt] river near by, with scoop-nets, and seemed...to take the fish with great facility. These Indians...invited the men to go into the camp, and gave them some of their broiled trout (Langworthy 1855:131-132).

The native trout...of the Humboldt [River]...are lighter in color than fishes from Lake Tahoe (Snyder 1917:73).

The suckers and chubs were important in [Humboldt River] native economy, but it was probably the tahoe trout which...was preferred (Steward 1938: 41).

In...Humboldt River, and other Lahontan waters, the trout fishing was by no means a casual activity (Rostlund 1952:24).

EXPLANATION OF PLATES

- Plate 1 Lower pharyngeals (101), length 2.8 to 8.3 mm., of tui chub (Gila bicolor); representing at least 55 fish about 48 to 119 mm. in length and about 0.9 to 16.3 g. in weight; from coprolite 56D.
- Plate 2 Right cleithrum, height 55 mm., of cui-ui (Chasmistes cujus); representing a fish about 480 mm. in length and about 1.2 kg. in weight; from midden refuse; UCLMA 2-39411.
- Plate 3 Right lower pharyngeal, length 4.0 mm., of Lahontan speckled dace (Rhinichthys osculus robustus); representing a fish about 68 mm. in length and about 4.1 g. in weight; from coprolite 16D.
- Plate 4 Left lower pharyngeal, incomplete, of Tahoe sucker (Catostomus tahoensis); representing a fish about 150 mm. in length and about 35.0 g. in weight; from coprolite 26D.
- Plate 5 Half-grown tui chub (Gila bicolor), length about 200 mm., weight about 100 g.; from Pyramid Lake, Nevada.

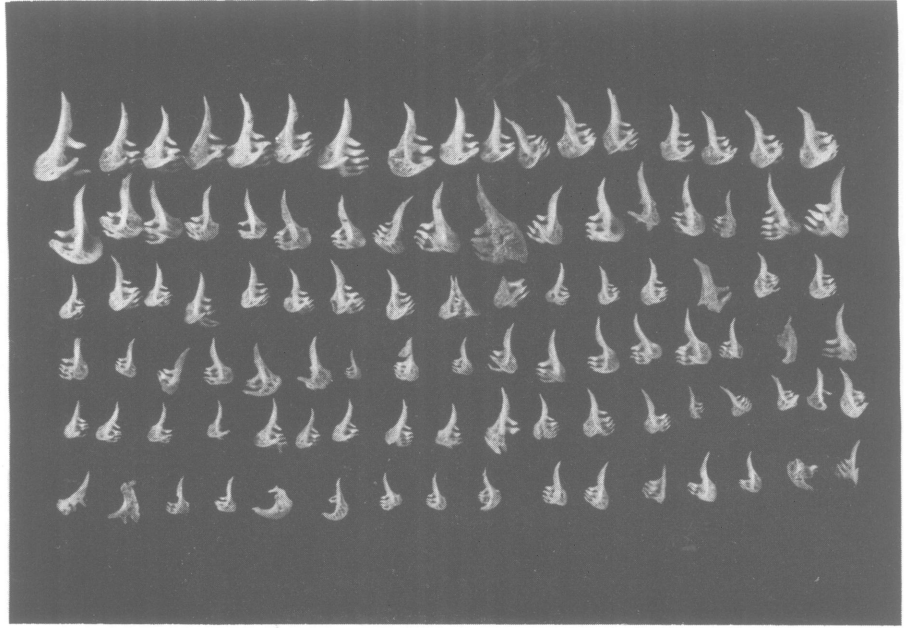


Plate 1



Plate 2



Plate 3



Plate 4

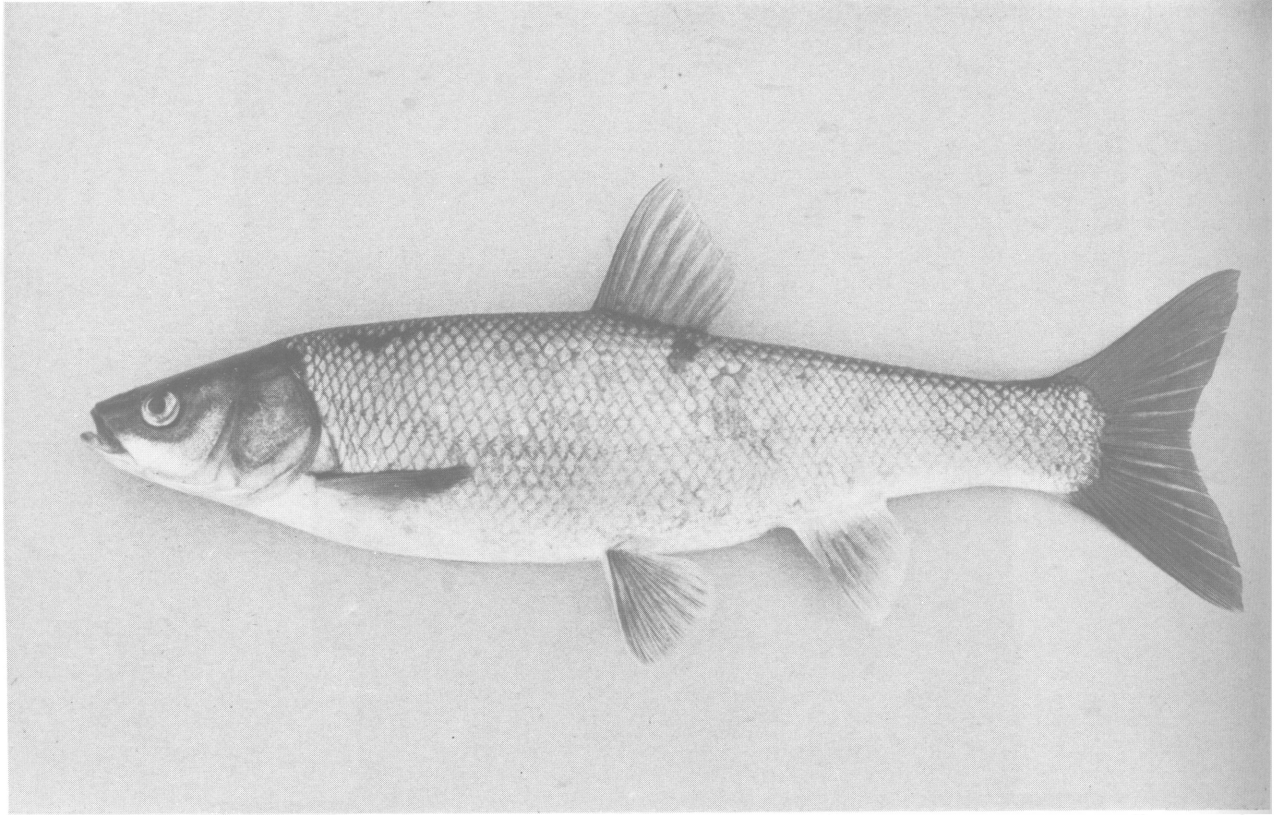


Plate 5

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