THE FISHES OF THE COASTAL STREAMS OF OREGON AND NORTHERN CALIFORNIA

By JOHN OTTERBEIN SNYDER
Assistant Professor of Zoology, Leland Stanford Junior University

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INTRODUCTION.

The present paper contains an account of the fish fauna of the smaller coastal streams of Oregon and northern California which have their origin west of the Sierra-Cascade Mountain system and drain a section of the coast extending from the Columbia River to the Sacramento. All of the streams reaching the ocean between the Columbia and Sacramento are therefore included except the Klamath, which rises in the high table-lands east of the Cascade Mountains.

The material was collected during a series of field investigations conducted under the auspices of the Bureau of Fisheries for the general purpose of studying the fish fauna of this region.[a] The study of a collection made by Messrs. Frank Cramer and Keinosuke Otaki in the basins of the Rogue, Willamette, and Umpqua rivers is also embodied in this report. Many specimens from the lake region of Oregon, and from the Columbia, Klamath, and Sacramento basins have been kindly furnished for examination by Dr. B. W. Evermann.

LOCAL DISTRIBUTION OF THE FISH FAUNA.

The coast region of Oregon and northern California is one of great rainfall, the quantity of rain increasing to the northward, where streams draining even the smallest basins have an unusually large and constant volume. Apparently every condition favorable to the support of a rich fauna prevails, and the streams in many places fairly swarm with fishes. The number of species is remarkably small, however, and those present consist mostly of anadromous forms such as the sturgeon, salmon, and trout, together with others able to withstand salt water, as the cottoids and sticklebacks. Only 11 species of strictly fluvial fishes have been found in the smaller coastal streams, 7 of which occur in the rivers north of the Klamath.

[a] The work was under the general supervision of Dr. C. H. Gilbert, of Stanford University. During June and July, 1897, a party consisting of Dr. Gilbert, A. G. Maddren, G. B. Culver, and J. O. Snyder explored the region south of the Rogue River. From July until late in September, 1899, a second party, including W. F. Allen, J. S. Burcham, E. C. Robinson and J. O. Snyder, students of Stanford University, extended the survey northward to the Columbia. Side excursions from the main line of work were frequently made to examine tributaries of the Columbia, Klamath, and Sacramento rivers. The writer has been very materially aided both in field explorations and laboratory studies by Dr. C. H. Gilbert, to whom he wishes to express his deep obligation for direction, advice, and friendly criticism. Great credit is also due to the several field assistants whose hearty cooperation has made this investigation possible.

Not only are the species few in number, but their distribution is very irregular, there being as many as 4 or 6 forms in some streams, while in others equally large there are but 1 or 2 or even none at all.

Following the coastal streams southward in serial order from the Columbia, and enumerating those which have a fluvial fish fauna, they are found to contain species as follows: Nehalem, *Catostomus macrocheilus;* Nestucca, *Agosia nubila;* Yaquina, *A. nubila;* Siuslaw, *C. macrocheilus, Ptychocheilus umpquæ, Leuciscus balteatus, A. nubila;* Tsiltcoos, *C. macrocheilus, P. umpquæ, L. balteatus;* Takenitch, *P. umpquæ, L. balteatus;* Umpqua, *C. macrocheilus, P. umpquæ, L. balteatus, Rhinichthys evermanni, Hybopsis crameri, A. nubila;* Coos, *C. macrocheilus, A. nubila;* Coquille, *C. macrocheilus, A. nubila;* Flores, *C. macrocheilus;* Sixes, *C. macrocheilus;* Rogue, *Catostomus rimiculus;* Mad, *Catostomus humboldtianus;* Eel, *C. humboldtianus;* Bear, *C. humboldtianus;* Navarro, *Rutilus symmetricus;* Gualala, *R. symmetricus;* Russian River, *Catostomus occidentalis, Mylopharodon conocephalus, Ptychocheilus grandis, R. symmetricus.*

No great difficulty has been met in determining the relationships of these species. They are representatives of forms found either in the Columbia, Klamath, or Sacramento rivers.[a] Some are identical in every respect with the species of the larger basins, while others show a varying degree of differentiation, as described in the following pages. In no case, however, does the relationship appear doubtful. One stream only, the Rogue, contains a Klamath form. North of the Rogue the fluvial species are representatives of the Columbia fauna, while south of the Klamath they belong with the Sacramento. This interesting condition of distribution is graphically shown on the appended map, where rivers having representatives of the Columbia fauna are outlined in red, the Klamath in green, and the Sacramento in orange. Rivers in which fluvial fishes are not known to occur are traced in black.

The following species are described as new: *Catostomus humboldtianus; Ptychocheilus umpquæ; Rhinichthys evermanni; Hybopsis crameri.*

A table has been prepared to show where specimens of each form have been collected, thus avoiding the long catalogue of localities which would otherwise appear after each species. The trout and salmon are not included in the table.

[a] *Rhinichthys evermanni* is a possible exception. It does not appear to be closely related to *R. dulcis* of the Columbia. The genus does not occur in the Klamath or Sacramento. Reference may also be made to the well-known fact that the Columbia, Klamath, and Sacramento basins have each a distinctive fluvial fish fauna, consisting in many cases of characteristic species and genera.

TABLE SHOWING THE DISTRIBUTION OF SPECIES.

Locality.	Entosphenus tridentatus (Gairdner).	Acipenser medirostris Ayres.	Catostomus rimiculus Gilbert & Snyder.	Catostomus occidentalis Ayres.	Catostomus humboldtianus, new species.	Catostomus snyderi Gilbert.	Catostomus macrocheilus Girard.	Acrocheilus alutaceus Agassiz & Pickering.	Lavinia exilicauda Baird & Girard.	Mylopharodon conocephalus (Baird & Girard).	Mylocheilus lateralis Agassiz & Pickering.	Ptychocheilus grandis (Ayres).	Ptychocheilus oregonensis (Richardson).	Ptychocheilus umpquæ, new species.	Leuciscus caurinus Richardson.	Leuciscus bicolor (Girard).	Leuciscus balteatus (Richardson),
Columbia River fauna.																	
Columbia system:																	
Willamette River, Oregon City	X						X										
Clear Creek near Oregon City	X						X				X		X				X
Willamette River, Albany							X	X			X						X
Santiam Canal, Albany							X										X
Callapooya Creek near Albany							X	X			X		X				X
The Lakes near Albany							X										X
Willamette River near Corvallis							X	X			X		X		X		X
Willamette River near Junction City							X										X
Long Tom Creek near Monroe							X				X						X
McKenzie River near Eugene	X						X						X				X
Willamette River near Eugene	X						X						X				X
Coast Fork, Cottage Grove							X	X									X
Row River, Cottage Grove							X						X				X
Nehalem River							X										
Tillamook River																	
Trask River																	
Nestucca River	X																
Siletz River																	
Little Elk and Yaquina River																	
Alsea River																	
South Fork, Alsea River																	
North Fork, Alsea River																	
Siuslaw River and Lake Creek							X							X			X
Lake Creek, Deadwood							X							X			X
Lake Creek near Loon Lake							X										X
Tsiltcoos River														X			X
Takenitch Creek																	X
Umpqua system:																	
South Umpqua River, Roseburg	X						X							X			X
North Umpqua River, Winchester	X						X										X
Elk Creek, Drain							X							X			X
Callapooia Creek, Oakland							X							X			X
South Umpqua, Canyonville							X							X			X
Cow Creek	X						X										X
Deer Creek near Roseburg							X										X
South Fork Coos River							X										
North Fork Coquille River							X										
Coquille River, Myrtle Point							X										
Coquille River at South Fork																	
Coquille River at Middle Fork	X						X										
Flores Creek							X										
Sixes River							X										
Elk Creek, Curry County																	
Klamath River fauna.																	
Rogue River system:																	
Rogue River near mouth	X		X														
South Fork Illinois River, Josephine			X														
Deer Creek, Josephine County, Oreg																	
Rogue River, Grants Pass	X		X														
Butte Creek, Central Point																	
Butte Creek, Eagle Point			X														
Bear Creek near Central Point			X														
Bear Creek near Ashland			X														
Pistol River																	
Smith River																	
Klamath River system:																	
Klamath River near mouth	X	X	X			X										X	
Hunters Creek, Klamath			X														
Shasta River, Montague			X														
Shasta River Yreka			X														

TABLE SHOWING THE DISTRIBUTION OF SPECIES—Continued.

Locality.	Entosphenus tridentatus (Gairdner).	Acipenser medirostris Ayres.	Catostomus rimiculus Gilbert & Snyder.	Catostomus occidentalis Ayres.	Catostomus humboldtianus, new species.	Catostomus snyderi Gilbert.	Catostomus macrocheilus Girard.	Acrocheilus alutaceus Agassiz & Pickering.	Lavinia exilicauda Baird & Girard.	Mylopharodon conocephalus (Baird & Girard).	Mylocheilus lateralis Agassiz & Pickering.	Ptychocheilus grandis (Ayres).	Ptychocheilus oregonensis (Richardson.)	Ptychocheilus umpquæ, new species.	Leuciscus caurinus Richardson.	Leuciscus bicolor (Girard).	Leuciscus balteatus (Richardson).
Sacramento River fauna.																	
Redwood Creek, Orick																	
Mad River					×												
Maple Creek																	
Little River																	
Elk River																	
Van Duzen Creek					×												
South Fork Eel River near Garberville	×				×												
South Fork Eel River, Garberville	×				×												
Spawl Creek																	
Bear River, Capetown					×												
Mattole River near mouth																	
Mattole River, White Thorn																	
Usal Creek																	
Ten-Mile River																	
Noyo River																	
Big River																	
South Fork Big River	×																
Albion River																	
Navarro River near mouth																	
Navarro River near Philo																	
Navarro River near Boonville																	
Alder Creek																	
Garcia River near mouth																	
Garcia River 5 miles from mouth																	
Garcia River 10 miles from mouth	×																
Gualala River at North Fork																	
Gualala River at Wheatfield Fork																	
Wheatfield Fork, Gualala																	
Russian River system:																	
Roberts Creek				×						×		×					
Russian River, Ukiah				×						×		×					
Warm Springs Creek				×						×		×					
Dry Creek, Skaggs Springs				×						×							
Dry Creek, Healdsburg				×						×		×					
Russian River, Healdsburg	×			×						×		×					
Knights Valley Creek				×						×		×					
Napa River, Rutherford				×													
Napa River, Calistoga	×			×					×			×					
Conn Creek				×													

TABLE SHOWING THE DISTRIBUTION OF SPECIES—Continued.

Locality.	Rutilus symmetricus (Baird & Girard).	Rutilus bicolor (Girard).	Rhinichthys dulcis (Girard).	Rhinichthys evermanni, new species.	Agosia nubila (Girard).	Agosia klamathensis Evermann & Meek.	Agosia falcata Eigenmann & Eigenmann.	Hybopsis crameri, new species.	Coregonus williamsoni Girard.	Columbia transmontana Eigenmann & Eigenmann.	Gasterosteus cataphractus (Pallas).	Hysterocarpus traski Gibbons.	Cottus asper Richardson.	Cottus gulosus (Girard).	Cottus klamathensis Gilbert.	Cottus aleuticus Gilbert.	Cottus rhotheus Rosa Smith.
Columbia River fauna.																	
Columbia system:																	
Willamette River, Oregon City																	
Clear Creek near Oregon City					×			×					×	×			×
Willamette River, Albany										×				×			
Santiam Canal, Albany							×										
Callapooya Creek near Albany							×			×							
The Lakes near Albany								×		×	×		×				
Willamette River near Corvallis			×		×		×	×	×				×	×			
Willamette River near Junction City													×				
Long Tom Creek near Monroe								×		×			×				×
McKenzie River near Eugene			×		×		×	×	×	×	×			×			×
Willamette River near Eugene								×		×							
Coast Fork, Cottage Grove					×												×
Row River, Cottage Grove					×									×			
Nehalem River											×		×	×			
Tillamook River													×	×		×	
Trask River														×		×	
Nestucca River					×						×		×	×		×	
Siletz River														×		×	
Little Elk and Yaquina River					×								×	×			
Alsea River					×									×			
South Fork, Alsea River					×									×			
North Fork, Alsea River					×									×			
Siuslaw River and Lake Creek														×			
Lake Creek, Deadwood					×									×			
Lake Creek near Loon Lake														×			
Tsiltcoos River													×				
Takenitch Creek											×		×				
Umpqua system:																	
South Umpqua River, Roseburg				×				×						×			
North Umpqua River, Winchester											×			×			
Elk Creek, Drain								×						×			
Callapooia Creek, Oakland					×						×			×			
South Umpqua, Canyonville								×						×			
Cow Creek					×												
Deer Creek near Roseburg					×						×			×			
South Fork Coos River					×						×		×				
North Fork Coquille River																	
Coquille River, Myrtle Point					×						×		×			×	
Coquille River at South Fork																	
Coquille River at Middle Fork													×	×			
Flores Creek													×				
Sixes River											×		×				
Elk Creek, Curry County											×		×			×	
Klamath River fauna.																	
Rogue River system:																	
Rogue River near mouth													×			×	
South Fork Illinois River, Josephine																	
Deer Creek, Josephine County, Oreg														×			
Rogue River, Grants Pass														×			
Butte Creek, Central Point																	
Butte Creek, Eagle Point														×			
Bear Creek near Central Point																	
Bear Creek near Ashland														×			
Pistol River													×	×		×	
Smith River											×		×			×	
Klamath River system:																	
Klamath River near mouth		×				×					×		×				
Hunters Creek, Klamath													×				
Shasta River, Montague		×				×									×		
Shasta River, Yreka		×				×									×		

TABLE SHOWING THE DISTRIBUTION OF SPECIES—Continued.

Locality.	Rutilus symmetricus (Baird & Girard.)	Rutilus bicolor (Girard).	Rhinichthys dulcis (Girard).	Rhinichthys evermanni, new species	Agosia nubila (Girard).	Agosia klamathensis Evermann & Meek.	Agosia falcata Eigenmann & Eigenmann.	Hybopsis crameri, new species.	Coregonus williamsoni Girard.	Columbia transmontana Eigenmann & Eigenmann.	Gasterosteus cataphractus (Pallas).	Hysterocarpus traski Gibbons.	Cottus asper Richardson.	Cottus gulosus (Girard).	Cottus klamathensis Gilbert.	Cottus aleuticus Gilbert.	Cottus rhotheus Rosa Smith.
Sacramento River fauna.																	
Redwood Creek, Orick	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
Mad River	....	....	....	....	....	....	....	....	....	....	XX	....	X	....	....	....	....
Maple Creek	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Little River	....	....	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....
Elk River	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
Van Duzen Creek	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
South Fork Eel River near Garberville	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
South Fork Eel River, Garberville	....	....	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....
Spawl Creek	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Bear River, Capetown	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Mattole River near mouth	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Mattole River, White Thorn	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Usal Creek	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....	X	....
Ten-Mile River	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
Noyo River	....	....	....	....	....	....	....	....	....	....	X	....	X	X	....	....	....
Big River	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....	....
South Fork Big River	....	....	....	....	....	....	....	....	....	....	X	....	....	X	....	....	....
Albion River	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Navarro River near mouth	X	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Navarro River near Philo	X	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Navarro River near Boonville	X	....	....	....	....	....	....	....	....	....	X	....	....	X	....	....	....
Alder Creek	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Garcia River near mouth	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Garcia River 5 miles from mouth	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	X	....
Garcia River 10 miles from mouth	....	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Gualala River at North Fork	X	....	....	....	....	....	....	....	....	....	XX	....	X	....	....	....	....
Gualala River at Wheatfield Fork	X	....	....	....	....	....	....	....	....	....	XX	....	X	....	....	X	....
Wheatfield Fork, Gualala	X	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Russian River system:																	
Roberts Creek	X	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Russian River, Ukiah	X	....	....	....	....	....	....	....	....	....	X	X	....	....	....	....	....
Warm Springs Creek	X	....	....	....	....	....	....	....	....	....	....	....	....	X	....	....	....
Dry Creek, Skaggs Springs	X	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Dry Creek, Healdsburg	X	....	....	....	....	....	....	....	....	....	X	X	X	....	....	....	....
Russian River, Healdsburg	X	....	....	....	....	....	....	....	....	....	X	....	....	....	....	....	....
Knights Valley Creek	X	....	....	....	....	....	....	....	....	....	....	X	....	X	....	....	....
Napa River, Rutherford	X	....	....	....	....	....	....	....	....	....	X	....	....	X	....	....	....
Napa River, Calistoga	X	....	....	....	....	....	....	....	....	....	XX	X	....	X	....	....	....
Conn Creek	X	....	....	....	....	....	....	....	....	....	X	X	....	....	....	....	....

SYSTEMATIC DISCUSSION OF SPECIES.

The proportional measurements[a] recorded in the following pages are expressed in hundredths of the length from the tip of the snout to the base of the caudal fin.

The tables are intended to record something of the degree of differentiation which has arisen between closely allied forms. They will also serve to indicate the individual variation of certain characters as well as it may be shown by the examination of a small series of specimens.

1. **Entosphenus tridentatus** (Gairdner).

Young examples of this species were occasionally found in quiet pools, buried several inches in the soft sand and mud. Specimens were taken in the Willamette, Nestucca, Umpqua, Coquille, Rogue, Klamath, Eel, Garcia, Big, Russian, and Napa rivers.

[a] The method of measuring here adopted is explained in Snyder, Bulletin U. S. Bureau Fisheries, vol. XXVII, 1907, page 79.

2. Acipenser medirostris Ayres.

A large specimen from the Klamath River, near its mouth, was examined. The plates were located as follows: Mid-ventral row, 3 in front of anal, 2 behind; ventro-lateral row, 9; lateral row, 27; dorsal row, 11 in front of dorsal fin, 3 behind.

3. Catostomus rimiculus Gilbert & Snyder.

Practically no difference has been discovered between examples of this species taken in the Klamath and Rogue rivers. Examples from the Rogue appear to have the dorsal and ventral fins inserted somewhat more posteriorly than those of the Klamath. The difference is slight, not constant, and may be due in part to unequal shrinkage of specimens in preservation.

The largest specimen seen measured 410 mm. in length.

Klamath and Rogue rivers.

MEASUREMENTS OF CATOSTOMUS RIMICULUS.

Klamath River basin.

	Klamath River near mouth.					Shasta River near Yreka.						
Length of body.....mm..	234	242	252	275	301	334	262	250	225	228	223	212
Length head.....	.235	.24	.235	.23	.235	.225	.235	.23	.225	.24	.22	.23
Depth body.....	.20	.185	.20	.19	.195	.20	.19	.22	.24	.225	.215	.20
Depth caudal peduncle.....	.095	.095	.097	.095	.095	.085	.092	.095	.095	.092	.095	.095
Length caudal peduncle.....	.165	.155	.17	.17	.16	.16	.175	.165	.175	.18	.18	.185
Length snout.....	.11	.115	.105	.105	.11	.105	.12	.115	.11	.12	.105	.11
Diameter eye.....	.035	.035	.035	.03	.03	.03	.03	.035	.035	.032	.035	.035
Interorbital width.....	.095	.095	.095	.085	.095	.095	.10	.10	.095	.105	.10	.092
Depth head.....	.15	.155	.155	.15	.15	.16	.162	.16	.15	.175	.15	.15
Snout to dorsal.....	.485	.495	.495	.465	.485	.48	.50	.49	.485	.50	.48	.48
Snout to ventral.....	.57	.59	.565	.555	.57	.55	.555	.565	.56	.56	.575	.56
Length base of dorsal.....	.15	.145	.135	.145	.135	.14	.15	.14	.14	.135	.13	.15
Length base of anal.....	.07	.075	.08	.085	.09	.072	.075	.075	.075	.072	.08	.075
Height dorsal.....	.16	.155	.145	.15	.14	.142	.14	.145	.15	.15	.15	.15
Height anal.....	.185	.185	.18	.185	.18	.182	.17	.17	.17	.18	.17	.19
Length pectoral.....	.21	.195	.205	.20	.20	.195	.185	.17	.185	.20	.175	.19
Length ventral.....	.145	.145	.14	.145	.14	.14	.14	.145	.14	.135	.145	.145
Length caudal.....	.225	.23	.22	.205	.21	.20	.205	.20	.205	.21	.19	.21
Dorsal rays.....	12	11	11	11	11	11	12	11	11	11	10	12
Anal rays.....	7	7	7	7	7	7	7	7	6	7	7	7
Scales lateral line.....	91	89	91	89	88	86	88	85	89	85	93	89
Scales above lateral line.....	17	19	18	18	17	16	17	19	16	16	18	18
Scales before dorsal.....	45	47	44	40	44	38	42	39	39	40	39	44

Rogue River basin.

	South Fork Illinois River.					Bear Creek, Ashland, Oreg.				
Length of body.....mm..	247	266	281	285	296	77	86	90	101	135
Length head.....	.26	.26	.24	.235	.24	.25	.245	.24	.24	.225
Depth body.....	.22	.205	.21	.205	.20	.21	.21	.20	.21	.215
Depth caudal peduncle.....	.095	.095	.09	.095	.097	.09	.09	.09	.09	.095
Length caudal peduncle.....	.16	.15	.165	.16	.165	.17	.17	.165	.16	.17
Length snout.....	.125	.135	.12	.12	.125	.11	.12	.11	.12	.10
Diameter eye.....	.035	.035	.033	.033	.03	.05	.045	.045	.04	.04
Interorbital width.....	.095	.10	.095	.09	.095	.09	.09	.09	.095	.09
Depth head.....	.17	.175	.16	.15	.17	.16	.16	.16	.16	.16
Snout to dorsal.....	.51	.525	.505	.50	.51	.52	.52	.51	.50	.50
Snout to ventral.....	.585	.61	.575	.57	.56	.58	.59	.58	.58	.56
Length base of dorsal.....	.14	.13	.13	.135	.13	.14	.14	.14	.16	.14
Length base of anal.....	.075	.07	.08	.08	.08	.075	.07	.07	.07	.07
Height dorsal.....	.15	.16	.15	.14	.135	.17	.17	.16	.17	.15
Height anal.....	.18	.195	.185	.185	.18	.17	.16	.165	.18	.17
Length pectoral.....	.19	.20	.185	.175	.185	.21	.21	.21	.21	.19
Length ventral.....	.14	.15	.135	.14	.135	.15	.16	.16	.16	.14
Length caudal.....	.225	.215	.205	.21	.205	.24	.23	.22	.22	.22
Dorsal rays.....	11	12	10	11	11	11	11	11	12	11
Anal rays.....	7	7	7	7	7	7	7	6	7	7
Scales lateral line.....	87	89	90	89	89	81	81	87	84	81
Scales above lateral line.....	16	16	17	15	17	15	15	16	16	16
Scales before dorsal.....	42	43	41	42	45	38	38	40	39	41

SCALE COUNTS IN CATOSTOMUS RIMICULUS.

	Klamath River near mouth.	Shasta River near Yreka.	Illinois River.	Rogue River near mouth.	Total.
In lateral line:	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
81 scales	1				1
83 scales	1				1
84 scales	1	1	1	1	4
85 scales		2			2
86 scales		1	1		2
87 scales	3		5	1	9
88 scales	3	1	2	1	7
89 scales		1	1		2
90 scales	1	4	1	1	7
91 scales	2		1	1	4
92 scales		1			1
93 scales	1	1			2
Above lateral line:					
15 scales			1		1
16 scales		2	3	3	8
17 scales	3	5	6	1	15
18 scales	2	1	1	1	5
19 scales	6	4			10
20 scales	1	1	1		3
21 scales	1				1
Before dorsal:					
37 scales		1			1
38 scales		2			2
39 scales		2	4		6
40 scales	1	5		2	8
41 scales			3		3
42 scales	1		2	1	4
43 scales	1	1	1		3
44 scales	2		1		3
45 scales	4	1	1	1	7
46 scales	2			1	3
51 scales	1				1
52 scales	1				1

4. Catostomus occidentalis Ayres.

Specimens from the Russian River appear to differ in no way from those of Napa River or of the Sacramento basin.

Russian and Napa river basins.

MEASUREMENTS OF CATOSTOMUS OCCIDENTALIS.

Sacramento River basin.

	Yuba River.			Goose Lake.							
Length of body.....mm..	273	262	237	267	258	255	238	222	232	223	255
Length head	.24	.238	.23	.228	.225	.235	.225	.232	.228	.225	.23
Depth body	.19	.18	.19	.20	.195	.20	.206	.21	.22	.225	.21
Depth caudal peduncle	.085	.088	.082	.09	.085	.085	.08	.09	.085	.085	.085
Length caudal peduncle	.15	.165	.155	.165	.16	.16	.172	.18	.17	.17	.165
Length snout	.13	.12	.115	.105	.10	.105	.11	.105	.11	.11	.10
Width lower lip	.065	.06	.062	.065	.05	.05	.042	.05	.05	.05	.05
Diameter eye	.04	.04	.042	.035	.04	.038	.038	.04	.04	.05	.035
Interorbital width	.098	.10	.095	.10	.10	.11	.10	.105	.10	.095	.11
Depth head	.15	.15	.16	.17	.165	.17	.162	.17	.175	.165	.17
Snout to occiput	.212	.205	.195	.195	.19	.195	.185	.20	.185	.20	.20
Snout to dorsal	.52	.495	.49	.47	.485	.49	.48	.51	.50	.49	.48
Snout to ventral	.59	.58	.58	.565	.58	.585	.55	.58	.58	.54	.54
Length base of dorsal	.175	.155	.16	.16	.17	.165	.16	.15	.155	.165	.18
Length base of anal	.085	.08	.08	.08	.085	.072	.08	.075	.08	.085	.08
Height dorsal	.162	.165	.18	.16	.15	.162	.16	.158	.165	.17	.17
Height anal	.20	.18	.175	.19	.185	.18	.23	.185	.19	.205	.23
Length pectoral	.20	.19	.19	.20	.18	.195	.21	.21	.205	.22	.205
Length ventral	.162	.152	.165	.15	.142	.15	.155	.15	.155	.16	.16
Length caudal	.223	.212	.23	.21	.21	.225	.22	.222	.225	.222	.225
Dorsal rays	13	12	12	12	12	12	11	11	11	11	12
Scales lateral line	69	62	64	72	63	67	71	65	71	69	64
Scales above lateral line	15	16	15	17	16	15	15	17	16	16	15
Scales before dorsal	34	37	32	37	34	31	35	37	38	38	32

MEASUREMENTS OF CATOSTOMUS OCCIDENTALIS—Continued.

Sacramento River basin—Continued.

	Cache Creek, Yolo County, Cal.							
Length of body.....mm..	212	232	222	200	193	172	195	223
Length head.....	.23	.25	.24	.235	.24	.24	.245	.24
Depth body.....	.22	.21	.22	.225	.245	.23	.225	.225
Depth caudal peduncle.....	.08	.085	.08	.085	.085	.08	.08	.085
Length caudal peduncle.....	.165	.155	.155	.16	.162	.16	.16	.15
Length snout.....	.11	.13	.11	.105	.11	.115	.11	.12
Width lower lip.....	.05	.055	.055	.04	.05	.05	.05	.052
Diameter eye.....	.045	.045	.045	.04	.045	.05	.045	.04
Interorbital width.....	.095	.10	.10	.10	.11	.105	.10	.10
Depth head.....	.17	.17	.165	.165	.165	.17	.165	.175
Snout to occiput.....	.195	.23	.205	.195	.21	.21	.205	.21
Snout to dorsal.....	.49	.52	.50	.51	.52	.52	.505	.53
Snout to ventral.....	.575	.575	.56	.58	.57	.58	.59	.57
Length base of dorsal.....	.16	.16	.185	.172	.175	.16	.16	.17
Length base of anal.....	.075	.078	.08	.08	.08	.075	.075	.08
Height dorsal.....	.175	.185	.165	.18	.18	.18	.20	.18
Height anal.....	.175	.18	.17	.17	.19	.18	.185	.18
Length pectoral.....	.195	.195	.185	.19	.20	.195	.20	.19
Length ventral.....	.15	.155	.15	.15	.16	.16	.16	.16
Length caudal.....	.255	.26	.225	.22	.255	.25	.27	.25
Dorsal rays.....	12	12	14	13	12	12	12	14
Scales lateral line.....	71	69	70	66	70	67	66	68
Scales above lateral line.....	17	15	16	16	15	14	15	16
Scales before dorsal.....	34	34	32	36	33	32	32	36

Russian River basin.

	Dry Creek near Healdsburg.									
Length of body.....mm..	79	95	100	119	151	155	177	193	197	211
Length head.....	.27	.26	.25	.26	.24	.25	.24	.235	.26	.245
Depth body.....	.215	.25	.23	.235	.23	.235	.24	.25	.23	.24
Depth caudal peduncle.....	.085	.08	.08	.08	.085	.08	.085	.083	.085	.08
Length caudal peduncle.....	.14	.135	.15	.135	.14	.16	.15	.14	.135	.14
Length snout.....	.12	.12	.115	.12	.115	.125	.12	.11	.125	.12
Width lower lip.....	.05	.055	.042	.05	.045	.045	.05	.05	.043	.045
Diameter eye.....	.055	.05	.05	.055	.05	.05	.045	.045	.045	.045
Interorbital width.....	.10	.10	.09	.10	.095	.09	.09	.095	.10	.10
Depth head.....	.175	.17	.18	.17	.17	.17	.165	.16	.165	.165
Snout to dorsal.....	.53	.525	.525	.53	.51	.52	.525	.52	.525	.52
Snout to ventral.....	.58	.575	.58	.60	.575	.59	.57	.575	.58	.57
Length base of dorsal.....	.19	.18	.18	.18	.185	.175	.185	.19	.20	.175
Length base of anal.....	.08	.08	.075	.075	.09	.083	.085	.095	.085	.09
Height dorsal.....	.21	.19	.19	.20	.19	.185	.175	.175	.19	.175
Height anal.....	.18	.185	.175	.19	.17	.175	.175	.185	.21	.195
Length pectoral.....	.215	.21	.205	.215	.20	.20	.20	.195	.21	.195
Length ventral.....	.17	.17	.16	.16	.16	.16	.155	.145	.17	.15
Length caudal.....	.28	.25	.25	.26	.25	.24	.24	.24	.26	.22
Dorsal rays.....	13	12	12	13	13	12	13	13	14	14
Scales lateral line.....	70	67	69	65	68	70	69	64	65	71
Scales above lateral line.....	15	13	15	14	15	15	15	15	15	15
Scales before dorsal.....	33	32	32	32	31	35	31	31	33	32

5. Catostomus humboldtianus, new species.

The affinities of this species are with *C. occidentalis* of the Sacramento and adjacent streams. It differs from *C. occidentalis* in having larger scales between the occiput and insertion of dorsal (28 to 33 rows against 30 to 36) and larger scales above the lateral line (11 to 14 rows between lateral line and middle of back near origin of dorsal, against 13 to 17). The mouth is larger than that of *C. occidentalis*, the papillose lips are broader, usually extend farther backward, and have larger papillæ. The eye is smaller and the pectorals are rounded instead of pointed. The differences exhibited by the mouth and eye will usually serve to distinguish the species at a glance. From *C. snyderi* of the Klamath basin it differs in having fewer scales in the lateral series (62 to 69 in the lateral line against 70 to 77) and in having a much larger mouth with markedly broader lips.

Distribution, Mad, Eel, and Bear rivers, Humboldt County, Cal.

Head 4 in length; depth 4.25; depth of caudal peduncle 2.75 in head; eye 8; snout 2.14; interorbital space 2.5; number of dorsal rays 12; anal rays 7; scales in lateral line 67; above lateral line 12; between lateral line and ventral fin 9; between occiput and dorsal 30.

Width of mouth contained about 4 times in length of head; upper lip with 6 or 7 rows of papillæ anterior to mouth, lower lip split nearly to border of mouth; one or two rows of papillæ between cleft and border of lip; distance between anterior border of upper lip and posterior border of lobe of lower lip 2.9 in head; inner border of lips smooth and hard; 3 rows of minute papillæ between inner border of upper lip and the valve. Interorbital area convex. Length of fontanelle about equal to diameter of orbit.

Origin of dorsal fin midway between tip of snout and base of caudal fin; height of longest dorsal ray somewhat greater than length of base of fin, the latter contained 6.6 times in the length. Height of anal 2.3 times length of its base, 5 in the length; tip of fin when depressed just reaching base of lower caudal rays. Pectoral rays 18, the longest contained 5.1 in the length. Origin of ventral below ninth dorsal ray, the fin when depressed not reaching anal opening, 6.75 in the length. Caudal 4.8 in the length.

The scales grow gradually larger porteriorly, those on caudal peduncle being about twice the width of the anterior ones.

Color dusky above, the scales with dark borders; dorsal, caudal, and upper side of pectorals dusky; ventrals and anal whitish. Occasional specimens are somewhat brassy, having whitish tubercles on lower part of caudal peduncle, on anal and lower half of caudal fin.

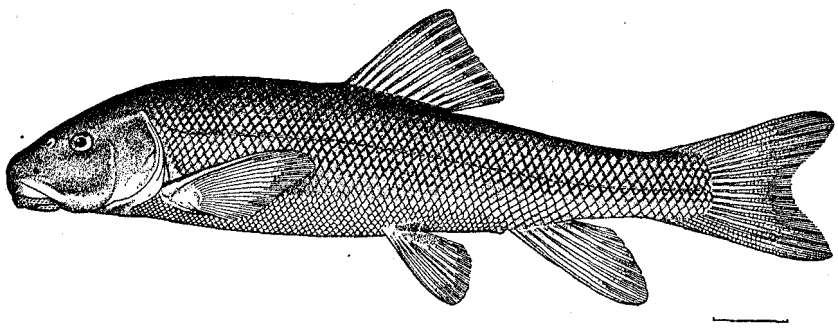


FIG. 1.—Catostomus humboldtianus, new species. Type.

Type, in U. S. National Museum, a specimen from the south fork of Eel River, near Garberville, Humboldt County, Cal. Cotype no. 9861, Stanford University.

No differences have been detected between specimens from Bear, Eel, and Mad rivers. *C. humboldtianus* appears to be a slightly differentiated form of *C. occidentalis*, resembling that species much more closely than *C. snyderi* of the Klamath. It is well to note in this connection that but little is known of *C. snyderi*, and a detailed and thorough examination of *C. occidentalis* is yet to be made.

Bear, Eel, and Mad rivers.

MEASUREMENTS OF CATOSTOMUS HUMBOLDTIANUS.

	Eel River.					Mad River.				
Length of body.....mm..	234	239	221	227	203	185	198	185	175	190
Length head.....	.25	.245	.24	.245	.24	.25	.26	.265	.25	.26
Depth body.....	.24	.235	.22	.24	.23	.23	.22	.215	.24	.23
Depth caudal peduncle.....	.095	.095	.09	.095	.095	.09	.09	.10	.10	.095
Length caudal peduncle.....	.175	.17	.165	.16	.16	.16	.16	.15	.168	.155
Length snout.....	.125	.115	.115	.13	.12	.13	.13	.135	.115	.135
Width lower lip.....	.055	.065	.055	.062	.062	.07	.067	.065	.055	.065
Diameter eye.....	.035	.035	.033	.035	.038	.04	.04	.04	.035	.04
Interorbital width.....	.11	.10	.098	.098	.105	.10	.098	.105	.10	.105
Depth head.....	.175	.175	.165	.17	.175	.18	.18	.175	.18	.18
Snout to occiput.....	.20	.21	.21	.215	.205	.225	.23	.225	.20	.24
Snout to dorsal.....	.515	.51	.51	.50	.505	.52	.53	.525	.505	.52
Snout to ventral.....	.575	.575	.60	.59	.58	.60	.59	.62	.625	.59
Length base of dorsal.....	.15	.14	.145	.153	.145	.15	.15	.145	.155	.165
Length base of anal.....	.085	.07	.063	.08	.065	.08	.072	.075	.07	.08
Height dorsal.....	.18	.165	.16	.17	.18	.165	.155	.155	.16	.16
Height anal.....	.20	.17	.172	.20	.19	.172	.18	.175	.18	.19
Length pectoral.....	.205	.19	.18	.20	.195	.205	.185	.18	.195	.18
Length ventral.....	.15	.14	.14	.15	.15	.15	.14	.145	.15	.14
Length caudal.....	.235	.21	.21	.215	.24	.22	.21	.22	.23	.225

SCALE AND FIN CHARACTERS OF CATOSTOMUS HUMBOLDTIANUS FROM MAD, EEL, AND BEAR RIVERS.

Mad River.				Eel River.				Bear River.			
Scales in lateral line.	Scales above lateral line.	Scales before dorsal fin.	Rays in dorsal fin.	Scales in lateral line.	Scales above lateral line.	Scales before dorsal fin.	Rays in dorsal fin.	Scales in lateral line.	Scales above lateral line.	Scales before dorsal fin.	Rays in dorsal fin.
65	13	33	12	67	13	32	12	64	12	29	11
65	12	28	12	65	12	31	12	63	12	28	12
65	13	31	12	62	13	31	12	64	13	28	12
62	14	29	12	67	13	30	12	64	13	30	11
65	13	28	12	64	13	31	12	63	12	28	12
63	13	28	11	68	13	31	12	66	13	31	12
69	13	31	12	68	13	30	12	62	13	28	12
65	13	33	12	66	13	30	12	64	14	31	12
65	14	31	12	67	13	30	13	70	13	30	12
65	12	31	12	69	14	33	12	63	14	30	12
65	13	32	12	67	14	33	12	64	13	30	12
65	13	30	11	68	12	33	12	63	13	29	12
66	14	32	12	67	11	30	11	63	13	28	12
68	13	31	12	66	13	29	12	62	12	29	12
69	13	31	12	66	12	28	12	63	12	29	12
67	11	29	11	67	13	28	11	67	13	30	12
67	13	32	12	66	12	29	12	62	12	29	11
64	12	28	12	62	12	29	12	63	13	29	12
65	12	29	11	64	12	27	12	64	13	29	12
65	12	28	12	65	13	31	12	60	12	29	12

COMPARATIVE SCALE AND FIN CHARACTERS OF CATOSTOMUS OCCIDENTALIS AND CATOSTOMUS HUMBOLDTIANUS.

	C. occidentalis.	C. humboldtianus.		C. occidentalis.	C. humboldtianus.
Having in series above lateral line—	*Specimens.*	*Specimens.*	Having in series between occiput and dorsal fin—(Continued).	*Specimens.*	*Specimens.*
11 scales	.....	2	32 scales	23	6
12 scales	.....	20	33 scales	15	6
13 scales	11	41	34 scales	10	2
14 scales	24	7	35 scales	12	.....
15 scales	36	.....	36 scales	13	.....
16 scales	25	.....	37 scales	1	.....
17 scales	5	.....	Showing in dorsal fin—		
Having in series between occiput and dorsal fin—			11 rays	.....	12
27 scales	.....	1	12 rays	52	55
28 scales	.....	12	13 rays	42	2
29 scales	3	14	14 rays	5	.....
30 scales	11	13	15 rays	2	.....
31 scales	12	16			

6. **Catostomus snyderi** Gilbert.

The coarse-scaled sucker of the Klamath appears to be a rare form, but few examples having been seen. One large individual was taken in the Klamath near its mouth.

The species seems to differ from *C. occidentalis* and *C. macrocheilus* in having a shorter and somewhat deeper head, a narrower mouth with smaller lips, a much deeper caudal peduncle, somewhat smaller scales and fewer dorsal rays.

Klamath River.

7. **Catostomus macrocheilus** Girard.

The coarse-scaled sucker of the Columbia River is so nearly like that of the Sacramento that its specific distinctness may be regarded with some doubt. It appears to differ from the Sacramento form in having slightly shorter fins, the pectorals being at the same time more rounded, and in usually having a smaller eye. The scales are alike in both forms, and the fin rays are equal in number.

C. macrocheilus occurs in the larger coastwise streams of Oregon north of the Rogue River. No characters have been detected which will serve to distinguish specimens taken in any of these rivers from those of the Columbia basin. The results of a comparison of a few specimens from each of several isolated basins are given in the appended tables.

In the larger streams individuals of this species often attain a length of 2 feet. They may sometimes be seen frequenting the deeper pools in great numbers. Large schools often follow the tide down the lower courses of the rivers, frequently venturing some distance into the brackish water. In Coos River 81 specimens, measuring from 250 to 420 millimeters long, were cut off from such a school without perceptibly reducing its size.

Drs. Evermann and Meek record the species from Tsiltcoos Lake and the Siuslaw River as *Catostomus tsiltcoosensis*.[a] A much larger series of specimens from both the coastal streams of Oregon and from the Willamette and lower Columbia than was accessible to these authors makes it appear that no differences exist between examples from the Siuslaw and Tsiltcoos rivers and the lower Columbia.

Willamette, Nehalem, Siuslaw, Umpqua, Coos, Coquille, Flores, and Sixes river basins.

MEASUREMENTS OF CATOSTOMUS MACROCHEILUS.

	Columbia River basin.														
	Willamette River, Junction City.									Willamette River near Corvallis.					
Length of body.....mm..	380	318	328	292	298	308	300	312	263	322	313	305	287	330
Length head.....	.245	.25	.24	.235	.245	.23	.245	.235	.23	.25	.255	.265	.247	.248
Depth body.....	.19	.20	.24	.21	.215	.22	.23	.20	.215	.23	.21	.22	.22	.21
Depth caudal peduncle.....	.073	.08	.08	.075	.075	.078	.082	.075	.075	.08	.078	.08	.08	.075
Length caudal peduncle.....	.16	.145	.17	.15	.165	.152	.16	.16	.16	.15	.175	.16	.16	.165
Length snout.....	.12	.13	.12	.11	.12	.11	.115	.12	.115	.12	.115	.12	.12	.115
Width lower lip.....	.065	.063	.048	.05	.055	.05	.05	.055	.04	.04	.045	.045	.047	.05
Diameter eye.....	.033	.035	.035	.033	.035	.033	.033	.033	.038	.035	.035	.03	.036	.035
Interorbital width.....	.098	.095	.11	.10	.10	.10	.105	.105	.10	.105	.105	.11	.10	.11
Depth head.....	.165	.175	.172	.165	.17	.165	.18	.165	.16	.165	.175	.17	.168	.172
Snout to occiput.....	.20	.23	.21	.20	.21	.185	.20	.195	.192	.205	.21	.20	.21	.195
Snout to dorsal.....	.50	.525	.51	.495	.495	.51	.52	.495	.49	.485	.49	.475	.505	.50
Snout to ventral.....	.565	.58	.55	.56	.575	.585	.58	.55	.56	.54	.57	.545	.565	.565
Length base of dorsal.....	.165	.17	.172	.175	.16	.165	.175	.175	.175	.19	.18	.20	.19	.18
Length base of anal.....	.08	.075	.08	.075	.08	.075	.085	.085	.08	.085	.08	.085	.085	.08
Height dorsal.....	.135	.145	.14	.148	.16	.145	.155	.135	.16	.145	.165	.15	.145	.145
Height anal.....	.185	.22	.172	.185	.19	.18	.175	.185	.17	.225	.19	.215	.20	.185
Length pectoral.....	.173	.195	.175	.20	.20	.195	.172	.19	.175	.182	.193	.185	.195	.177
Length ventral.....	.133	.14	.145	.145	.14	.145	.13	.142	.132	.14	.142	.145	.148	.138
Length caudal.....	.205	.23	.20	.22	.23	.205	.20	.21	.21	.207	.235	.225	.24	.225
Dorsal rays.....	14	14	31	14	14	14	14	15	13	14	14	15	15	15
Scales lateral line.....	67	68	65	68	75	72	72	75	76	73	72	68	66	77
Scales above lateral line.....	13	14	13	14	16	13	14	14	13	14	14	14	14	16
Scales before dorsal.....	36	35	35	36	36	36	35	36	38	36	35	33	34	38

	Columbia River basin—Continued.			Nehalem River basin.									
	Long Tom Creek.			Nehalem River, near mouth.									
Length of body.....mm..	148	175	215	425	303	183	156	156	146	142	185	178	188
Length head.....	.25	.25	.245	.26	.235	.232	.24	.237	.24	.25	.235	.245	.255
Depth caudal peduncle.....	.07	.075	.08	.085	.08	.082	.075	.08	.08	.08	.08	.08	.08
Width lower lip.....	.045	.055	.05	.058	.055	.038	.043	.045	.045	.048	.045	.048	.05
Diameter eye.....	.045	.04	.04	.035	.035	.038	.043	.042	.04	.043	.04	.04	.04
Snout to occiput.....	.212	.21	.19	.23	.192	.192	.21	.21	.215	.215	.215	.22	.21
Snout to dorsal.....	.51	.52	.51	.49	.49	.48	.49	.49	.49	.51	.51	.51	.515
Snout to ventral.....	.59	.58	.535	.53	.57	.572	.56	.565	.57	.58	.56	.555	.57
Height dorsal.....	.17	.17	.17	.125	.135	.16	.16	.165	.16	.175	.16	.16	.162
Height anal.....	.18	.18	.20	.17	.20	.175	.15	.16	.175	.165	.17	.165	.17
Length pectoral.....	.19	.19	.20	.185	.185	.19	.175	.185	.19	.182	.18	.18	.19
Length ventral.....	.16	.15	.16	.135	.145	.14	.145	.14	.145	.14	.14	.135	.142
Length caudal.....	.24	.24	.24	.21	.20	.22	.22	.215	.23	.235	.222	.225	.238
Dorsal rays.....	14	14	14	13	13	13	13	13	13	13	14	13	13
Scales lateral line.....	70	68	74	68	67	70	65	65	73	71	70	66	68
Scales above lateral line.....	15	15	15	15	15	15	15	15	14	14	16	13	14
Scales before dorsal.....	35	32	35	35	34	32	32	33	31	30	34	34	30

[a] *Catostomus tsiltcoosensis* Evermann & Meek, Bulletin U. S. Fish Commission, vol. XVII, 1898, p. 68.

MEASUREMENTS OF CATOSTOMUS MACROCHEILUS—Continued.

	Siuslaw River basin.		Umpqua River basin.								
			Callapooia Creek.								
Length of body.....mm..	400	330	226	305	289	293	251	240	229	220	166
Length head.....	.27	.25	.24	.24	.235	.252	.24	.235	.24	.23	.235
Depth caudal peduncle.....	.095	.09	.09	.085	.08	.092	.09	.08	.085	.086	.085
Width lower lip.....	.065	.058	.06	.065	.053	.058	.05	.05	.055	.06	.06
Diameter eye.....	.035	.035	.04	.038	.038	.049	.04	.04	.04	.042	.042
Snout to occiput.....	.225	.215	.205	.21	.21	.21	.20	.205	.21	.195	.215
Snout to dorsal.....	.53	.515	.515	.512	.52	.50	.51	.52	.51	.515	.505
Snout to ventral.....	.58	.58	.59	.555	.54	.58	.57	.58	.58	.60	.575
Height dorsal.....	.14	.132	.15	.145	.142	.14	.16	.162	.15	.15	.155
Height anal.....	.18	.185	.17	.185	.18	.18	.18	.19	.175	.18	.19
Length pectoral.....	.172	.185	.172	.17	.182	.18	.19	.195	.175	.19	.205
Length ventral.....	.132	.14	.145	.13	.14	.135	.15	.155	.14	.155	.15
Length caudal.....	.205	.205	.225	.225	.215	.21	.21	.23	.22	.235	.25
Dorsal rays.....	13	12	14	14	13	13	12	13	12	14	14
Scales lateral line.....	65	71	67	65	68	69	66	65	65	67	68
Scales above lateral line.....	14	14	16	15	14	17	16	15	14	14	14
Scales before dorsal.....	36	35	35	33	33	36	39	35	37	38	34

	Umpqua River basin—Continued.								Coos River basin.					
	Elk Creek, near Drain.								South Fork Coos River.					
Length of body.....mm..	170	134	123	126	121	124	116	118	325	370	353	282	294	330
Length head.....	.25	.25	.25	.235	.245	.245	.245	.25	.222	.222	.23	.242	.225	.225
Depth caudal peduncle.....	.08	.09	.085	.08	.08	.085	.08	.085	.09	.092	.092	.09	.092	.09
Width lower lip.....	.055	.05	.05	.045	.05	.048	.055	.045	.05	.053	.05	.045	.052	.045
Diameter eye.....	.042	.05	.05	.05	.05	.05	.05	.05	.032	.03	.032	.035	.037	.032
Snout to occiput.....	.23	.22	.23	.21	.22	.22	.22	.215	.195	.195	.19	.20	.19	.195
Snout to dorsal.....	.515	.51	.52	.49	.50	.51	.51	.52	.468	.48	.49	.495	.48	.495
Snout to ventral.....	.58	.59	.60	.59	.60	.59	.595	.59	.552	.562	.59	.57	.55	.562
Height dorsal.....	.162	.18	.175	.18	.182	.17	.18	.19	.135	.125	.135	.142	.14	.135
Height anal.....	.18	.19	.175	.17	.18	.185	.17	.175	.175	.175	.18	.192	.22	.17
Length pectoral.....	.20	.20	.195	.185	.20	.195	.19	.195	.162	.165	.18	.162	.172	.165
Length ventral.....	.15	.15	.15	.145	.15	.15	.15	.15	.132	.125	.14	.145	.145	.135
Length caudal.....	.25	.26	.265	.26	.27	.26	.265	.265	.198	.18	.195	.21	.21	.195
Dorsal rays.....	13	13	14	13	13	13	12	13	12	12	12	12	13	13
Scales lateral line.....	67	67	66	70	70	65	72	65	67	69	68	70	71	73
Scales above lateral line.....	14	15	15	14	14	14	15	16	14	14	13	14	12	14
Scales before dorsal.....	36	38	39	39	37	38	39	38	36	33	36	34	35	35

	Coos River basin—Continued.				Coquille River basin.									
	South Fork Coos River—Continued.				Coquille River near Myrtle Point.									
Length of body.....mm..	300	243	268	220	252	194	200	218	197	199	200	183	186	230	260
Length head.....	.23	.232	.24	.22	.25	.245	.25	.245	.26	.25	.245	.255	.25	.235	.265
Depth caudal peduncle.....	.092	.092	.09	.09	.09	.085	.083	.085	.085	.09	.085	.085	.085	.092	.09
Width lower lip.....	.052	.044	.052	.04	.05	.05	.05	.055	.052	.058	.05	.05	.05	.048	.055
Diameter eye.....	.032	.038	.035	.037	.037	.038	.04	.04	.042	.042	.038	.042	.042	.038	.035
Snout to occiput.....	.195	.195	.195	.195	.225	.21	.225	.205	.23	.218	.22	.22	.22	.20	.232
Snout to dorsal.....	.48	.50	.512	.495	.51	.495	.52	.51	.52	.50	.52	.495	.51	.51	.52
Snout to ventral.....	.58	.562	.59	.59	.565	.508	.58	.57	.59	.58	.58	.58	.595	.58	.59
Height dorsal.....	.16	.14	.14	.14	.15	.16	.16	.155	.16	.165	.17	.16	.15	.165	.175
Height anal.....	.18	.165	.172	.169	.20	.175	.185	.17	.185	.185	.185	.18	.175	.185	.18
Length pectoral.....	.18	.165	.178	.169	.19	.21	.185	.185	.20	.20	.185	.20	.18	.178	.175
Length ventral.....	.14	.135	.138	.135	.15	.14	.145	.135	.145	.158	.15	.15	.14	.155	.145
Length caudal.....	.192	.20	.215	.195	.22	.22	.225	.215	.22	.22	.225	.24	.22	.19	.225
Dorsal rays.....	12	13	12	12	12	13	13	12	12	12	13	13	12	11	11
Scales lateral line.....	72	69	73	75	72	69	74	72	72	70	70	75	75	69	68
Scales above lateral line.....	14	15	13	15	13	13	14	15	14	14	14	15	14	14	13
Scales before dorsal.....	37	33	35	35	33	33	34	37	35	33	34	31	31	37	31

MEASUREMENTS OF CATOSTOMUS MACROCHEILUS—Continued.

	Flores River basin.												Sixes River basin.	
	Flores River near mouth.													
Length of body.....mm..	259	295	292	326	273	255	296	305	320	292	260	270	330	365
Length head.....	.232	.24	.23	.225	.23	.225	.25	.233	.25	.24	.235	.24	.245	.25
Depth caudal peduncle.....	.09	.09	.088	.085	.09	.09	.09	.09	.09	.085	.095	.095	.10	.095
Width lower lip.....	.05	.045	.042	.043	.048	.04	.058	.05	.055	.05	.05	.048	.047	.05
Diameter eye.....	.035	.035	.036	.03	.038	.035	.032	.035	.035	.035	.038	.038	.032	.032
Snout to occiput.....	.185	.19	.20	.205	.19	.195	.21	.19	.222	.205	.21	.20	.215	.22
Snout to dorsal.....	.48	.51	.50	.475	.49	.485	.525	.485	.495	.51	.50	.49	.53	.53
Snout to ventral.....	.565	.585	.54	.54	.555	.56	.575	.575	.56	.58	.57	.56	.572	.57
Height dorsal.....	.16	.155	.155	.142	.15	.155	.16	.158	.145	.145	.155	.15	.16	.145
Height anal.....	.205	.168	.22	.162	.22	.21	.175	.18	.18	.165	.215	.22	.195	.18
Length pectoral.....	.19	.19	.19	.172	.18	.195	.19	.185	.185	.18	.195	.195	.185	.18
Length ventral.....	.132	.135	.145	.128	.142	.132	.135	.135	.135	.132	.14	.142	.15	.15
Length caudal.....	.22	.223	.235	.20	.212	.23	.23	.232	.21	.205	.225	.24	.225	.195
Dorsal rays.....	11	12	13	12	13	13	11	12	12	12	12	12	12	12
Scales lateral line.....	72	68	69	70	69	68	67	73	69	73	71	69	71	71
Scales above lateral line.....	14	14	13	13	14	14	14	13	14	13	13	14	13	14
Scales before dorsal.....	31	33	33	32	34	33	38	33	33	35	35	38	35	33

SCALES AND DORSAL RAYS OF CATOSTOMUS MACROCHEILUS AND CATOSTOMUS OCCIDENTALIS.

Catostomus macrocheilus.

	Willamette River.	Nehalem River.	Siuslaw River.	Umpqua River.	Coos River.	Coquille River.	Flores Creek.	Sixes River.	Total.
	Specimens.	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
In lateral line:									
65 scales.....	3	3	2	6	.....	.....	.....	.....	14
66 scales.....	1	1	.....	3	.....	.....	.....	.....	5
67 scales.....	3	.....	.....	6	3	1	1	.....	14
68 scales.....	6	2	.....	7	1	1	2	.....	19
69 scales.....	.....	1	.....	5	2	1	4	1	14
70 scales.....	.....	4	1	3	1	2	1	1	13
71 scales.....	.....	1	1	.....	2	3	1	2	10
72 scales.....	6	.....	1	1	1	4	1	.....	14
73 scales.....	1	1	.....	.....	2	.....	2	.....	6
74 scales.....	.....	.....	.....	.....	.....	2	.....	.....	2
75 scales.....	2	1	.....	.....	1	2	.....	.....	6
76 scales.....	1	.....	.....	.....	.....	.....	.....	.....	1
Above lateral line:									
12 scales.....	1	.....	.....	.....	.....	1	.....	.....	2
13 scales.....	8	4	1	4	5	5	5	3	35
14 scales.....	13	5	4	14	4	7	7	1	55
15 scales.....	.....	4	.....	9	2	3	.....	.....	18
16 scales.....	1	1	.....	3	1	.....	.....	.....	6
17 scales.....	.....	.....	.....	1	.....	.....	.....	.....	1
Before dorsal:									
30 scales.....	2	5	1	.....	.....	.....	.....	.....	8
31 scales.....	1	1	.....	1	.....	4	1	.....	8
32 scales.....	1	5	1	4	.....	1	1	.....	13
33 scales.....	3	1	.....	4	4	4	5	2	23
34 scales.....	1	2	.....	5	1	2	1	.....	12
35 scales.....	6	.....	.....	4	5	3	2	2	22
36 scales.....	7	.....	2	3	2	.....	.....	.....	14
37 scales.....	.....	.....	.....	4	1	2	.....	.....	7
38 scales.....	2	.....	.....	5	.....	.....	2	.....	9
39 scales.....	.....	.....	.....	1	.....	.....	.....	.....	1
Dorsal rays:									
11 scales.....	.....	.....	.....	.....	.....	2	2	.....	4
12 scales.....	.....	.....	1	3	9	8	7	4	32
13 scales.....	6	11	3	15	3	6	3	.....	47
14 scales.....	12	3	1	12	1	.....	.....	.....	29
15 scales.....	5	.....	.....	1	.....	.....	.....	.....	6

SCALES AND DORSAL RAYS OF CATOSTOMUS MACROCHEILUS AND CATOSTOMUS OCCIDENTALIS—Continued.

Catostomus occidentalis.

	Stony Creek, Cal.	Cache Creek, Cal.	Putah Creek, Cal.	Russian River, Cal.	Total.
In lateral line:	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
62 scales				1	1
63 scales		1	2	1	4
64 scales	1	1	1	5	8
65 scales	4			2	6
66 scales	1	4	1	4	10
67 scales	1	4	1	7	13
68 scales	1	4	1	6	12
69 scales		3		6	9
70 scales	3	3	2		8
71 scales		1	1		2
72 scales	1	1	2	4	8
73 scales			1		1
74 scales	1			1	2
75 scales	1				1
Above lateral line:					
13 scales	4	1		4	9
14 scales	3	8	2	9	22
15 scales	5	4	6	10	25
16 scales	1	7	4	12	24
17 scales	1	2		1	4
Before dorsal:					
29 scales				3	3
30 scales	3	2	1	4	10
31 scales	2	3		4	9
32 scales	1	4	5	8	18
33 scales	1	4	1	4	10
34 scales	3	2	1	4	10
35 scales	1	4	1	4	10
36 scales	2	3	3	5	13
Dorsal rays:					
12 scales	7	15	6	17	45
13 scales	7	5	6	16	34
14 scales				3	3
15 scales				1	1

8. **Acrocheilus alutaceus** Agassiz & Pickering.

Not found in the streams south of the Columbia.

Willamette and tributaries.

9. **Lavinia exilicauda** Baird & Girard.

Occurs in Napa River, but has not been taken in the Russian River or in any streams to the northward.

10. **Mylopharodon conocephalus** (Baird & Girard).

This species is found in the Russian River, where it reaches its northern limit of distribution. It was not taken in Napa River.

The dorsal fin has 8 rays; the anal 8, rarely 9. There are from 71 to 81 scales in the lateral line.

Russian River and tributaries.

MEASUREMENTS OF MYLOPHARODON CONOCEPHALUS FROM THE RUSSIAN RIVER.

Length of body.....mm..	97	134	144	149	158	175	185	151	159	172
Length head.....	.27	.27	.26	.26	.26	.26	.26	.27	.27	.26
Depth body.....	.21	.24	.215	.21	.21	.23	.22	.225	.23	.22
Snout to dorsal.....	.56	.55	.56	.56	.55	.56	.57	.57	.57	.56
Snout to ventral.....	.52	.52	.53	.53	.52	.54	.525	.55	.54	.53
Depth caudal peduncle.....	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
Length caudal peduncle.....	.16	.17	.17	.17	.18	.19	.18	.165	.18	.19
Length snout.....	.09	.09	.085	.09	.09	.09	.085	.09	.09	.09
Length maxillary.....	.085	.095	.085	.09	.09	.09	.09	.09	.09	.09
Diameter eye.....	.05	.05	.05	.05	.045	.045	.045	.045	.05	.05
Interorbital width.....	.10	.10	.10	.10	.10	.10	.10	.10	.10	.095
Depth head.....	.15	.16	.155	.15	.15	.15	.16	.16	.155	.15
Length base of dorsal.....	.13	.12	.12	.12	.12	.12	.115	.115	.115	.125
Height dorsal.....	.20	.185	.18	.195	.19	.19	.185	.19	.20	.18
Length base of anal.....	.11	.10	.11	.10	.10	.10	.105	.10	.10	.10
Height anal.....	.17	.155	.15	.16	.16	.155	.16	.16	.16	.15
Length pectoral.....	.18	.17	.165	.18	.175	.17	.175	.175	.17	.17
Length ventral.....	.17	.155	.15	.16	.15	.15	.16	.16	.15	.15
Length caudal.....	.28	.26	.25	.275	.255	.25	.255	.27	.26	.25
Dorsal rays.....	8	8	9	8	8	9	8	8	8	8
Anal rays.....	8	8	8	8	8	8	8	8	8	8
Scales lateral line.....	79	76	78	75	76	81	76	74	79	79
Scales above lateral line.....	17	19	19	19	19	19	19	19	18	18

11. **Mylocheilus lateralis** Agassiz & Pickering.

This is the *Mylocheilus caurinus* of recent authors and is not to be confused with *Leuciscus caurinus* Richardson.

The species does not inhabit the coastwise streams south of the Columbia River.

Willamette basin.

12. **Ptychocheilus grandis** (Ayres).

No difference has been observed between specimens of this species from the Russian River and from the Sacramento.

Russian and Napa rivers.

SCALES AND DORSAL RAYS OF PTYCHOCHEILUS GRANDIS.

	Specimens examined.	Dorsal rays.	Scales above lateral line.		Specimens examined.	Dorsal rays.	Scales above lateral line.
Putah Creek (Sacramento).....	3	8	13	Dry Creek near Healdsburg (Russian River).....	22	8	.....
	9	8	14		2	9	.....
	5	8	15		9	.....	13
Cache Creek (Sacramento).....	3	8	13		14	.....	14
	4	8	14		1	.....	15
Cottonwood Creek (Sacramento)....	5	8	14				
	1	8	15				
Warm Springs Creek (Russian River).....	5	8	14				
	1	8	15				

13. **Ptychocheilus oregonensis** (Richardson).

Willamette and tributaries.

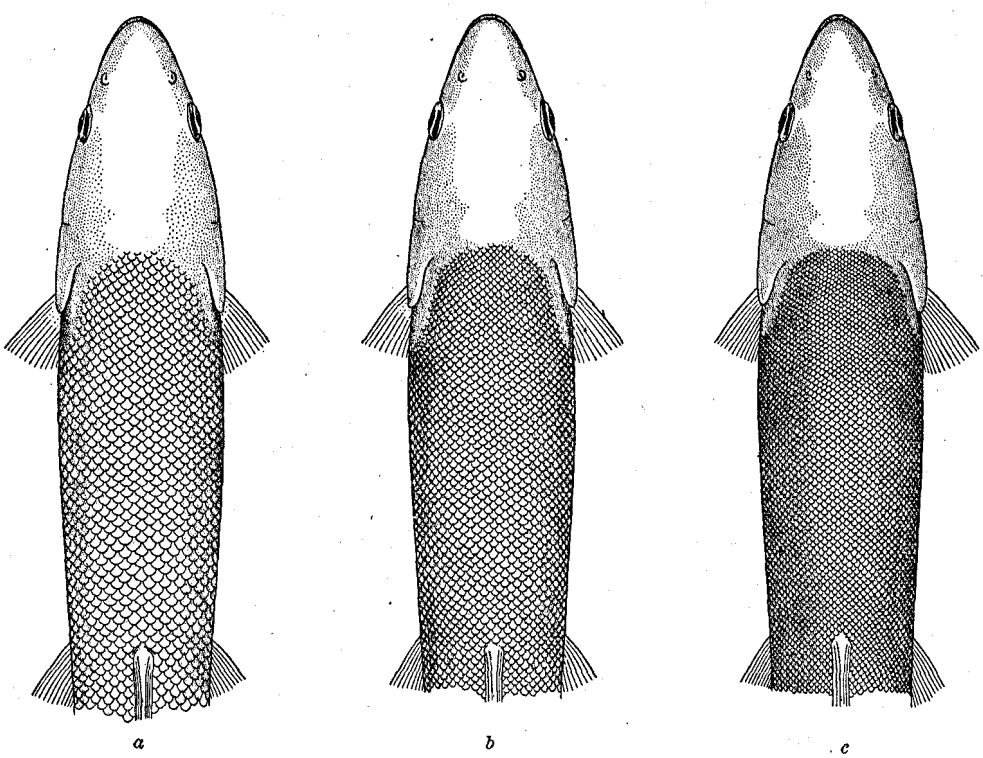
14. **Ptychocheilus umpquæ,** new species.

Ptychocheilus oregonensis is represented in the Siuslaw and Umpqua rivers by a well marked form here described as new. It differs from *P. oregonensis* in having smaller scales, especially in the region posterior to the occiput, where they are minute and densely crowded.

Head exclusive of opercular flap, 3.8 in length to base of caudal; depth 5.2; snout 3 in head; eye 6; interorbital space 4; maxillary 2.75; dorsal 9; anal 8; scales in lateral line 75; in series above lateral line 21; between occiput and dorsal 65.

The form of the body is like that common to *P. oregonensis* and *P. grandis*, long and rather slender, the depth about one-fourth greater than the width; depth of caudal peduncle equal to length of

maxillary. Head conical, the snout rounded in outline when viewed from above, pointed when seen from the side. Jaws about equal, the lower included by the upper; maxillary projecting to a vertical through anterior edge of pupil; interorbital space low, slightly concave; nostrils located anterior to eye a distance equal to diameter of pupil; membranous flap of opercle equal in width to pupil. Gill-rakers on first arch minute, only 5 or 6 developed near angle of arch. Teeth 2, 5–4, 2, without grinding surface, the upper teeth (those nearest angle of arch) close set, the space between them not greater than half the diameter of first tooth, the two lower ones usually more widely spaced; the second tooth from below largest and longest; upper teeth hooked, the hooks growing gradually less pronounced on the second and third, scarcely discernible on the lowest. Alimentary canal with 2 folds, its length about equal to distance between snout and base of caudal. Posterior portion of air bladder 1.5 times as long as the anterior part. Peritoneum silvery, stippled with black. Vertebræ 45.



a *b* *c*

FIG. 2.—(*a*) Ptychocheilus grandis, (*b*) P. oregonensis, and (*c*) P. umpquæ, showing characteristic difference in size of scales which distinguishes the species.

Scales very small on median portion of back anterior to the dorsal, and on breast and throat; minute and densely crowded anteriorly.

Base of dorsal lying entirely between verticals through anterior edge of ventral and anal; posterior edge of fin straight, the rays graduated in length so that when depressed the first and last extend an equal distance posteriorly, reaching a vertical through middle of base of anal. Anal slightly rounded posteriorly, the anterior rays reaching a little beyond the posterior ones when depressed. Ventrals rounded, reaching midway between anus and base of anal fin. Pectorals rounded, their tips reaching two-thirds the distance between axil and base of ventral.

Color silvery, often more or less brassy; the upper parts dusky.

Type no. 61577, U. S. National Museum, Callapooia Creek, Oakland, Oreg., length, 238 mm. Cotype no. 9862, Stanford University.

This species is found in the Umpqua and its tributaries. It also occurs in the Siuslaw River and in the small lakes near the coast between the latter river and the Umpqua. No characters are evident which will separate the Umpqua basin specimens from those of the Siuslaw.

The following table shows in some detail the chief differences between *P. oregonensis* and *P. umpquæ* as demonstrated by an examination of 98 specimens.

DIFFERENCES IN SIZE OF SCALES OF PTYCHOCHEILUS OREGONENSIS AND PTYCHOCHEILUS UMPQUÆ.

Ptychocheilus oregonensis.

	Willamette River.	Columbia River, Astoria.	Skookumchuck River.	Payette River.	Silvies River, Oreg.	Total.
In lateral line:	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
67 scales			1	1		2
68 scales	2	1	1		2	6
69 scales	4		1		4	9
70 scales	2			2	3	7
71 scales	3			2	1	6
72 scales	1	1	1			3
73 scales	1	1			1	3
74 scales			1		3	4
75 scales	1		1	1	1	4
Before dorsal:						
46 scales			1	1	1	3
47 scales	1			3	1	5
48 scales	2		3		1	6
49 scales	2		1		2	5
50 scales	2				4	6
51 scales		1			2	3
52 scales					1	1
53 scales	3	2	1		2	8
54 scales	2			1	1	4
55 scales	1					1
56 scales	1			1		2
Above lateral line:						
16 scales	1	1	2	1		5
17 scales	7		1	1	3	12
18 scales	5	1	3	3	5	17
19 scales	1			1	5	7
20 scales		1			2	3

Ptychocheilus umpquæ.

	S. Umpqua River.	Callapooia Creek.	Siuslaw River.	Tsiltcoos River.	Total.
In lateral line:	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
73 scales			1		1
74 scales		1	2		3
75 scales		4			4
76 scales	1	2	1		4
77 scales	2	3	1		6
78 scales	3	1		1	5
79 scales	3		1	1	5
80 scales	4	2	2		8
81 scales	5	1		1	7
82 scales	3		1		4
83 scales	3		2		5
84 scales	1				1
85 scales	1				1
Before dorsal:					
55 scales			2		2
56 scales	2			1	3
58 scales	2		1		3
59 scales	4		1		5
60 scales	3	1		1	5
61 scales	3	1	2		6
62 scales	4	3	2	1	10
63 scales	2	3	1		6
64 scales		1			1
65 scales	3	1	1		5
66 scales		1			1
67 scales	2	3	1		6
68 scales	1				1
Above lateral line:					
19 scales			1		1
20 scales	3		3	1	7
21 scales	10	4	2	1	17
22 scales	13	7	4		24
23 scales		2	1	1	4
24 scales		1			1

MEASUREMENTS OF PTYCHOCHEILUS UMPQUÆ FROM CALLAPOOIA CREEK, OAKLAND, OREG.

Length of body.....mm..	192	198	176	176	177	175	203	192	192	188
Length head.....	.27	.275	.265	.28	.28	.265	.275	.275	.275	.275
Depth body.....	.20	.22	.21	.22	.21	.20	.215	.20	.21	.21
Snout to dorsal.....	.59	.585	.575	.59	.575	.575	.575	.57	.57	.58
Snout to ventral.....	.55	.56	.565	.57	.565	.55	.57	.55	.565	.55
Length of snout.....	.095	.095	.095	.10	.10	.09	.10	.10	.10	.10
Length maxillary.....	.11	.105	.11	.115	.115	.105	.115	.105	.11	.11
Diameter eye.....	.05	.045	.05	.05	.05	.045	.045	.05	.045	.05
Interorbital width.....	.075	.075	.07	.08	.075	.07	.07	.07	.075	.07
Height dorsal.....	.16	.17	.16	.17	.155	.155	.155	.....	.16	.17
Height anal.....	.15	.165	.15	.15	.145	.15	.145	.145	.145	.16
Length pectoral.....	.20	.20	.19	.165	.16	.175	.18	.19	.16	.195
Length ventral.....	.15	.15	.14	.135	.13	.135	.15	.15	.13	.15
Length caudal.....	.24	.245	.24	.23	.23	.24	.23	.23	.23	.24
Dorsal rays.....	9	9	9	9	9	9	9	9	9	9
Anal rays.....	8	8	8	8	8	8	8	8	8	8
Scales lateral line.....	75	76	80	75	75	77	78	76	75	77
Scales before dorsal.....	65	67	63	60	62	64	62	67	60	66
Scales above lateral line.....	21	22	23	21	23	22	22	21	21	22

15. Leuciscus caurinus Richardson.

The *Mylocheilus caurinus* of recent authors is the species described by Agassiz and Pickering as *Mylocheilus lateralis*[a], and should not be confused with *Leuciscus caurinus*[b] of Richardson.

A specimen of *Leuciscus caurinus* taken in the Willamette River near Corvallis is here described.

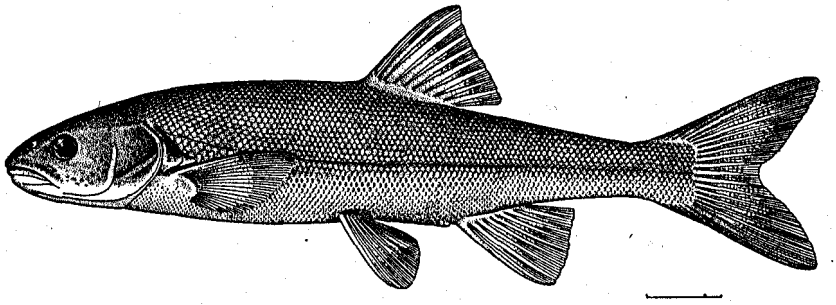


FIG. 3.—Leuciscus caurinus Richardson.

Head 4 in length to base of caudal; depth 4.6; depth caudal peduncle 3 in head; length snout 2.9; maxillary 3.1; diameter eye 5.6; width interorbital space 2.9; dorsal rays 10; anal 9; scales in lateral line 86.

Body elongate, the width contained about 1.5 times in the depth; head long, the snout prominent; mouth large, end of maxillary reaching a vertical passing midway between anterior edge of orbit and pupil; upper lip without foramen; lower jaw included, its edge being posterior to tip of snout, a distance equal to three-fourths the diameter of pupil; maxillary without barbel. Distance between nostril and eye equal to half the diameter of eye; eye located nearer tip of snout than edge of opercle, a distance equal to its diameter. Gillrakers on first arch 9 or 10, short, pointed. Pharyngeal teeth in two series, 2+4 on the right arch, 1+5 on the left; the lesser teeth slender and round, their tips curved away from the others; greater teeth considerably flattened, hooked at their tips, with a narrow though distinct grinding surface which is more pronounced on the middle teeth than on the outer ones. Peritoneum dusky. Exposed edges of scales semicircular; scales of breast and throat minute, those on back anterior to dorsal fin small, becoming minute and closely crowded on the nape; scales in series above lateral line 21, between dorsal and occiput about 50; lateral line complete, decurved in the region above pectoral fin; origin of dorsal fin midway between anterior edge of pupil and base of caudal, second fully developed ray longest, the last ray reaching slightly beyond it when the fin is depressed; free edge of fin slightly concave; origin of anal close behind base of last dorsal ray; first and last rays reaching

[a] Agassiz, L., American Journal Science & Arts, vol. XIX. 1855, p. 231.
[b] Richardson, John, Fauna Boreali-Americana, vol. III, 1836, p. 304.

an equal distance posteriorly when fin is depressed; posterior edge of fin slightly concave; caudal deeply notched; origin of ventrals about a pupil's diameter in advance of dorsal; tips of fins just reaching anal opening; pectorals obtusely pointed. Color plain; dusky above, light below. Length about 290 mm.

Willamette River.

16. Leuciscus bicolor (Girard).

One specimen was taken in the Klamath River near the mouth.

17. Leuciscus balteatus (Richardson).

Among the coastwise streams of Oregon this species has been taken in the Umpqua, Siuslaw, Takenitch, and Tsiltcoos rivers. It probably does not occur south of the Umpqua, nor in any of the streams between the Siuslaw and the Columbia.

Specimens of this form from the Siuslaw River were lately described by Dr. Evermann and Dr. Meek[a] under the name *Leuciscus siuslawi*. They were said to differ from *L. balteatus* in having smaller anal and dorsal fins, a more slender body, smaller and more slender head, longer and more pointed snout, and fewer anal rays. In a large series of examples from the Siuslaw, Tsiltcoos, Umpqua, Willamette, and Columbia rivers, these distinctions disappear entirely, and the *Leuciscus* from the isolated coastal streams of Oregon does not appear to differ in any way from that of the Columbia. It is to be noted, however, that no western Oregon specimens, whether from the Columbia or neighboring basins have been seen in which the anal fin rays numbered more than 16. It will be of interest in this connection to compare the following table of counts of fin rays with a similar one published by Dr. Gilbert and Dr. Evermann.[b]

Willamette, Siuslaw, Tsiltcoos, Takenitch, and Umpqua basins.

MEASUREMENTS OF LEUCISCUS BALTEATUS FROM FOUR RIVER BASINS.

	Umpqua River, Callapooia Creek, Oakland.					Takenitch Creek, near mouth.				
Length body.....mm..	100	97	88	101	76	92	94	93	96	96
Depth body.....	.28	.26	.25	.265	.25	.29	.27	.28	.25	.25
Length head.....	.255	.24	.26	.25	.26	.25	.25	.255	.25	.245
Length snout.....	.08	.08	.08	.085	.08	.08	.085	.08	.085	.08
Height dorsal.....	.175	.18	.18	.19	.20	.18	.185	.18	.19	.175
Height anal.....	.18	.17	.185	.20	.20	.19	.19	.195	.17	.18

	Siuslaw River, Lake Creek.					Columbia River, Umatilla River, Pendleton.				
Length body.....mm..	92	110	84	84	89	92	78	78	77	70
Depth body.....	.25	.26	.27	.26	.26	.275	.26	.265	.27	.28
Length head.....	.255	.25	.25	.25	.245	.25	.25	.23	.25	.25
Length snout.....	.08	.08	.08	.08	.08	.08	.08	.075	.08	.075
Height dorsal.....	.18	.18	.20	.17	.175	.18	.19	.17	.20	.20
Height anal.....	.18	.175	.19	.17	.175	.18	.18	.18	.18	.19

[a] *Leuciscus siuslawi* Evermann & Meek, Bulletin U. S. Fish Commission, vol. XVII, 1897, p. 72.

[b] Gilbert, C. H., & Evermann, B. W., Bulletin U. S. Fish Commission, vol. XIV, 1894, p. 196.

ANAL FIN RAYS OF LEUCISCUS BALTEATUS FROM STREAMS OF WESTERN OREGON.

Locality.	11 rays.	12 rays.	13 rays.	14 rays.	15 rays.	16 rays.
Umpqua basin:						
South Umpqua River, Roseburg				24	16	2
South Umpqua River, Canyonville			25	28	12	
North Umpqua River, Winchester			2	4		
Elk Creek, Drain		3	48	25		
Cow Creek, Douglas County		34	36	3		
Callapooia Creek, Oakland			8	18	10	4
Deer Creek, near Roseburg			9	8		
Takenitch Creek		1	6	1		
Tsiltcoos River		6	12	2		
Junction Lake and Deadwood Creek		8				
Willamette basin (Columbia):						
Willamette River, Corvallis			5	10	6	2
Willamette River, Eugene	2		8	7	4	2
Long Tom Creek		1	7	5		
The Lakes, Albany		1	4	7		
Coast Fork, Cottage Grove		1	6	4		
Row River, near Cottage Grove		2	3	2	2	

18. Rutilus symmetricus (Baird & Girard).

A minnow of this type occurs in the Navarro, Gualala, Russian, and Napa rivers. Specimens from the Russian and Napa rivers are alike in all respects, and they in turn agree closely with representatives from the streams tributary to San Francisco Bay. In a majority of cases the dorsal fin has 9 rays and the anal 8. The snout is rather pointed, the caudal peduncle slender and the fins long, the whole body being trim and well proportioned. Examples from the Navarro and Gualala rivers are distinguished from these by having generally 8 rays in the dorsal fin, a more robust body with a deeper caudal peduncle, and a more rounded and shortened snout. The fins are also shorter and somewhat less acute. While examples from the Navarro and Gualala rivers thus agree in differing from specimens taken in the neighboring basins, individuals from each of these streams bear a distinctive local stamp by which they may be recognized without difficulty, the Navarro examples having mostly one more ray in the anal fin and larger scales in the series above the lateral line. It has been shown that individuals from the partly isolated rivers tributary to San Francisco Bay[a] are alike in all points and that these are scarcely to be distinguished in any particular from individuals from the Napa and Russian rivers. Hence it appears that there are 3 well-differentiated forms of *Rutilus* in this somewhat restricted region, each of which occupies a distinct hydrographic basin or series of contiguous basins. When, however, the field is broadened and specimens from distant parts of the Sacramento and San Joaquin basins are brought together, similar variations of a local nature are found to occur, but whether any geographical significance may be attached to these can not be known until more extensive observations have been made. One of these local forms (*Rutilus symmetricus*) from Drew Creek, a tributary of Goose Lake, appears almost exactly to parallel the Gualala form, while another from Mariposa Creek, a branch of the San Joaquin, seems to be somewhat intermediate between the Russian River and Gualala varieties.

The males of *R. symmetricus* when in nuptial dress have the upper part of the head and body covered with tubercles. There is a patch of bright orange red at angle of mouth, on edge of preopercle, upper edge of opercle, and on bases of the paired fins. The sides of head and lower parts of body have a translucent brassy color.

The species does not occur to the northward of the Navarro River.

Navarro, Gualala, Russian, and Napa rivers.

[a] *Rutilus symmetricus*, Snyder, Appendix to Report Commissioner of Fisheries for 1904, p. 332.

DORSAL AND ANAL RAYS OF RUTILUS SYMMETRICUS FROM VARIOUS BASINS.

Locality.	8 dorsal rays.	9 dorsal rays.	6 anal rays.	7 anal rays.	8 anal rays.	9 anal rays.
	Specimens.	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
Navarro River	72			3	68	1
Gualala River	80		1	70	9	
Russian River	22	49		5	66	
Napa River		97			95	2
Putah Creek		14			11	3
Berryessa Creek	6	12			18	
Pope Creek	19	5		1	23	
Kelsey Creek	12	10		3	19	
Mariposa Creek	18			18		
Tule River	2	14		1	15	
Fresno River	6	4		3	7	
Merced River	16	1		11	6	
Arroyo Hondo Creek		26		1	25	
Coyote Creek	1	23			24	
San Francisquito Creek	1	32			32	1

MEASUREMENTS OF RUTILUS SYMMETRICUS.

Russian River near Healdsburg, Cal.

Length of body.....mm	62	72	73	75	75	77	78	79	79	86
Length head	.27	.27	.26	.28	.28	.26	.27	.265	.26	.27
Depth body	.27	.26	.25	.26	.28	.25	.26	.265	.27	.25
Snout to dorsal	.56	.58	.57	.57	.58	.58	.58	.56	.57	.57
Snout to ventral	.51	.52	.53	.52	.525	.52	.51	.51	.52	.52
Depth caudal peduncle	.10	.11	.095	.11	.10	.10	.105	.095	.10	.105
Length caudal peduncle	.205	.19	.195	.20	.20	.18	.18	.17	.19	.18
Length snout	.08	.08	.08	.09	.09	.08	.09	.08	.08	.075
Length maxillary	.08	.08	.08	.08	.09	.08	.08	.08	.08	.08
Diameter eye	.06	.06	.06	.06	.06	.06	.06	.06	.06	.055
Interorbital width	.09	.09	.09	.09	.10	.09	.10	.09	.09	.09
Depth head	.19	.19	.175	.19	.19	.18	.19	.18	.1	.18
Length base of dorsal	.15	.14	.135	.13	.145	.16	.14	.135	.135	.14
Height dorsal	.20	.19	.20	.21	.20	.19	.185	.19	.20	.19
Length base of anal	.11	.11	.095	.10	.11	.11	.11	.11	.11	.11
Height anal	.19	.17	.18	.20	.18	.165	.18	.16	.16	.17
Length pectoral	.20	.19	.20	.25	.19	.18	.18	.19	.19	.20
Length ventral	.15	.14	.15	.17	.14	.14	.14	.14	.14	.15
Length caudal	.27	.27	.28	.27	.28	.27	.27	.25	.27	.26
Dorsal rays	10	9	9	9	9	9	9	9	9	9
Anal rays	8	8	8	8	8	8	8	8	8	8
Scales in lateral line	59	59	53	55	58	51	51	54	55	57
Scales above lateral line	12	11	12	12	13	12	13	12	13	12

Napa River, Calistoga, Cal.

Length of body.....mm	60	61	73	74	76	77	78	78	86	94
Length head	.27	.29	.26	.26	.26	.26	.26	.255	.28	.25
Depth body	.28	.26	.26	.27	.28	.28	.29	.26	.28	.26
Snout to dorsal	.58	.575	.57	.585	.56	.56	.58	.57	.58	.57
Snout to ventral	.52	.53	.51	.52	.50	.52	.52	.52	.53	.52
Depth caudal peduncle	.11	.10	.10	.10	.11	.10	.10	.10	.095	.095
Length caudal peduncle	.19	.175	.18	.17	.17	.17	.175	.175	.17	.175
Length snout	.08	.08	.09	.08	.08	.08	.08	.085	.09	.08
Length maxillary	.08	.08	.08	.08	.08	.08	.08	.075	.08	.07
Diameter eye	.07	.07	.065	.06	.06	.06	.065	.06	.06	.055
Interorbital width	.09	.09	.08	.08	.09	.09	.09	.085	.09	.08
Depth head	.19	.19	.17	.18	.19	.18	.18	.18	.20	.18
Length base of dorsal	.15	.145	.135	.14	.15	.14	.14	.14	.14	.14
Height dorsal	.20	.21	.19	.20	.19	.19	.20	.20	.20	.18
Length base of anal	.11	.11	.11	.11	.12	.11	.11	.115	.10	.11
Height anal	.19	.19	.16	.18	.17	.17	.18	.16	.17	.16
Length pectoral	.19	.21	.20	.19	.17	.19	.19	.17	.17	.18
Length ventral	.14	.15	.14	.14	.14	.14	.15	.13	.15	.14
Length caudal	.28	.28	.25	.27	.27	.24	.29	.26	.28	.25
Dorsal rays	9	9	9	9	9	9	9	9	9	9
Anal rays	8	8	8	8	8	8	8	8	8	8
Scales in lateral line	56	57	56	56	56	59	53	55	55	56
Scales above lateral line	13	13	14	14	13	14	13	13	13	13

MEASUREMENTS OF RUTILUS SYMMETRICUS—Continued.

Wheatfield Fork, Gualala River, Cal.

Length of body.....mm..	44	61	64	65	70	71	73	74	76	81
Length head	.29	.26	.27	.275	.27	.27	.28	.27	.27	.27
Depth body	.25	.235	.24	.23	.24	.25	.23	.25	.25	.25
Snout to dorsal	.57	.56	.57	.57	.57	.56	.56	.57	.58	.55
Snout to ventral	.52	.50	.52	.53	.51	.52	.52	.52	.52	.52
Depth caudal peduncle	.115	.115	.105	.12	.12	.12	.115	.105	.11	.11
Length caudal peduncle	.20	.19	.19	.20	.20	.19	.19	.17	.18	.20
Length snout	.09	.085	.09	.09	.085	.08	.09	.09	.09	.085
Length maxillary	.09	.08	.08	.08	.08	.075	.08	.085	.08	.075
Diameter eye	.06	.055	.06	.06	.06	.055	.055	.055	.055	.05
Interorbital width	.08	.09	.09	.09	.085	.09	.09	.09	.095	.095
Depth head	.19	.18	.18	.19	.185	.175	.18	.18	.18	.18
Length base of dorsal	.125	.12	.115	.115	.12	.115	.12	.125	.12	.12
Height dorsal	.20	.19	.19	.19	.19	.17	.18	.....	.17	.17
Length base of anal	.09	.09	.08	.09	.085	.085	.08	.10	.09	.085
Height anal	.17	.17	.17	.17	.165	.16	.15	.15	.15	.155
Length pectoral	.19	.215	.22	.22	.22	.20	.22	.175	.18	.18
Length ventral	.14	.14	.15	.14	.15	.14	.14	.14	.14	.13
Length caudal	.25	.24	.24	.24	.23	.24	.215	.23	.22	.23
Dorsal rays	8	8	8	8	8	8	8	8	8	8
Anal rays	7	8	7	7	7	7	7	7	7	8
Scales in lateral line	54	59	55	55	57	55	57	59	56	59
Scales above lateral line	14	14	15	14	14	14	15	15	16	15

Navarro River near Philo, Cal.

Length of body.....mm..	59	65	67	72	73	73	76	77	80	80
Length head	.28	.28	.27	.27	.27	.26	.28	.27	.27	.27
Depth body	.26	.26	.27	.28	.27	.25	.27	.26	.25	.26
Snout to dorsal	.58	.59	.57	.57	.56	.57	.56	.58	.56	.58
Snout to ventral	.52	.53	.53	.55	.52	.51	.51	.51	.52	.52
Depth caudal peduncle	.11	.12	.11	.11	.12	.11	.11	.12	.12	.11
Length caudal peduncle	.20	.19	.19	.20	.20	.20	.21	.19	.18	.19
Length snout	.08	.09	.09	.09	.085	.08	.09	.085	.09	.09
Length maxillary	.08	.09	.085	.08	.08	.08	.08	.08	.08	.08
Diameter eye	.06	.06	.06	.06	.06	.055	.06	.06	.055	.055
Interorbital width	.09	.085	.09	.09	.09	.09	.09	.09	.09	.08
Depth head	.19	.19	.19	.20	.185	.18	.19	.18	.19	.18
Length base of dorsal	.11	.12	.12	.115	.13	.12	.115	.12	.13	.12
Height dorsal	.18	.185	.18	.18	.19	.18	.17	.19	.18	.13
Length base of anal	.08	.095	.11	.095	.09	.095	.09	.095	.10	.10
Height anal	.16	.16	.15	.16	.16	.16	.15	.18	.17	.145
Length pectoral	.17	.19	.17	.17	.22	.19	.18	.21	.20	.17
Length ventral	.12	.135	.13	.13	.14	.13	.125	.16	.15	.13
Length caudal	.22	.23	.23	.25	.24	.24	.23	.26	.24	.23
Dorsal rays	8	8	8	8	8	8	8	8	8	8
Anal rays	8	8	8	8	7	8	8	8	8	8
Scales in lateral line	56	52	51	56	56	57	53	58	52	59
Scales above lateral line	11	12	13	13	13	13	14	13	12	12

Mariposa Creek, Mariposa, Cal.

Length of body.....mm..	83	79	83	76	70
Length head	.27	.26	.27	.26	.26
Depth body	.25	.23	.24	.22	.24
Snout to dorsal	.58	.58	.57	.565	.55
Snout to ventral	.50	.53	.54	.53	.51
Depth caudal peduncle	.12	.11	.12	.11	.11
Length caudal peduncle	.22	.25	.26	.22	.23
Length snout	.09	.09	.095	.085	.08
Length maxillary	.09	.08	.095	.085	.08
Diameter eye	.055	.06	.055	.055	.06
Interorbital width	.09	.09	.095	.09	.09
Depth head	.20	.19	.19	.19	.18
Length base of dorsal	.13	.12	.125	.12	.125
Height dorsal	.17	.16	.17	.17	.18
Length base of anal	.10	.12	.09	.095	.10
Height anal	.17	.15	.16	.16	.17
Length pectoral	.20	.21	.20	.19	.22
Length ventral	.16	.16	.15	.14	.17
Length caudal	.25	.28	.25	.25	.26
Dorsal rays	8	8	8	8	8
Anal rays	7	7	7	7	7
Scales in lateral line	54	58	59	56	52
Scales above lateral line	12	14	12	13	14

19. Rutilus bicolor (Girard).

Several specimens from the Klamath River, near its mouth, were lighter in color but differed in no other way from examples taken in the Shasta River, near Yreka and Montague.

Klamath River.

20. Rhinichthys dulcis (Girard).

Apparently rare. One specimen was taken in the Willamette at Eugene and another near Corvallis.

21. Rhinichthys evermanni, new species.

This species is characterized by a narrow head, long snout, slender caudal peduncle, elongate fins, the anal being somewhat falcate, and by having 9 rays in the dorsal. From *Rhinichthys dulcis* (Girard) it may be distinguished by its slender caudal peduncle, elongate fins, more prominent snout, larger scales, and more numerous dorsal rays.

Head 3.8 in length to base of caudal fin; depth 4.25; eye 5.7 in head; snout 2.1; interorbital space 4; depth of caudal peduncle 3.25; dorsal rays 9; anal 7; scales in lateral line 61; above lateral line 12; between occiput and origin of dorsal 34.

Deepest part of body at origin of ventrals, the width about 1.5 the depth. Head long, the snout obtusely pointed; eye located slightly posterior to middle of head; interorbital space convex. Mouth inferior, the snout projecting a distance equal to diameter of eye; lips very thick, the upper with a broad

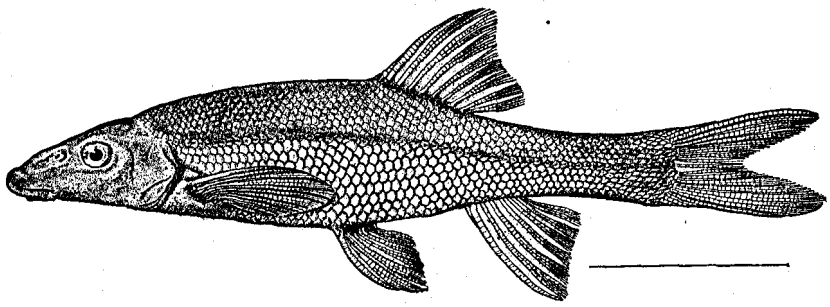


FIG. 4.—Rhinichthys evermanni, new species. Type.

phrenum; maxillary with a barbel attached to its posterior edge, equal in length to diameter of pupil, the barbel inconspicuous on account of the broad, rather pendulous lip; width of mouth equal to width of space between the eyes. Gillrakers minute, 4 or 5 on first arch. Teeth 2-4, 4-2, long and slender, without grinding surface; the two posterior or upper teeth hooked, the others rather blunt. Peritoneum silvery; intestinal canal short, its length about equal to distance between snout and base of caudal.

Lateral line slightly decurved near its origin, nearly straight throughout the remainder of its length.

Origin of dorsal midway between pupil and base of caudal; free edge of fin slightly concave; when depressed the tips of first dorsal rays fall a little short of the last. Origin of anal below last ray of dorsal; when depressed the first rays fall considerably beyond tips of the last ones; in some individuals the first rays are more elongate, the free edge of the fin being deeply concave. Ventrals reaching base of third anal ray. Dorsal and ventrals located a little farther posteriorly than is usual in *R. dulcis*. Pectorals and ventrals sharply rounded. Caudal deeply notched, the lobes pointed.

Color in alcohol brownish, very finely stippled with black especially on edges of scales; an indefinite dark band extending from near tip of snout to eye; a similar indistinct band along side of body. Young examples have a conspicuous dark band about as wide as pupil extending forward from eye, and a somewhat broader, less prominent band running backward from opercle, broadening on posterior end of caudal peduncle, contracting on base of caudal, where it ends in a small, distinct spot.

Type no. 61572, U. S. National Museum, from South Umpqua River, Roseburg, Oreg. Length 107 mm. Collected by Frank Cramer and K. Otaki. Cotype no. 9864, Stanford University. Specimens were taken only in the type locality.

In his field notes Mr. Cramer mentions that the species was taken in shallow, rapid water, the river being high and muddy at the time. Other collectors have not succeeded in finding it.

Of 107 specimens of *R. dulcis* from 13 localities in the Columbia basin, all have 8 rays in the dorsal, except two which have 9. The number of scales in the lateral line varies from about 65 to 75. Measurements of *R. evermanni* and also of *R. dulcis* are appended.

Named for Dr. Barton Warren Evermann.

No form closely related to this species is known.

MEASUREMENTS OF RHINICHTHYS EVERMANNI FROM SOUTH UMPQUA RIVER, ROSEBURG, OREG.

Length of body.....mm..	39	39	41	60	64	65	78	86
Length head	.29	.29	.29	.28	.27	.27	.26	.26
Depth body	.20	.20	.18	.22	.23	.23	.23	.22
Depth caudal peduncle	.08	.09	.09	.085	.09	.08	.08	.08
Length caudal peduncle	.22	.20	.20	.20	.20	.20	.20	.20
Length snout	.12	.12	.12	.12	.12	.12	.12	.115
Length maxillary	.085	.085	.085	.08	.085	.08	.08	.08
Diameter eye	.07	.075	.06	.06	.06	.05	.05	.05
Interorbital width	.07	.075	.06	.06	.06	.055	.06	.06
Depth head	.16	.15	.15	.15	.15	.15	.15	.15
Snout to dorsal	.56	.55	.58	.57	.58	.57	.55	.58
Snout to ventral	.51	.51	.52	.52	.52	.51	.51	.52
Length base of dorsal	.12	.14	.15	.15	.15	.16	.15	.14
Length base of anal	.08	.11	.10	.10	.11	.12	.11	.095
Height dorsal	.22	.22	.21	.22	.21	.21	.22	.19
Height anal	.21	.21	.20	.21	.20	.21	.20	.21
Length pectoral	.21	.24	.22	.23	.22	.22	.22	.21
Length ventral	.18	.17	.18	.19	.18	.18	.17	.17
Length caudal	.25	.25	.25	.28	.26	.26	.27	.25
Dorsal rays	9	9	9	9	9	9	9	9
Anal rays	7	7	7	7	7	7	7	7
Scales lateral line	57	58	58	59	58	58	59	59
Scales above lateral line	13	13	13	14	13	13	13	14

MEASUREMENTS OF RHINICHTHYS DULCIS FROM ROSS FORK, POCATELLO, IDAHO.

Length of body.....mm..	85	89	90	63	60
Length head	.25	.26	.25	.25	.25
Snout to dorsal	.53	.54	.54	.55	.53
Snout to ventral	.48	.48	.50	.51	.48
Depth caudal peduncle	.12	.10	.12	.12	.12
Length snout	.11	.11	.11	.10	.10
Height anal	.165	.17	.15	.16	.17
Length pectoral	.19	.20	.20	.19	.21

22. Agosia nubila (Girard).

Examples of this species from the Yaquina, Siuslaw, and Coquille rivers appear to agree in having the barbels very small or frequently absent from one or both sides, while those from the Umpqua and Willamette have them always present and well developed. In large males the pectoral fins are often very long, while small tubercles are present on the head and upper parts of body.

The species was not found in the streams south of the Coquille.

Willamette, Nestucca, Yaquina, Alsea, Siuslaw, Umpqua, Coos, and Coquille rivers.

SCALE COUNTS IN AGOSIA NUBILA.

Scales in lateral series.	Willamette River, Corvallis.	Clear Creek, Oregon City.	Coast Fork, Cottage Grove.	Cow Creek, Douglas County.	Deer Creek, Roseburg.	Nestucca River.	Little Elk.	Lake Creek.	Coquille River.
	Specimens.	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
49		2	1						
50	1	2	3						
51		3	5						
52			5	2					
53	1		3	2	3				1
54	1		1	5	4				1
55	1			4		1			5
56	1			4	5				6
57				6		2			4
58				6	2	2	2		5
59				4	2	2	5		6
60				2	1	1	3		2
61				6	1		4		3
62				7	1	1	6	2	2
63				2			5		1
64				1		1	1	1	3
65				1		1	3	1	
67							1		
68							2		
69							1		
70							1		

23. Agosia klamathensis Evermann & Meek.

The above name is here retained for the *Agosia* of the Klamath basin, although this form is scarcely to be distinguished from the *Agosia nubila carringtoni* [a] of the upper Columbia.

Klamath River.

SCALE COUNTS IN AGOSIA KLAMATHENSIS.

Scales in lateral line.	Klamath River near mouth.	Shasta River near Montague.	Shasta River near Yreka.	Pickayune Lake, Trinity River.	Lost River near Klamath Falls.
	Specimens.	*Specimens.*	*Specimens.*	*Specimens.*	*Specimens.*
60		1	2		
61		1			
62		1	2		
63			2		
64			3	1	
65		2		2	
66		2	2	1	
67		3	3	1	
68		5	3	3	1
69		2	2	2	3
70		2	1	2	4
71		1	1		3
72				3	1
73		1		2	3
74		2			8
75		2		1	9
76	1	1			5
77	1			1	2
78	2				4
79	1				4
80	2				4
81	1				1

24. Agosia falcata Eigenmann & Eigenmann.

Specimens of this species were collected in the Willamette basin. None was found in the coastwise streams of Oregon.

[a] Gilbert & Evermann, Investigations Columbia River Basin, Bulletin U. S. Fish Commission, vol. XIV, 1894, p. 191–193. Evermann & Meek, Salmon Investigations Columbia River Basin in 1896, ibid., vol. XVII, 1897, p. 74. Gilbert, Fishes of the Klamath Basin, ibid., vol. XVII, 1897, p. 9. Snyder, Relationships of Fish Fauna of Lakes of Southeastern Oregon, Bulletin Bureau of Fisheries, vol. XXVII, 1907, p. 98.

25. Hybopsis crameri, new species.

This species, which is apparently very different from any other in the genus, is distinguished by having the teeth in 2 rows, the grinding surface being at the same time well developed, and in possessing a markedly deep and compressed body with a relatively slender caudal peduncle. It is the only species[a] known to occur west of the Rocky Mountains. It has been found in the Willamette and Umpqua rivers.

Head 4 in length, depth 3.4, depth of caudal peduncle 2.5 in head, dorsal 8, anal 7, scales in lateral line 37, above lateral line 7, between occiput and dorsal 16.

Body notably deep and compressed, the caudal peduncle slender; width of body contained 2.5 times in the depth. Dorsal contour evenly curved and gradually rising from occiput to origin of dorsal, from which point it rapidly falls along base of fin, then curves more evenly and gently to base of caudal; profile concave over eye, the snout blunt; ventral outline evenly rounded from throat to end of anal base. Eye round, located in anterior half of head; interorbital space convex, its width contained 2.5 times in head; mouth oblique; jaws equal; premaxillary protractile, its length equal to diameter of orbit, reaching posteriorly to or slightly beyond edge of orbit; a minute barbel on the lower posterior edge. Pseudobranchiæ present; gillrakers very short and blunt, some of them mere knobs, 5 on

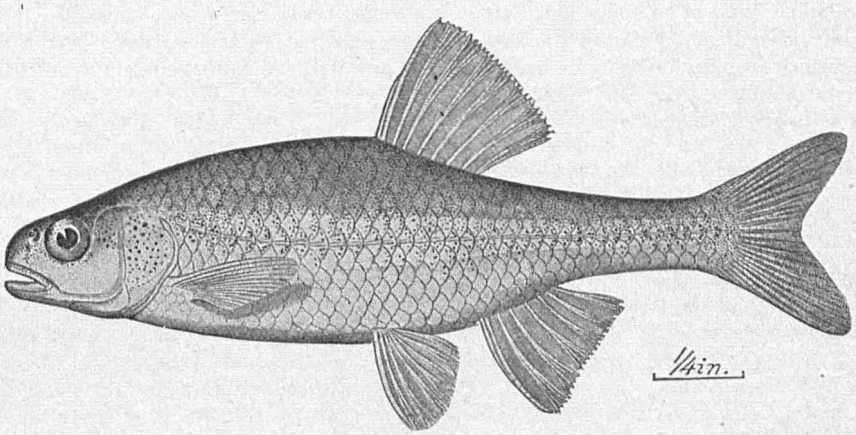


FIG. 5.—Hybopsis crameri, new species. Type.

first arch. Teeth rather slender, in 2 rows; 4 in the major row, slightly hooked and with a narrow grinding surface; 1 in the minor row. Alimentary canal short, coiled like the letter S. Peritoneum silvery, sparsely stippled with black in the dorsal region.

Scales large and regular. Lateral line complete, decurved on 3 scales near its origin, then running nearly straight alongside of body to base of caudal.

Origin of dorsal fin midway between anterior edge of orbit and base of caudal; longest ray contained about 4.25 in the length. Origin of anal below base of last dorsal ray; height of fin contained

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[a] Günther described a species of *Hybopsis* (*Ceratichthys cumingii* Günther, Catalogue fishes of British Museum, vol. VII, p. 177), the types of which are said to be from California. Besides minor differences it is unlike *H. crameri* in having 10 dorsal and 9 anal rays, finer scales, and deeper body. The following description of Dr. Günther's types was made by Mr. Edwin Chapin Starks while studying in the British Museum:

2 specimens, 2.75 and 2.5 in. long.

Head 4–4.1 in length; depth 4.75; depth of caudal peduncle 2.5 in head; dorsal rays 10; anal 10; scales in lateral line 44 (tubes 42); above lateral line 6.5; between occiput and dorsal 20–22.

Body rather elongate, the caudal peduncle comparatively deep. Posterior edge of eye in middle of head; width of interorbital space contained 3 times in head; mouth oblique; jaws equal; premaxillary protractile, its length a little greater than diameter of orbit, reaching posteriorly to or slightly beyond edge of orbit.

Scales small; lateral line complete, decurved on 4 or 5 scales near its origin, then wavy or irregular along side of body to base of caudal.

Origin of dorsal fin midway between anterior edge of orbit and base of caudal; the longest ray contained about 5.33 times in the length. Origin of anal a little behind base of last dorsal ray; height of fin 6 in the length. Pectorals a little longer than ventrals, 5 in the length. Caudal deeply forked, 4.25 in the length.

A fairly conspicuous dark band extending along the side posteriorly to base of caudal; upper parts of body uniform light dusky; a narrow, median dusky band extending from occiput to dorsal fin.

5.3 in the length. Ventrals inserted directly below or slightly anterior to origin of dorsal, their tips when depressed extending to base of second anal ray. Pectorals a little longer than ventrals. 4.5 in the length. Caudal deeply forked, 4 in the length.

According to Mr. Cramer's notes the color in life is pale olive overlaid with silver; a fairly conspicuous silver band extending along the side to base of caudal; upper parts of body speckled with black, the specks grouped here and there in clusters; scales on dorsal half of body narrowly edged with dusky; top of head dark, a narrow, median dusky band extending from occiput to dorsal fin. In spirits the color changes to light brown, the silver partly disappears, and an inconspicuous dusky band is seen along the side, most evident posteriorly.

This description, except the life color, is of the type, no. 61574, U. S. National Museum, a specimen 65 mm. long from the Willamette River at Oregon City, Oreg., Messrs. Frank Cramer and K. Otaki, collectors. Cotype no. 9863, Stanford University. Named for its discoverer, Mr. Frank Cramer.

The barbel is sometimes absent from one or both sides. Among 35 specimens from "The Lakes," near Albany, Oreg., 3 are without barbels. There is also some individual variation in the color, the small spots on the sides sometimes forming in longitudinal lines. Besides the specks which are massed together to form rather distinct spots there are isolated ones of large size occurring most frequently below the lateral line. The appended table shows some variations of a local character, the anal fin being lower and the caudal shorter in the specimens from the Willamette basin. Short fin rays are not characteristic of individuals from the Willamette, however, as in 10 specimens from "The Lakes" the anal averages 0.2 and the caudal 0.3 of the length.

Willamette and Umpqua basins.

MEASUREMENTS OF HYBOPSIS CRAMERI.

Willamette River, Oregon City.

Length of body ..... mm.	38	39	41	44	52	52	53	55	55	56
Length head	.24	.24	.24	.24	.26	.26	.26	.25	.25	.25
Depth body	.25	.25	.28	.30	.31	.29	.29	.31	.28	.32
Depth caudal peduncle	.09	.09	.09	.10	.09	.09	.09	.09	.09	.09
Length caudal peduncle	.25	.25	.23	.25	.24	.22	.23	.23	.24	.22
Length snout	.07	.065	.06	.07	.075	.065	.065	.07	.07	.065
Diameter eye	.08	.075	.07	.075	.07	.07	.065	.07	.065	.07
Interorbital width	.09	.095	.09	.09	.095	.08	.09	.09	.09	.09
Snout to dorsal	.55	.54	.54	.54	.55	.57	.55	.54	.55	.56
Snout to ventral	.48	.48	.48	.49	.51	.51	.52	.48	.51	.52
Length base of dorsal	.15	.15	.14	.15	.16	.14	.14	.15	.15	.16
Length base of anal	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
Height dorsal	.23	.22	.21	.22	.23	.19	.20	.22	.21	.21
Height anal	.20	.17	.16	.19	.17	.17	.17	.19	.17	.17
Length pectoral	.19	.15	.16	.18	.18	.17	.17	.19	.17	.18
Length ventral	.18	.16	.15	.16	.16	.15	.16	.18	.16	.16
Length caudal	.25	.24	.24	.25	.23	.23	.25	.25	.24	.22
Dorsal rays	8	8	8	8	8	8	8	8	8	8
Anal rays	7	7	7	7	7	7	7	7	7	7
Scales lateral line	36	35	36	36	38	38	37	38	36	36
Scales above lateral line	6	6	6	6	6	6	6	6	6	6

Elk Creek near drain.

Length of body ..... mm.	44	43	46	46	42	44	46	42	43	46
Length head	.26	.25	.25	.25	.25	.25	.26	.25	.26	.26
Depth body	.27	.27	.28	.27	.27	.28	.27	.27	.27	.28
Depth caudal peduncle	.09	.085	.085	.08	.09	.09	.08	.09	.09	.09
Length caudal peduncle	.24	.26	.23	.23	.23	.25	.23	.24	.24	.21
Length snout	.08	.075	.075	.07	.07	.08	.08	.08	.075	.075
Diameter eye	.08	.08	.075	.075	.07	.08	.08	.075	.07	.075
Interorbital width	.09	.085	.09	.085	.08	.08	.09	.09	.08	.09
Snout to dorsal	.56	.55	.57	.56	.56	.56	.56	.56	.56	.56
Snout to ventral	.51	.50	.52	.54	.52	.52	.54	.52	.52	.54
Length base of dorsal	.16	.16	.16	.17	.15	.16	.16	.16	.165	.16
Length base of anal	.12	.11	.12	.11	.11	.11	.10	.10	.12	.12
Height dorsal	.23	.22	.23	.23	.23	.23	.23	.22	.23	.22
Height anal	.20	.20	.21	.18	.21	.19	.18	.21	.21	.22
Length pectoral	.20	.20	.20	.19	.19	.20	.19	.21	.20	.21
Length ventral	.15	.18	.18	.17	.16	.18	.17	.18	.17	.18
Length caudal	.30	.29	.30	.30	.31	.29	.29	.31	.30	.30
Dorsal rays	8	8	8	8	8	8	8	8	8	8
Anal rays	7	7	7	7	7	7	7	7	7	7
Scales lateral line	36	36	36	36	38	37	36	38	37	35
Scales above lateral line	6	6	6	6	6	7	6	6	6	6

26. Coregonus williamsoni Girard.

Willamette River.

27. Oncorhynchus keta (Walbaum).

Occurs in all except the smallest streams between the Sacramento and Columbia rivers. The young of this salmon were apparently more abundant than those of any other.

28. Oncorhynchus tschawytscha (Walbaum).

To be found in the larger streams. Commonly reported to be growing less abundant.
Eel, Mad, Klamath, Rogue, Coquille, and Nehalem rivers.

29. Oncorhynchus kisutch (Walbaum).

Said to be commonly found in the larger streams. Specimens were taken in Takenitch Creek, Butte Creek at Eagle Point, Oregon, and in Redwood Creek, near Orick, Cal.

30. Salmo clarkii Richardson.

The trout observed by the writer in the coastal streams of Oregon and northern California are here referred to 2 species. From the Nehalem River southward to Redwood Creek in California a fine-scaled form was frequently taken, while from the Russian River northward, at least to the Tillamook, a large-scaled form was found to be abundant. The former, generally characterized by having from 140 to 170 scales in the lateral series, usually a red blotch on the inner side of the lower jaw, and teeth on the hyoid, are identified as *S. clarkii*. The latter, with from 110 to 145 scales, the lower jaw white and the hyoid without teeth, are called *S. irideus*. It is but fair to state that specimens which could hardly be referred to either species were sometimes taken in the streams north of Redwood Creek. For instance, in Hunters Creek, a tributary of the Klamath, specimens were collected in which the hyoid teeth were often absent and the throat red or not, without in any way coinciding with the number of scales, which varied from 120 to 150. The same conditions were found among specimens from the Coquille and other streams. In Nehalem River examples of typical *S. clarkii* were found. The throat was red, the scales numbered from 145 to 178, and the hyoid teeth were generally present.

No specimens of the form known as the steelhead, *S. rivularis*, were examined.

Trout are abundant in all the coastal streams, fairly swarming in those that have not been fished to excess. Their quality is unsurpassed, living as they do in clear, cool water, well supplied with food.

31. Salmo irideus Gibbons.

The trout found in the coastwise streams as far north as Redwood Creek are identified with this form. North of Redwood Creek examples brighter in color though apparently belonging to this form were frequently seen, together with others which could not be distinguished from the preceding species.

Trout were seen in every coastwise stream examined.

32. Columbia transmontana Eigenmann & Eigenmann.

Not found in the coastwise streams south of the Columbia.
Willamette River.

33. Gasterosteus cataphractus (Pallas).

A close scrutiny of about 2,000 specimens of this species [a] from the streams between the Sacramento and Columbia rivers appears to emphasize the seeming impossibility of recognizing within the group subspecies which may be defined by characters coordinate with geographical areas. The fully plated forms are apt to occur most often in or near salt water, while the less protected ones are usually found farther up the streams.

[a] For a discussion of the variations of the species see Jordan & Gilbert, Fishes of Bering Sea, in Report Fur-Seal Investigations 1896-1897, part 3, p. 443; also Rutter, Notes on freshwater fishes Pacific slope North America, Proceedings California Academy of Science, 2d ser., vol. VI, p. 245.

VARIATIONS IN GASTEROSTEUS CATAPHRACTUS.

Locality.	Specimens with—							
	4 to 6 plates.	7 or 8 plates.	9 or 10 plates.	10 to 12 plates, then an unprotected space followed by a low keel.	15 to 17 plates, then an unprotected space followed by a low keel.	Fully plated; posterior plates very small; keel low.	Fully plated; posterior plates large; keel high.	Small, young specimens 4 to 6 plates.
Conn Creek	200							
Napa River, Rutherford	25							
Napa River, Calistoga	165							
Dry Creek, Healdsburg	1							
Russian River, near Healdsburg	80							
Russian River, Ukiah	70							
Roberts Creek, Ukiah	8							
Wheatfield Fork, Gualala River	20							
Junction Wheatfield Fork and Gualala River		2				45		
Junction North Fork and Gualala River						95		
Garcia River, near mouth	1				1	38		
Garcia River, 5 miles from mouth						45		
Garcia River, 10 miles from mouth	1					50		
Alder Creek						60		
Navarro River, 4 miles above mouth						9		
Navarro River, near Philo				1		35		
Navarro River, near Boonville	1			1				49
Albion River, near Comptche			4		4	55		
Big River, 7 miles above mouth		16		6		150		
South Fork of Big River							1	7
Noyo River	4					125		
Ten Mile River	9		33		20	100		
Maple Creek							13	
Usal Creek							23	
Mattole River, White Thorn	2							
Mattole River, Petrolia							16	
Bear River, Capetown							3	
Van Duzen Creek							21	
South Fork Eel River, Myers							22	
Elk River					28	83		
Mad River, near mouth							6	2
Redwood Creek, near mouth							37	
Klamath River, near mouth							5	
Smith River, near mouth							7	
Coquille River, near mouth						7	54	15
Deer Creek, Roseburg	3							
North Umpqua, Winchester	1					12		
Takenitch Creek, near mouth	55	8	1	1		15		
Nehalem River, near mouth						3		
McKenzie River, near Eugene	25							
The Lakes, Albany	15							

34. **Hysterocarpus traski** Gibbons.

Not known from the streams north of the Russian River.

Russian and Napa rivers.

35. **Cottus asper** Richardson.

The extent of the prickly investment of the body is subject to considerable variation in this species. This variation often appears between specimens from different streams, but it is also common among individuals from the same stream. Usually the entire body, except the breast, abdomen, and caudal peduncle, is closely covered with rather coarse prickles. Often this armed area is reduced to a spot no larger than the pectoral fin, while occasionally it is much smaller. No entirely smooth examples have been seen. In rare instances a loss of the palatine teeth accompanies a great reduction of the prickly area. Two preopercular spines are always present. A third very small one sometimes appears below them.

The species is commonly found in the lower courses of the streams, often being abundant in brackish or even salt water. It frequents deep, quiet pools, apparently being partial to a muddy bottom.

Specimens were collected in nearly every river basin between the Columbia and Sacramento.

FIN CHARACTERS AND EXTENT OF PRICKLY INVESTMENT OF 139 SPECIMENS OF COTTUS ASPER.

Locality.	Number of specimens with—																Extent of prickly investment of skin.
	8 dorsal spines.	9 dorsal spines.	10 dorsal spines.	18 dorsal rays.	19 dorsal rays.	20 dorsal rays.	21 dorsal rays.	22 dorsal rays.	16 anal rays.	17 anal rays.	18 anal rays.	19 anal rays.	15 pectoral rays.	16 pectoral rays.	17 pectoral rays.	18 pectoral rays.	
Lake Washington, Wash.	2	15	....	....	2	8	7	....	4	12	1	....	....	2	5	....	Entire upper parts except caudal peduncle.
Columbia River, Astoria.	1	5	1	....	1	1	5	....	4	3	....	....	....	5	2	....	Do.
The Lakes, Oregon City.	1	9	....	....	....	....	10	....	....	5	5	....	....	....	....	....	Do.
Nestucca River	....	10	....	....	....	1	5	4	1	6	3	....	1	9	....	....	Entire upper parts except caudal peduncle; area often reduced to size of pectoral fin.
Takenitch River	....	16	....	....	....	8	3	5	3	9	4	....	....	11	5	....	Do.
Coquille River	....	8	....	....	....	3	5	....	....	7	1	....	2	4	2	....	Do.
Flores Creek	....	12	....	....	....	1	6	5	....	6	5	1	....	6	3	3	Area size of pectoral or somewhat larger.
Rogue River, near mouth.	....	8	....	....	....	2	5	1	1	6	1	....	1	5	2	....	Entire upper parts, except caudal peduncle, often reduced to area no larger than pectoral.
Smith River	1	3	....	....	....	1	3	....	2	2	....	....	....	4	....	....	Do.
Mad River	1	5	....	....	....	5	1	....	1	5	....	....	2	4	....	....	Do.
Redwood Creek	1	3	....	....	....	2	2	....	....	4	....	....	2	2	....	....	Area size of pectoral.
Eel River	....	4	....	....	....	....	3	1	....	2	2	....	....	3	1	....	Do.
Garcia River	....	6	....	....	....	4	2	....	4	1	1	....	3	3	....	....	Entire upper parts except caudal peduncle.
Navarro River	2	9	....	....	2	7	2	....	6	5	....	....	2	8	1	....	Do.
Gualala River	1	8	....	....	....	6	3	....	4	5	....	....	2	7	....	....	Do.
Paper Mill Creek, Marine County, Cal.	1	8	1	1	1	8	....	....	9	1	....	....	....	9	1	....	Entire upper parts, except caudal peduncle, often reduced to area half the size of pectoral.

36. Cottus gulosus (Girard).

Cottus gulosus has been confused by recent authors with *Cottus asper* Richardson, the name *gulosus* having been applied to examples of *C. asper* from the Sacramento and neighboring streams which were erroneously supposed to differ from representatives of the same form from the Columbia. *Cottus gulosus* or *Cottopsis gulosus* described by Girard [a] is a species differing from *C. asper*, notably in having a much shorter anal fin. It now appears that the species *C. gulosus* extends northward at least to the Columbia and includes the form known as *Cottus perplexus*, specimens of which do not differ from examples of *C. gulosus* from the Sacramento. In the Klamath basin *C. gulosus* is represented by *Cottus klamathensis*, which seems to be a slightly distinct form, or at least should be so considered until certain characters which now appear to be distinctive are shown to be unreliable. *C. gulosus* is also closely related to *Cottus punctulatus* and *Cottus beldingi*. A careful examination of the relationships of these forms will no doubt be fruitful.

C. gulosus occurs in most of the coastwise streams between the Sacramento and Columbia rivers, with possibly the single exception of the Klamath. It is usually to be found in the upper courses of the rivers, although it is not uncommonly associated with *C. asper* and *C. aleuticus* farther downstream.

In *C. gulosus* the preopercle is always armed with one strong spine which is curved or pointed upward, the size of the spine, its curvature, and the angle of inclination varying somewhat in different individuals. It is often nearly cylindrical in shape, while again it may be rather broad and flat, possibly inclining toward the cylindrical form in southern examples, and being more often flat in the northern ones. There is also present a second comparatively weak spine which varies considerably in size, being sometimes reduced to a mere prominence or in rare instances disappearing entirely. Occasionally a third spine appears below the others. The palatine bones are usually without teeth, although in some cases a small patch of minute teeth may be seen. The presence or absence of teeth

[a] *Cottopsis gulosus* Girard, Proceedings Academy Natural Sciences, Philadelphia, vol. VII, 1854, p. 129.

appears to bear no relation to the armature of the preopercle or to the condition and extent of the prickly investment of the skin. The skin is commonly smooth. A restricted axillary area of fine prickles is often present, being in some examples prolonged posteriorly to the origin of the anal. The lateral line is incomplete, ending at some point below the base of the soft dorsal. Rare exceptions have the lateral line complete or nearly so. The dorsal fins are generally joined by a membrane which extends about halfway up the first articulated ray. The width of the connecting membrane varies greatly and specimens are frequently met with in which it scarcely rises above the base of the first ray. The upper pectoral rays are occasionally branched. The color varies considerably, although some modification of the same general pattern is always preserved. Other slightly variable features, as the shape of body, the length of fins, number of rays, etc., are indicated in the appended tables. The variations here described are not greater than are commonly found among individuals of a widely distributed species, and while extremes of variation in certain characters may be seen among specimens of one locality, they are perhaps more often exhibited by examples from different basins.

FIN CHARACTERS OF COTTUS GULOSUS.

Locality.	Number of spines in dorsal—				Number of rays in dorsal—					Number of rays in anal—					Number of rays in pectoral—				
	6.	7.	8.	9.	16.	17.	18.	19.	20.	12.	13.	14.	15.	16.	13.	14.	15.	16.	17.
Holmans Creek, Oregon	....	1	5	2	....	....	....	8	....	....	....	3	5	....	....	....	6	2	....
Klaskanine River, Oregon	....	....	13	2	....	4	9	2	....	....	....	2	10	3	....	....	12	3	....
McKenzie River, Oregon	....	1	5	2	....	1	4	3	....	....	....	....	8	....	....	4	4	....	....
Nehalem River, Oregon	....	....	16	....	....	1	8	7	....	....	1	1	14	....	....	3	10	2	1
Tillamook River, Oregon	....	....	19	1	....	1	10	9	....	....	....	3	13	4	....	14	6	....	....
Siletz River, Oregon	....	2	4	....	....	2	1	3	....	....	1	3	2	....	....	4	2	....	....
Deer Creek, Roseburg, Oreg	....	....	5	....	....	....	3	2	....	....	....	....	5	....	....	5	....	....	....
Elk Creek, Drain, Oreg	....	1	9	....	....	2	4	4	....	....	....	4	6	....	....	7	3	....	....
Cow Creek, Oregon	....	....	3	....	....	1	2	....	....	....	....	3	....	....	....	3	....	....	....
Coquille River, Oregon	....	1	9	....	2	6	2	....	....	....	2	7	1	....	....	5	5	....	....
Rogue River, Grants Pass, Oreg	....	2	7	1	....	6	4	....	....	....	....	7	3	....	....	7	3	....	....
Butte Creek, Oregon	....	....	9	1	....	7	3	....	....	....	....	9	1	....	1	8	1	....	....
Bear Creek, Ashland, Oreg	....	1	9	....	....	4	5	1	....	....	....	6	4	....	....	7	3	....	....
Noyo River, California	....	7	24	1	1	13	13	5	....	....	24	7	1	....	7	21	4	....	....
South Fork Big River, California	....	1	3	....	....	3	1	....	....	....	4	....	....	....	3	1	....	....	....
Warm Springs Creek, California	....	....	6	....	....	3	3	....	....	....	5	1	....	....	....	1	4	1	....
Knights Valley Creek, California	....	3	12	....	....	4	11	....	....	1	7	5	2	....	....	5	9	1	....
Napa River, California	....	3	18	1	....	12	10	....	....	....	9	12	1	....	....	4	17	1	....
McCloud River, Baird, Cal	....	....	6	....	....	3	3	....	....	....	4	2	....	....	....	1	5	....	....
Berryessa Creek, California	....	....	3	1	....	2	2	....	....	....	3	1	....	....	2	2	....	....	....
Ætna Springs Creek, California	....	1	5	1	....	1	5	1	....	....	2	5	....	....	3	3	1	....	....

MEASUREMENTS OF COTTUS GULOSUS.

	Columbia River basin.													
	Skookumchuck Creek, Chehalis, Wash.			Holman Creek, Ilwaco, Wash.					Klaskanine River, Olney, Oreg.					
Length of body.....mm..	60	50	57	69	74	71	69	66	71	74	72	60	51	
Length head	.335	.34	.33	.33	.34	.34	.32	.33	.33	.32	.32	.34	.33	
Depth body	.245	.26	.25	.235	.23	.24	.23	.23	.26	.22	.22	.30	.26	
Depth caudal peduncle	.10	.10	.09	.095	.09	.09	.09	.085	.105	.09	.085	.10	.10	
Length caudal peduncle	.135	.14	.13	.13	.12	.13	.13	.13	.13	.12	.125	.12	.13	
Length snout	.095	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10	.105	.10	
Length maxillary	.13	.13	.13	.14	.15	.14	.135	.13	.15	.15	.14	.14	.145	
Diameter eye	.08	.085	.08	.08	.08	.08	.075	.08	.075	.085	.075	.085	.09	
Interorbital width	.05	.055	.055	.05	.06	.05	.05	.045	.055	.05	.055	.06	.05	
Depth head	.21	.20	.205	.21	.22	.20	.22	.21	.22	.195	.19	.22	.21	
Snout to dorsal	.38	.41	.37	.39	.38	.40	.37	.37	.38	.38	.38	.41	.38	
Snout to anal	.56	.56	.54	.55	.56	.58	.60	.56	.56	.58	.59	.58	.59	
Length base of spinous dorsal	.18	.165	.16	.20	.18	.17	.18	.18	.20	.18	.185	.18	.205	
Length base of soft dorsal	.43	.46	.43	.43	.41	.39	.43	.40	.41	.42	.44	.40	.39	
Length base of anal	.34	.35	.33	.34	.34	.32	.31	.33	.34	.33	.34	.335	.33	
Height spinous dorsal	.....	.115	.12	.11	.10	.10	.09	.11	.09	.10	.095	.09	.11	
Height soft dorsal	.16	.17	.16	.16	.16	.14	.16	.15	.16	.15	.14	.155	.16	
Height anal	.14	.14	.14	.14	.15	.14	.14	.14	.14	.14	.125	.14	.13	
Length pectoral	.27	.26	.26	.28	.28	.30	.29	.27	.28	.27	.28	.27	.28	
Length ventral	.21	.21	.20	.20	.21	.20	.19	.19	.19	.19	.20	.21	.21	
Length caudal	.26	.27	.24	.23	.24	.235	.24	.24	.25	.25	.23	.26	.26	

MEASUREMENTS OF COTTUS GULOSUS—Continued.

	Nehalem River basin.					Rogue River basin.				
	Nehalem River.					Bear Creek, Ashland, Oreg.				
Length of body....mm..	67	65	67	58	60	57	60	63	63	56
Length head	.31	.32	.32	.33	.34	.315	.325	.31	.31	.31
Depth body	.22	.24	.22	.22	.21	.22	.23	.23	.23	.23
Depth caudal peduncle	.09	.10	.09	.10	.09	.085	.085	.09	.09	.09
Length caudal peduncle	.135	.135	.13	.13	.12	.125	.13	.14	.14	.14
Length snout	.105	.10	.10	.105	.10	.10	.11	.10	.10	.10
Length maxillary	13	.13	.13	.13	.13	.14	.15	.125	.14	.12
Diameter eye	.075	.07	.08	.08	.08	.08	.075	.07	.08	.08
Interorbital width	.04	.045	.04	.045	.04	.04	.04	.04	.045	.04
Depth head	.20	.20	.20	.20	.19	.18	.20	.20	.20	.19
Snout to dorsal	.37	.37	.37	.38	.36	.36	.375	.36	.37	.36
Snout to anal	.56	.55	.56	.56	.56	.57	.56	.53	.56	.55
Length base of spinous dorsal	.17	.17	.17	.16	.17	.18	.20	.18	.17	.18
Length base of soft dorsal	.40	.43	.42	.435	.42	.43	.41	.39	.40	.41
Length base of anal	.35	.34	.35	.33	.36	.32	.33	.33	.32	.35
Height spinous dorsal	.10	.10	.10	.11	.10	.105	.11	.09	.10	.10
Height soft dorsal	.14	.17	.15	.135	.15	.135	.14	.13	.15	.15
Height anal	.15	.135	.15	.13	.12	.135	.13	.12	.14	.13
Length pectoral	.28	.27	.29	.28	.26	.29	.31	.29	.28	.30
Length ventral	.20	.21	.20	.19	.20	.20	.21	.19	.19	.20
Length caudal	.24	.23	.23	.24	.24	.235	.22	.21	.22	.24

	Noyo River basin.									
	Noyo River, Cal.									
Length of body....mm..	46	48	49	50	50	51	53	54	55	62
Length head	.33	.34	.35	.34	.34	.35	.36	.36	.35	.36
Depth body	.22	.23	.24	.25	.24	.22	.25	.23	.24	.25
Depth caudal peduncle	.08	.08	.085	.09	.09	.09	.09	.09	.08	.08
Length caudal peduncle	.14	.13	.14	.12	.13	.13	.13	.13	.12	.12
Length snout	.10	.095	.11	.11	.10	.11	.11	.11	.10	.10
Length maxillary	.13	.13	.12	.13	.14	.13	.15	.15	.145	.145
Diameter eye	.08	.09	.09	.08	.085	.09	.09	.09	.095	.09
Interorbital width	.035	.04	.04	.04	.04	.035	.04	.045	.04	.04
Depth head	.20	.20	.21	.20	.20	.20	.20	.21	.20	.20
Snout to dorsal	.37	.39	.41	.38	.38	.38	.41	.40	.40	.40
Snout to anal	.56	.56	.56	.56	.55	.57	.60	.60	.58	.60
Length base of spinous dorsal	.17	.18	.17	.19	.20	.18	.17	.21	.19	.19
Length base of soft dorsal	.44	.43	.41	.41	.40	.44	.44	.42	.44	.45
Length base of anal	.32	.29	.28	.31	.31	.32	.31	.29	.28	.32
Height spinous dorsal	.10	.10	.09	.10	.10	.09	.10	.10	.10	.10
Height soft dorsal	.15	.15	.15	.15	.15	.14	.18	.15	.15	.15
Height anal	.125	.15	.14	.16	.14	.14	.16	.15	.14	.15
Length pectoral	.29	.31	.33	.29	.30	.29	.29	.30	.29	.32
Length ventral	.22	.23	.21	.21	.21	.21	.21	.23	.23	.22
Length caudal	.26	.26	.25	.23	.24	.24	.24	.25	.25	.24

	Sacramento River basin.									
	Napa River, Calistoga, Cal.									
Length of body....mm..	59	61	61	61	64	67	67	68	74	75
Length head	.35	.35	.35	.36	.35	.35	.35	.335	.36	.35
Depth body	.27	.29	.28	.28	.27	.28	.27	.27	.30	.27
Depth caudal peduncle	.09	.10	.085	.09	.10	.09	.09	.09	.10	.10
Length caudal peduncle	.12	.12	.12	.13	.14	.13	.11	.12	.105	.115
Length snout	.10	.11	.10	.10	.09	.09	.10	.10	.10	.10
Length maxillary	.13	.14	.13	.135	.145	.135	.135	.13	.15	.15
Diameter eye	.07	.07	.065	.07	.07	.065	.07	.07	.07	.065
Interorbital width	.05	.04	.045	.05	.05	.055	.05	.05	.055	.06
Depth head	.215	.22	.21	.215	.21	.21	.21	.21	.225	.22
Snout to dorsal	.385	.38	.38	.38	.37	.37	.37	.37	.39	.38
Snout to anal	.56	.57	.57	.57	.55	.56	.58	.55	.56	.57
Length base of spinous dorsal	.22	.21	.20	.215	.215	.22	.20	.21	.21	.19
Length base of soft dorsal	.43	.47	.44	.42	.42	.42	.45	.44	.43	.42
Length base of anal	.35	.32	.31	.32	.30	.31	.29	.32	.33	.31
Height spinous dorsal	.11	.09	.12	.115	.10	.10	.07	.10	.105	.10
Height soft dorsal	.16	.15	.15	.16	.16	.16	.16	.15	.15	.16
Height anal	.14	.14	.15	.15	.15	.14	.15	.14	.135	.14
Length pectoral	.28	.26	.30	.26	.30	.30	.30	.29	.27	.27
Length ventral	.19	.20	.20	.20	.19	.19	.20	.19	.19	.19
Length caudal	.24	.25	.24	.25	.25	.23	.25	.225	.24	.24

37. Cottus klamathensis Gilbert.

Specimens of this species from many widely separated localities in the Klamath system have been examined, and with scarcely an exception they have but one preopercular spine, below which the edge of the preopercle is entirely smooth. In rare instances there appears below the preopercular spine a small elevation not unlike that found in the uncommon, single-spined individuals of *C. gulosus*. A comparison also of the dorsal fins of this species with those of *C. gulosus* shows that in *C. klamathensis* the dorsal more often has 7 spines and 19 rays, while in *C. gulosus* there are most frequently 8 spines and 17 or 18 rays.

FIN CHARACTERS OF 46 SPECIMENS OF COTTUS KLAMATHENSIS.

Locality.	6 dorsal spines.	7 dorsal spines.	8 dorsal spines.	17 dorsal rays.	18 dorsal rays.	19 dorsal rays.	20 dorsal rays.	13 anal rays.	14 anal rays.	15 anal rays.	14 pectoral rays.	15 pectoral rays.	16 pectoral rays.
Shasta River, near Montague.	1	23	2	1	7	16	2	5	19	2	3	23	.....
Shasta River, near Yreka....	.....	16	4	.....	6	14	.....	5	14	1	4	15	1

MEASUREMENTS OF COTTUS KLAMATHENSIS.

	Shasta River near Yreka, Cal.					Shasta River near Montague, Cal.					
Length of body.....mm..	75	68	57	61	57	73	65	55	65	71	50
Length head.....	.325	.32	.34	.335	.32	.31	.31	.32	.32	.32	.31
Depth body.....	.21	.24	.25	.26	.21	.24	.24	.26	.25	.30	.25
Depth caudal peduncle.....	.10	.10	.105	.10	.10	.09	.10	.10	.10	.11	.10
Length caudal peduncle.....	.15	.14	.13	.145	.14	.14	.13	.12	.14	.13	.15
Length snout.....	.11	.10	.12	.11	.10	.095	.11	.11	.10	.105	.10
Length maxillary.....	.145	.14	.15	.14	.13	.14	.145	.14	.13	.14	.13
Diameter eye.....	.08	.07	.08	.085	.085	.085	.08	.085	.08	.08	.085
Interorbital width.....	.04	.04	.045	.04	.05	.045	.05	.04	.04	.05	.05
Depth head.....	.21	.22	.24	.215	.20	.20	.21	.21	.20	.21	.20
Snout to dorsal.....	.37	.38	.39	.39	.36	.36	.36	.37	.36	.38	.37
Snout to anal.....	.54	.60	.60	.57	.57	.54	.58	.56	.57	.56	.59
Length base of spinous dorsal.....	.16	.16	.17	.16	.16	.17	.15	.17	.17	.18	.16
Length base of soft dorsal.....	.39	.43	.43	.41	.43	.46	.41	.45	.425	.43	.41
Length base of anal.....	.33	.325	.33	.335	.33	.31	.33	.35	.33	.31	.32
Height spinous dorsal.....	.08	.085	.11	.08	.09	.11	.09	.10	.10	.11	.11
Height soft dorsal.....	.135	.14	.13	.14	.15	.15	.14	.16	.14	.14	.15
Height anal.....	.125	.12	.13	.13	.14	.12	.13	.13	.13	.13	.12
Length pectoral.....	.27	.28	.28	.28	.27	.28	.28	.32	.28	.27	.27
Length ventral.....	.18	.18	.20	.19	.19	.18	.19	.20	.185	.19	.18
Length caudal.....	.21	.22	.22	.23	.22	.23	.22	.25	.23	.22	.22

38. Cottus aleuticus Gilbert.

This species has been hitherto recorded from the Aleutian Islands and Vancouver. Specimens were recently taken by Mr. A. W. Greeley in the Carmel River just south of Monterey Bay, the range of the species being thus materially extended. These and other examples secured at various points along the Oregon and California coast have been compared with the types of *C. aleuticus* and appear not to differ in any respect.

Usually the body is perfectly smooth, the palatines without teeth, and the preopercle with but 1 spine. Spec mens from Maple Creek, California, were found to have a small axillary patch of very fine prickles and a second, minute, blunt spine on the preopercle.

The species is not commonly found. It appears to be confined to the lower courses of the rivers near the sea, where it is often associated with *C. asper*. From *C. asper* and from *C. gulosus* it may be easily distinguished by its tubular nostrils.

Specimens were collected in the following rivers: Tillamook, Trask, Nestucca, Yaquina, Coquille, Elk, Sixes, Pistol, Smith, Redwood, Mattole, Navarro, Alder, Garcia, and Gualala.

FIN CHARACTERS OF COTTUS ALEUTICUS.

Locality.	Specimens having—											
	8 dorsal spines.	9 dorsa spines.	10 dorsal spines.	18 dorsal rays.	19 dorsal rays.	20 dorsal rays.	12 anal rays.	13 anal rays.	14 anal rays.	13 pectoral rays.	14 pectoral rays.	15 pectoral rays.
Tillamook River	3	4	.....	1	5	1	.....	5	2	2	5	.....
Trask River	.....	4	.....	1	3	.....	.....	3	1	.....	4	.....
Nestucca River	1	4	.....	3	1	1	1	4	.....	.....	4	1
Elk River, Curry County, Oreg	1	1	.....	1	1	.....	.....	1	1	.....	2	.....
Pistol River	.....	.....	1	1	.....	.....	.....	1	.....	.....	1	.....
Rogue River	.....	2	.....	1	.....	1	.....	1	1	.....	2	.....
Alder Creek	2	3	.....	4	1	.....	1	4	.....	.....	5	.....
Maple Creek	4	6	.....	2	7	1	.....	10	.....	.....	5	5
Albion River	.....	1	.....	.....	1	.....	.....	1	.....	.....	1	.....
Smith River	2	1	.....	2	.....	1	1	2	.....	2	1	.....
Garcia River	.....	12	.....	4	7	1	2	8	2	1	10	1
Gualala River	3	2	1	2	4	.....	2	3	1	1	5	.....

39. Cottus rhotheus Rosa Smith.

Specimens of this species were collected in the Willamette basin.

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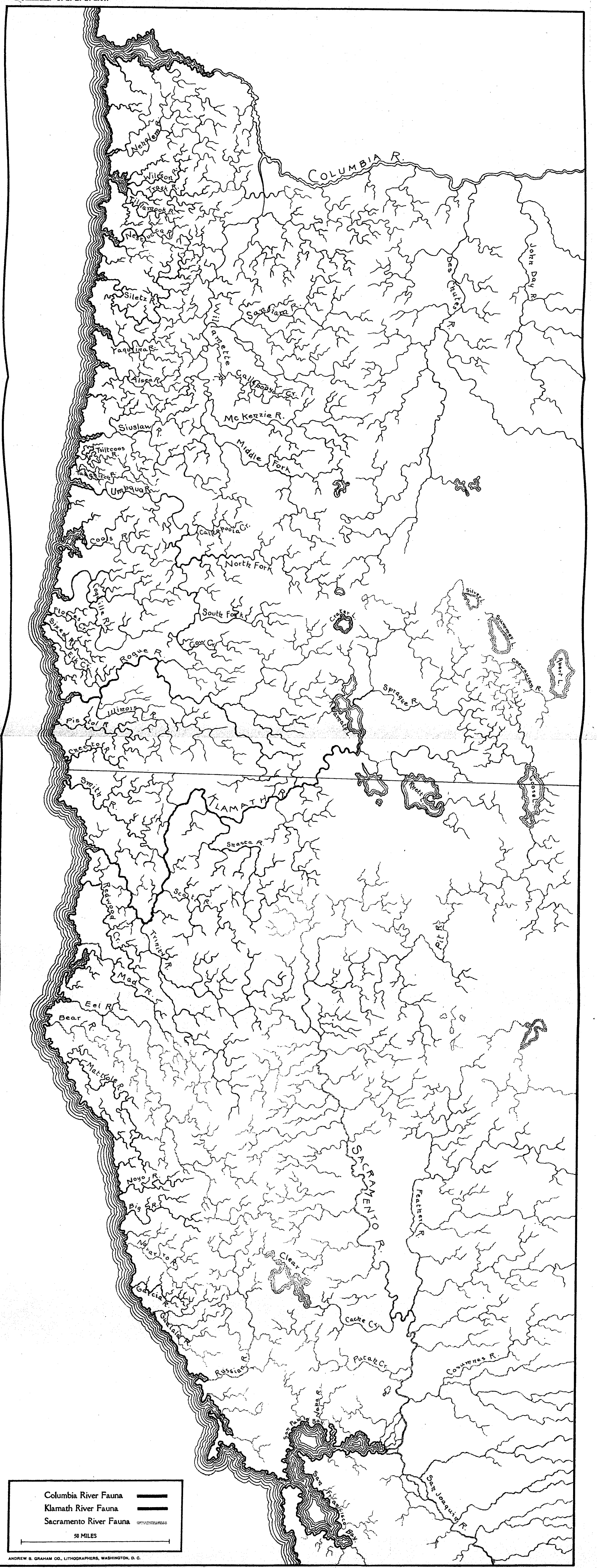

ANDREW B. GRAHAM CO., LITHOGRAPHERS, WASHINGTON, D. C.

MAP SHOWING DISTRIBUTION OF FLUVIAL FISHES IN THE COASTAL STREAMS OF OREGON AND NORTHERN CALIFORNIA.