BOTHRIOCEPHALUS ACHEILOGNATHI INFECTION OF FISH IN SOUTHERN CALIFORNIA

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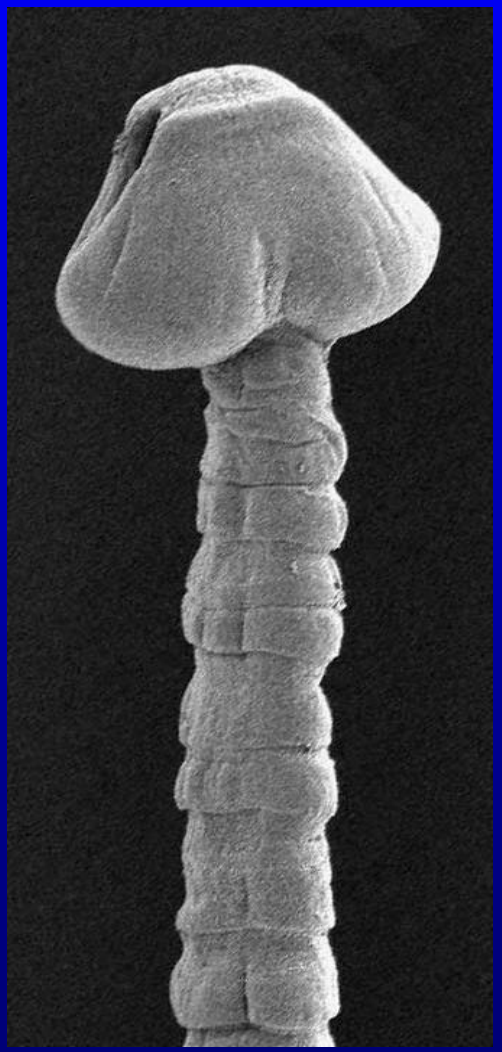
ASIAN TAPEWORM
BOTHRIOCEPHALUS ACHEILOGNATHI



- Harmful parasite of young cyprinid fishes
- Causes great economic losses in hatcheries & fish farms world wide
- Originated from China and Far East of former USSR
- Introduced with grass carp to Europe, Asia, North America, South America, New Zealand & Australia

PREVIOUS OCCURENCES OF *BOTHRIOCEPHALUS ACHEILOGNATHI* IN CALIFORNIA (CHEN, 1987)

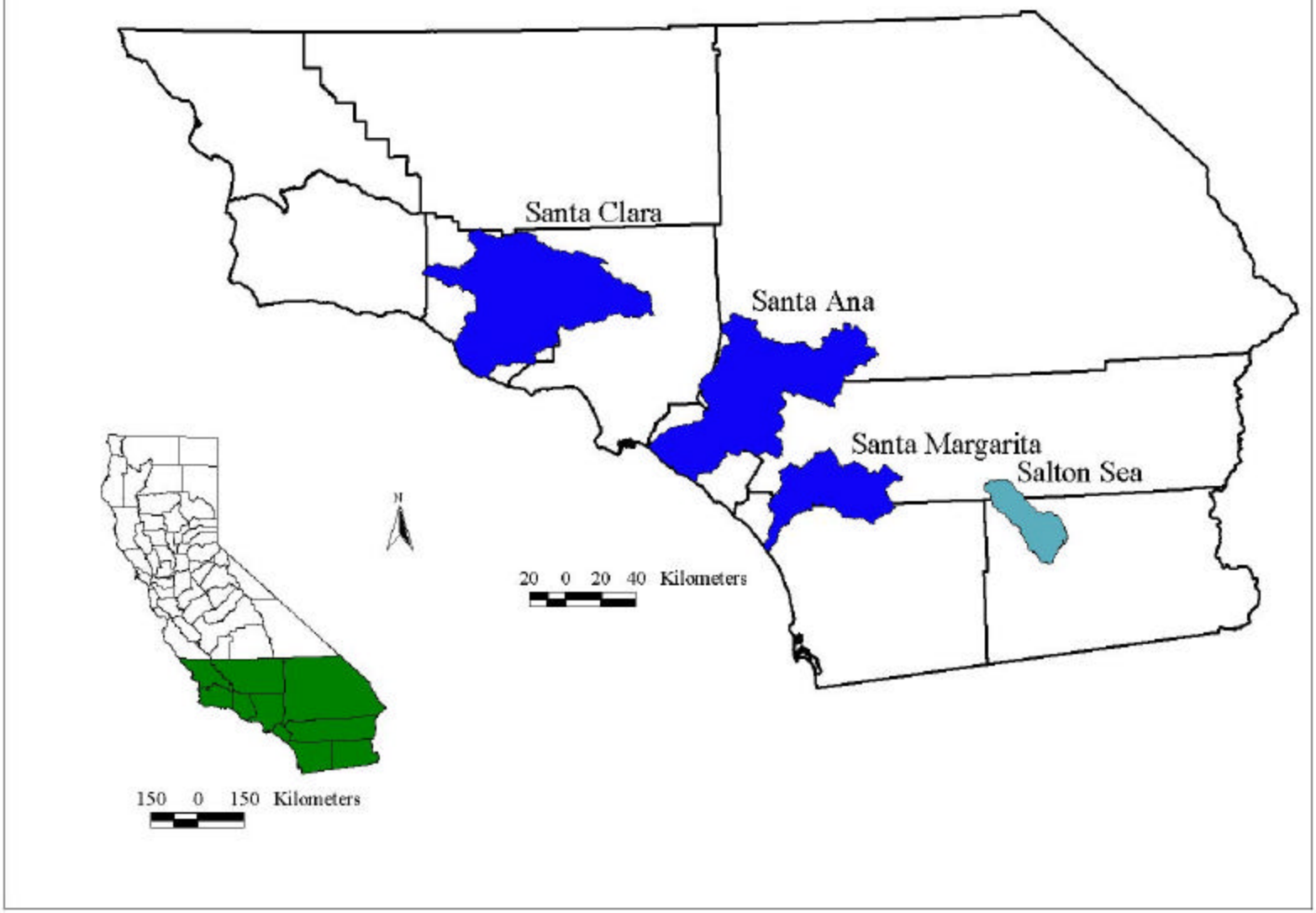
B. acheilognathi was recorded by California Dept of Fish & Game in 1984

- In imported grass carp at 3 irrigation reservoirs in Riverside and Imperial Counties
- In imported golden shiner in 3 bait fish farms
- In golden shiner in Lake Hodges, San Diego County

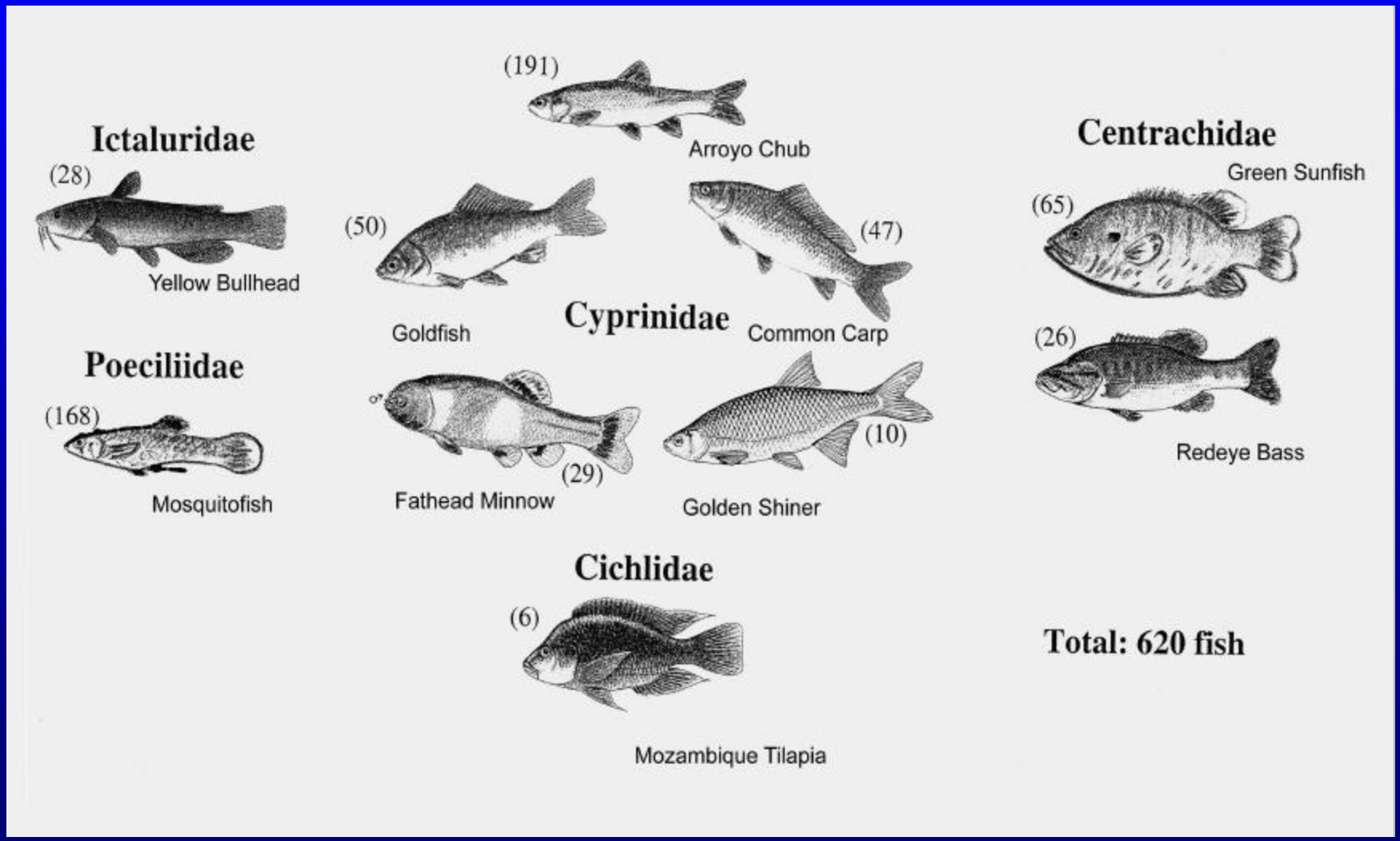
OBJECTIVES

- To examine fish in 3 river systems of Southern California for *Bothriocephalus acheilognathi*
- To estimate the prevalence and intensity of fish infection by *B. acheilognathi*
- To determine potential intermediate hosts of *B. acheilognathi* by experimental infestation of local copepods
- To study the structure of the tegument in procercoids and adult *B. acheilognathi*

SITES OF FISH COLLECTIONS 1999-2000



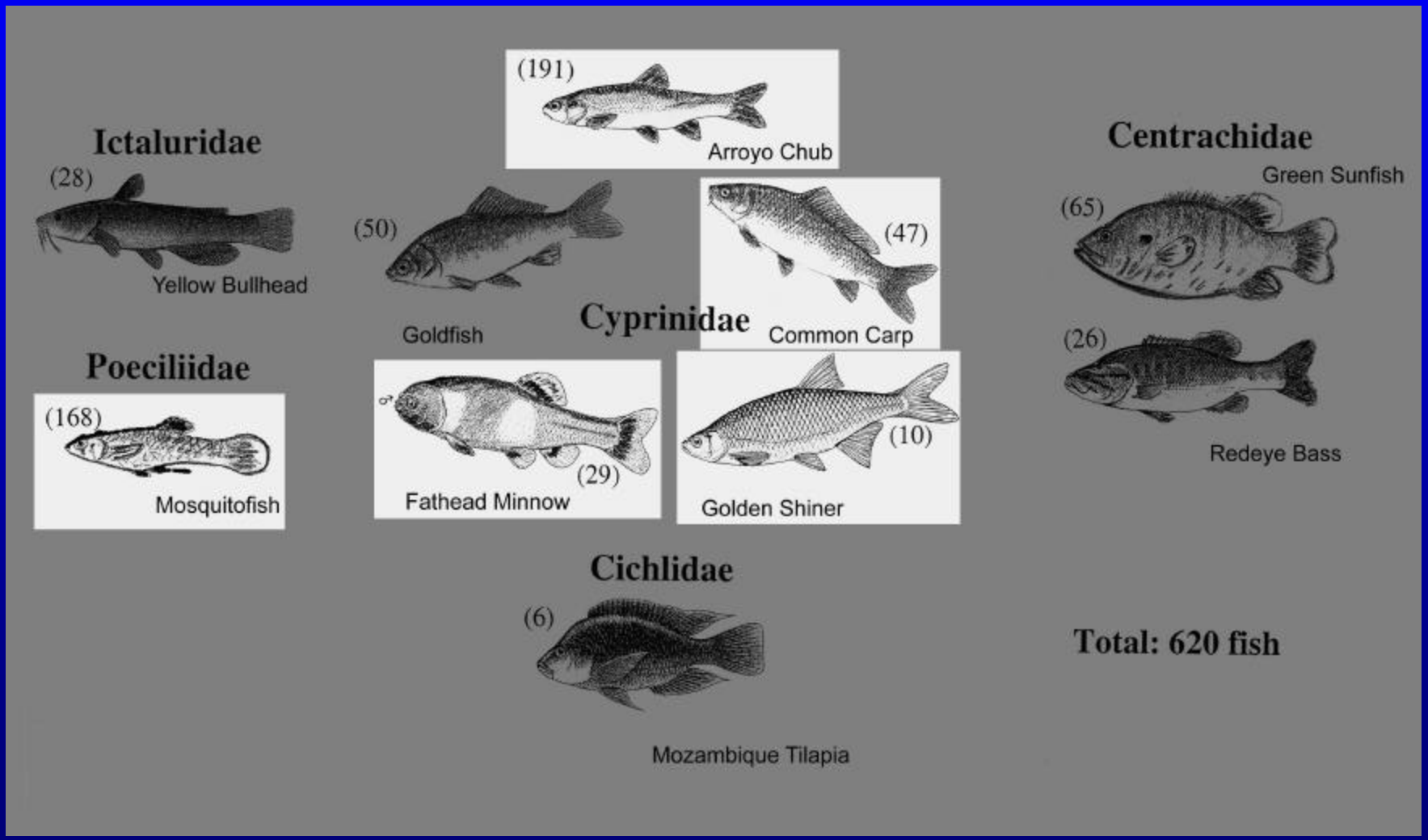
FISH EXAMINED FOR PARASITES IN 1999-2000



METHODS

1. Full parasitological examination of fish
2. Experimental infection of local cyclopoid copepods by coracidia of *B. acheilognathi*
3. LM, SEM and TEM study of procercoids and adult *B. acheilognathi*

FISH INFECTED BY *BOTHRIOCEPHALUS ACHEILOGNATHI*

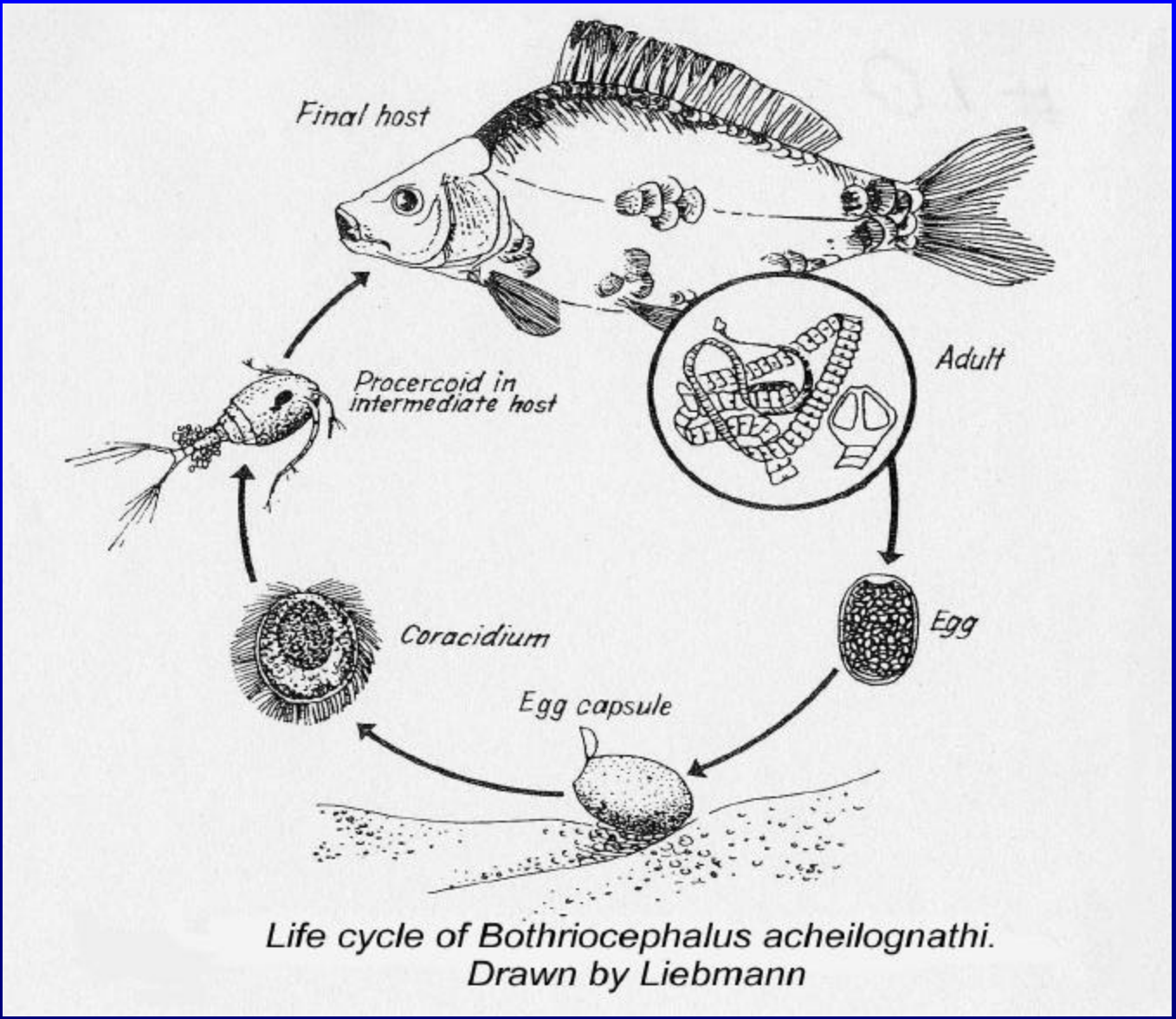


PREVALENCE AND INTENSITY OF FISH INFECTION BY *B. ACHEILOGNATHI* IN SOUTHERN CALIFORNIA, 1999-2000

Location	Mosquito fish L=2.0-5.7 cm		Arroyo * chub L= 2.0-12.0 cm		Common carp L= 4.0-26.0 cm		Fathead minnow L= 3.5-7.5 cm		Golden shiner L= 2.6-4.0 cm	
	N	%, intensity	N	%, intensity	N	%, intensity	N	%, intensity	N	%, intensity
SMR	47	27.6% 18.0 (1-75)	83	37.0% 2.3 (1-9)	3	0.0%		_____		_____
SAR	75	9.3% 2.9 (1-6)	67	12.0% 1 (1-2)	44	41.0 % 3.6 (1-15)	29	3.4% 1		_____
SCR	29	86.6% 10.5 (1-35)	41	0.0%		_____		_____		_____
CSS	7	42.8% 2.7(1-6)		_____		_____		_____	10	30.0% 6.3 (1-12)

SMR- Santa Margarita River; SAR- Santa Ana River; SCR- Santa Clara River; CSS- Creeks, Salton Sea

LIFE CYCLE OF *BOTHRIOCEPHALUS ACHEILOGNATHI*



Life cycle of Bothriocephalus acheilognathi.
Drawn by Liebmann

LIST OF LOCAL CYCLOPOID COPEPODS INFECTED BY CORACIDIA OF *BOTHRIOCEPHALUS ACHEILOGNATHI*

(Identification of cyclops was kindly provided by
Dr. V. Alekseev, Zoological Institute RAS, St. Petersburg, Russia)

Acanthocyclops americanus

Acanthocyclops robustus

Microcyclops varicans

Microcyclops rubellus

Eucyclops bondi

Eucyclops prionophorus

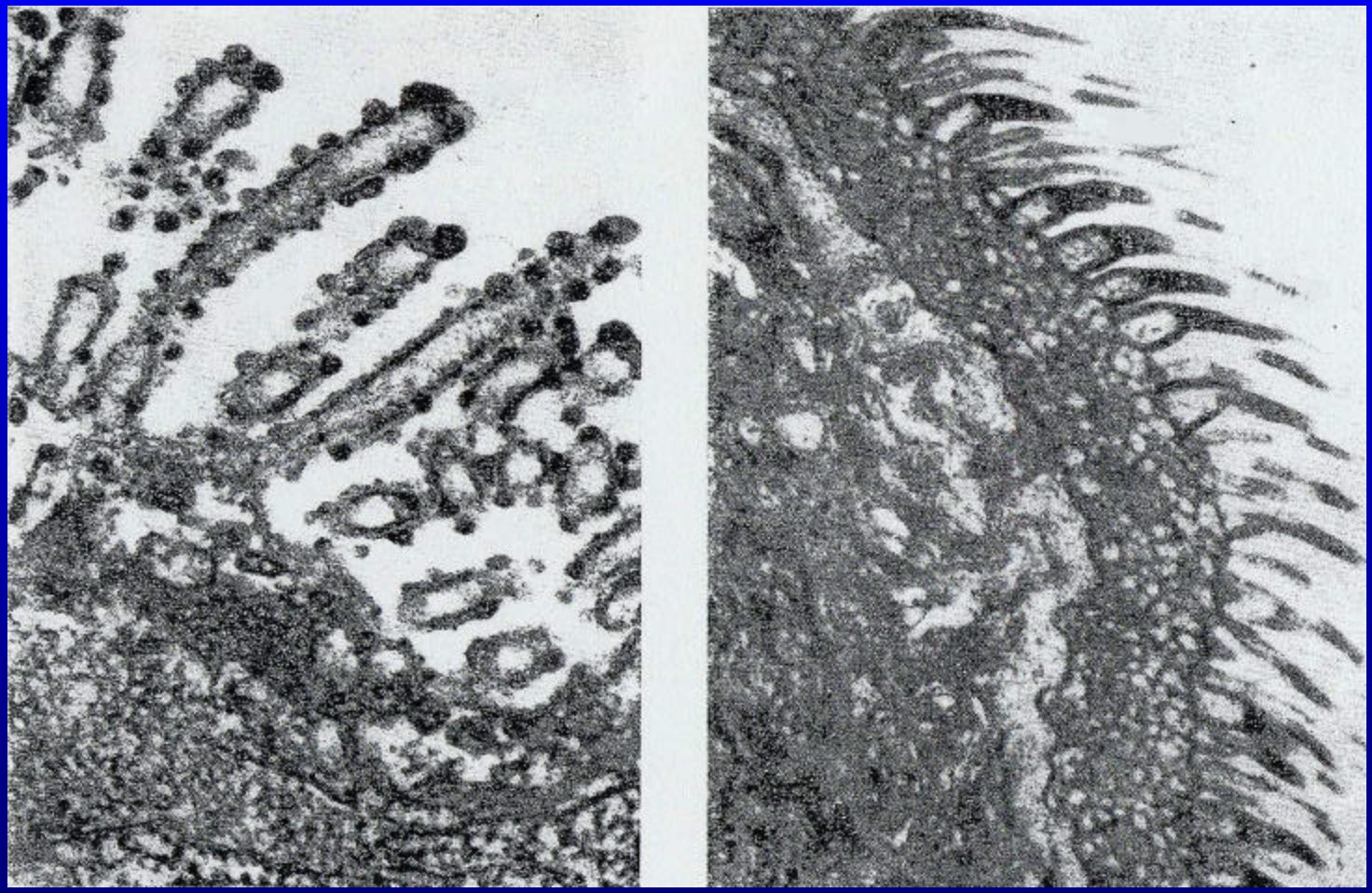
DEVELOPMENT OF PROCERCOIDS IN CYCLOPOID COPEPODS

4 Days

9 Days

INVASIVE PROCERCOID

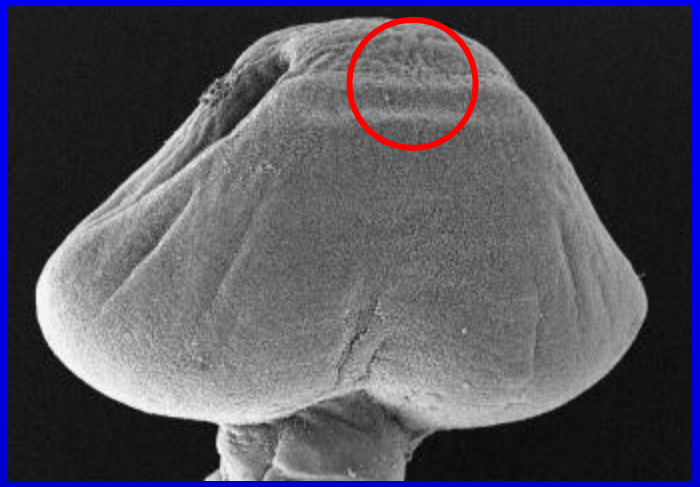
TEGUMENT OF PROCERCOID OF *B. ACHEILOGNATHI*

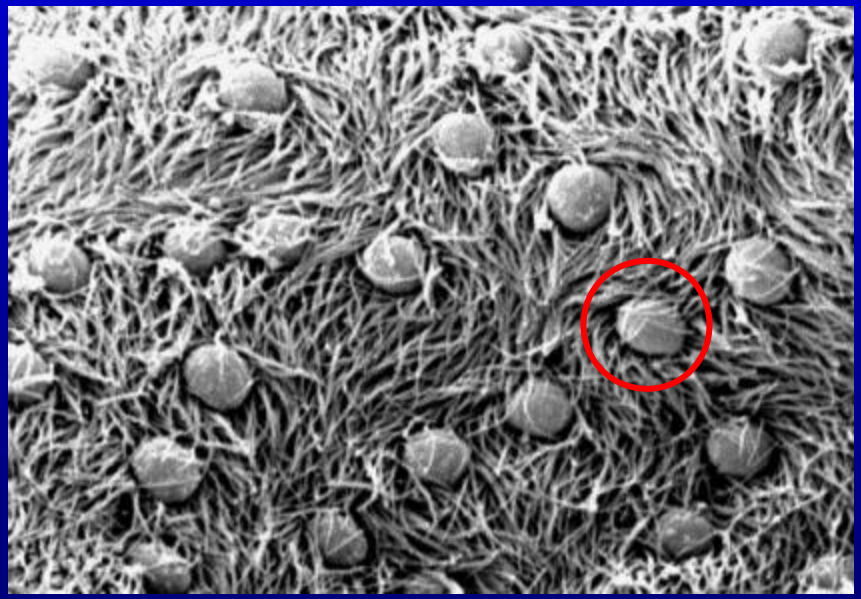


4 Days

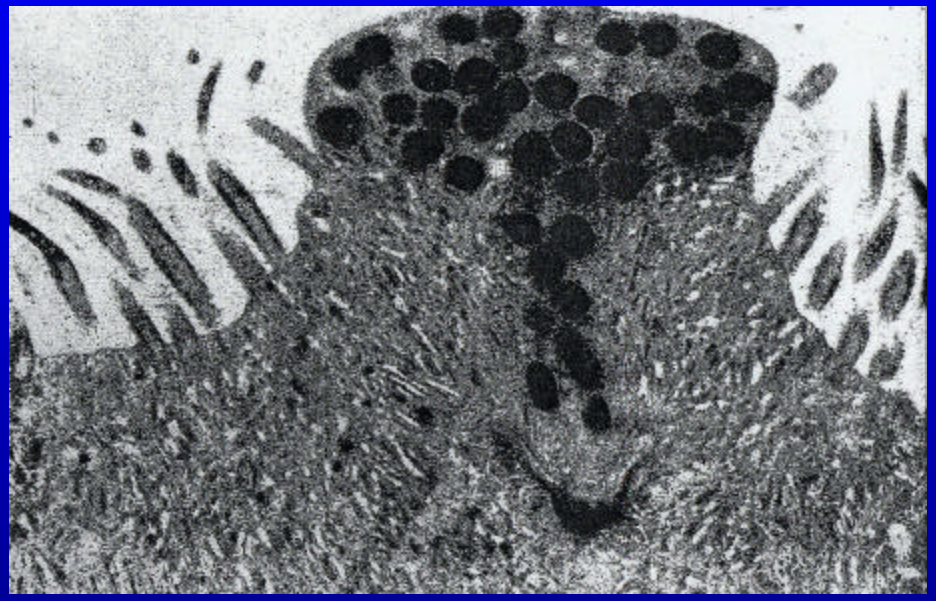
9 Days

SCOLEX OF ADULT *BOTHRIOCEPHALUS ACHEILOGNATHI*





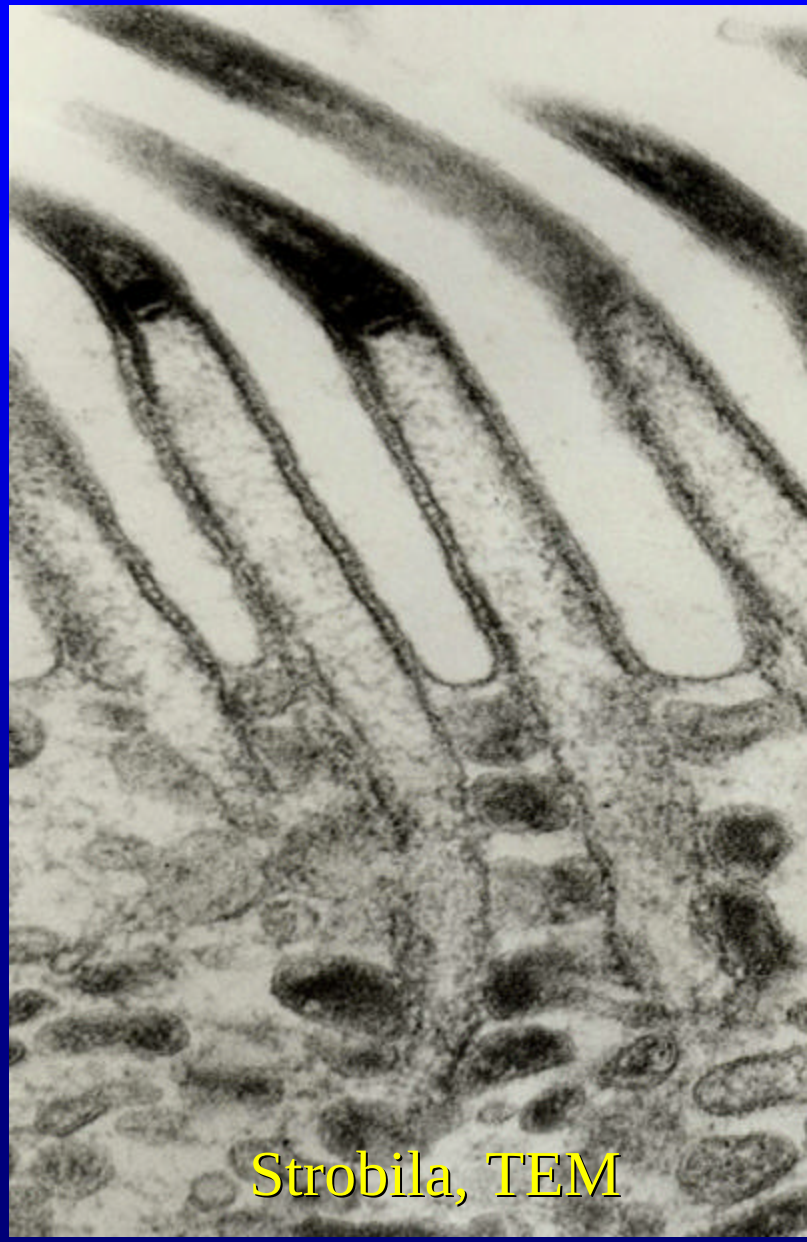
Microtriches and tumuli on the scolex, SEM



Section of tumulus with secretory granules, TEM

MICROTRICHES ON SCOLEX AND STROBILA OF *B. ACHEILOGNATHI*

Scolex, TEM



Strobila, TEM

CONCLUSIONS

- *Bothriocephalus acheilognathi* is found in 3 major water systems of Southern California (Santa Margarita, Santa Ana, and Santa Clara Rivers)
- *B. acheilognathi* infected 5 species of fish: arroyo chub, common carp, golden shiner, fathead minnow, and mosquitofish
- 6 species of local copepods are susceptible to infection by *B. acheilognathi*
- Developement of *B. acheilognathi* from procercoid to adult worm is associated with transformation of tegument and related structures

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Students of Class in Parasitology, 1999 & 2000