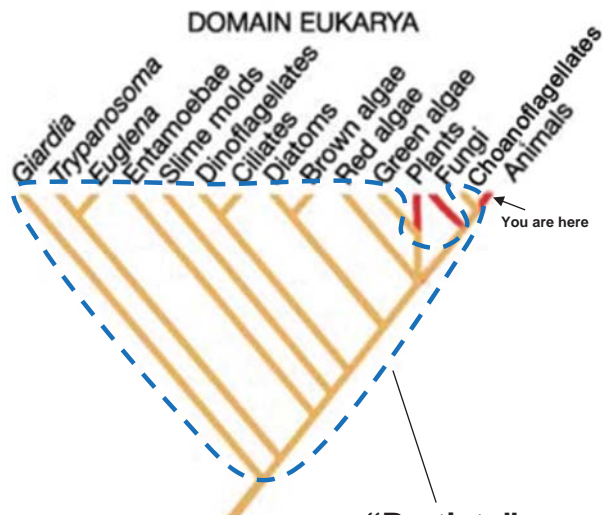
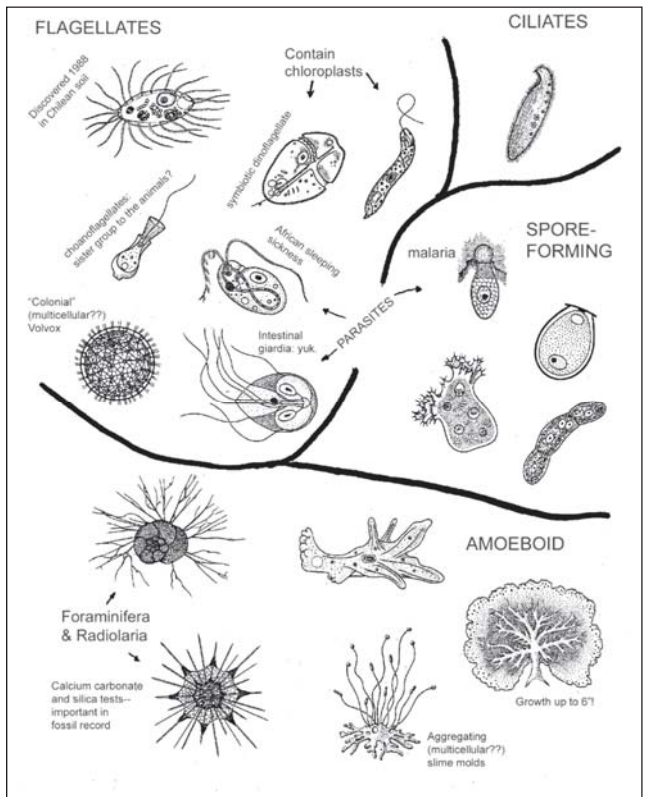


# Where did animals come from?



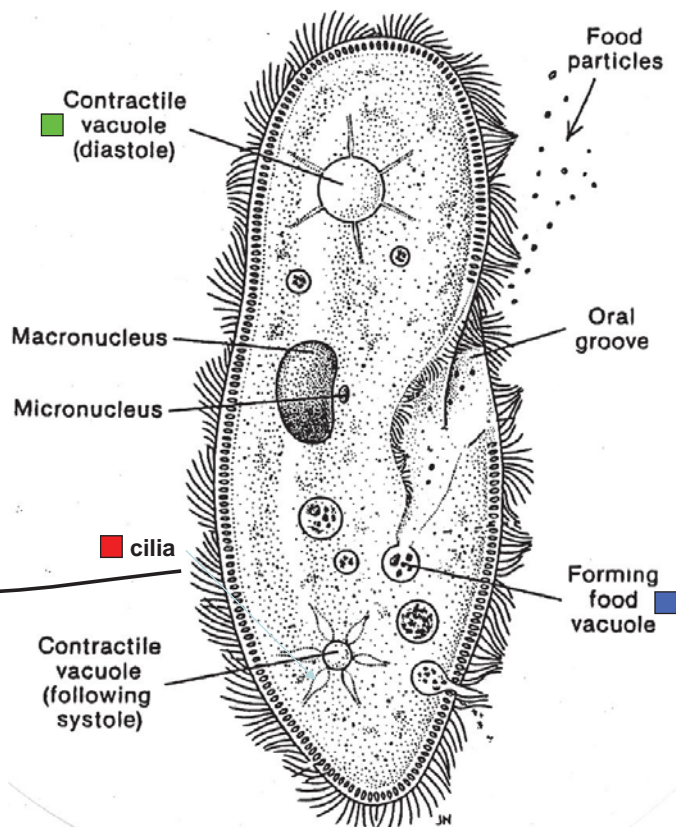
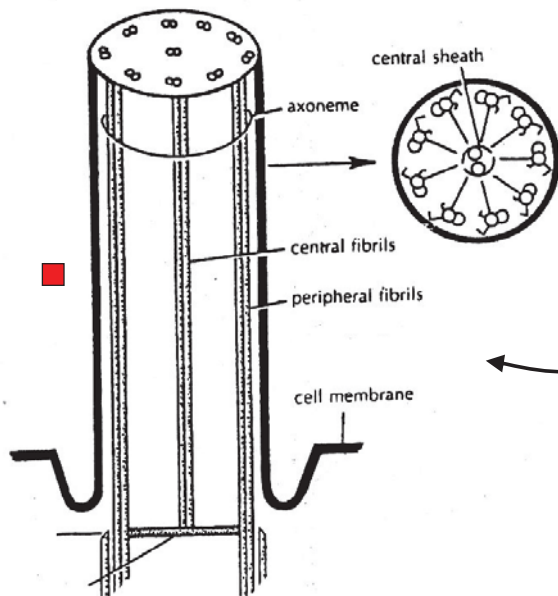
**“Protista”**  
 (single-celled eukaryotes  
 --a paraphyletic mess)

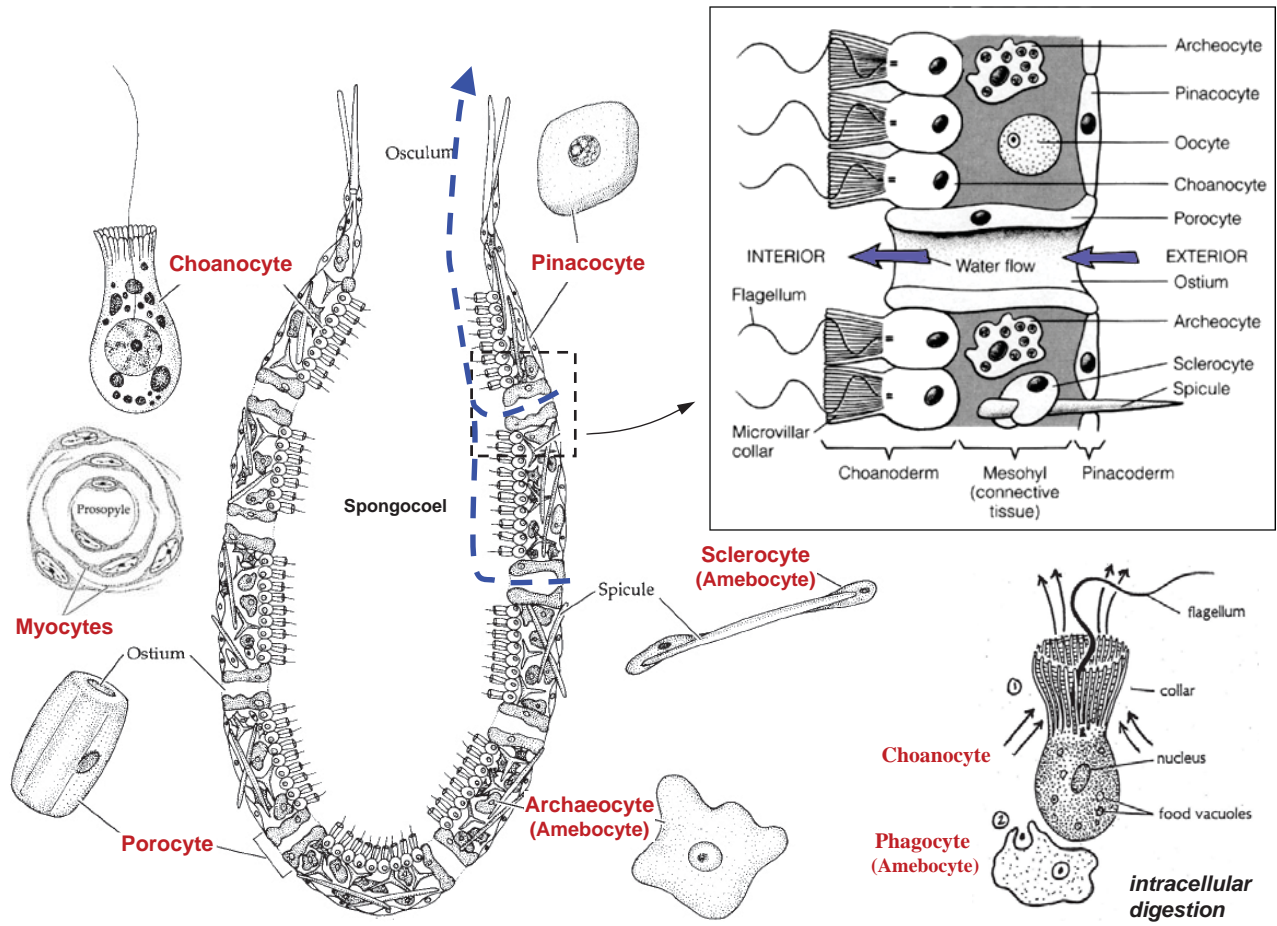
**“Protozoa”** = “animal-like” protists  
 Diverse “body plans”



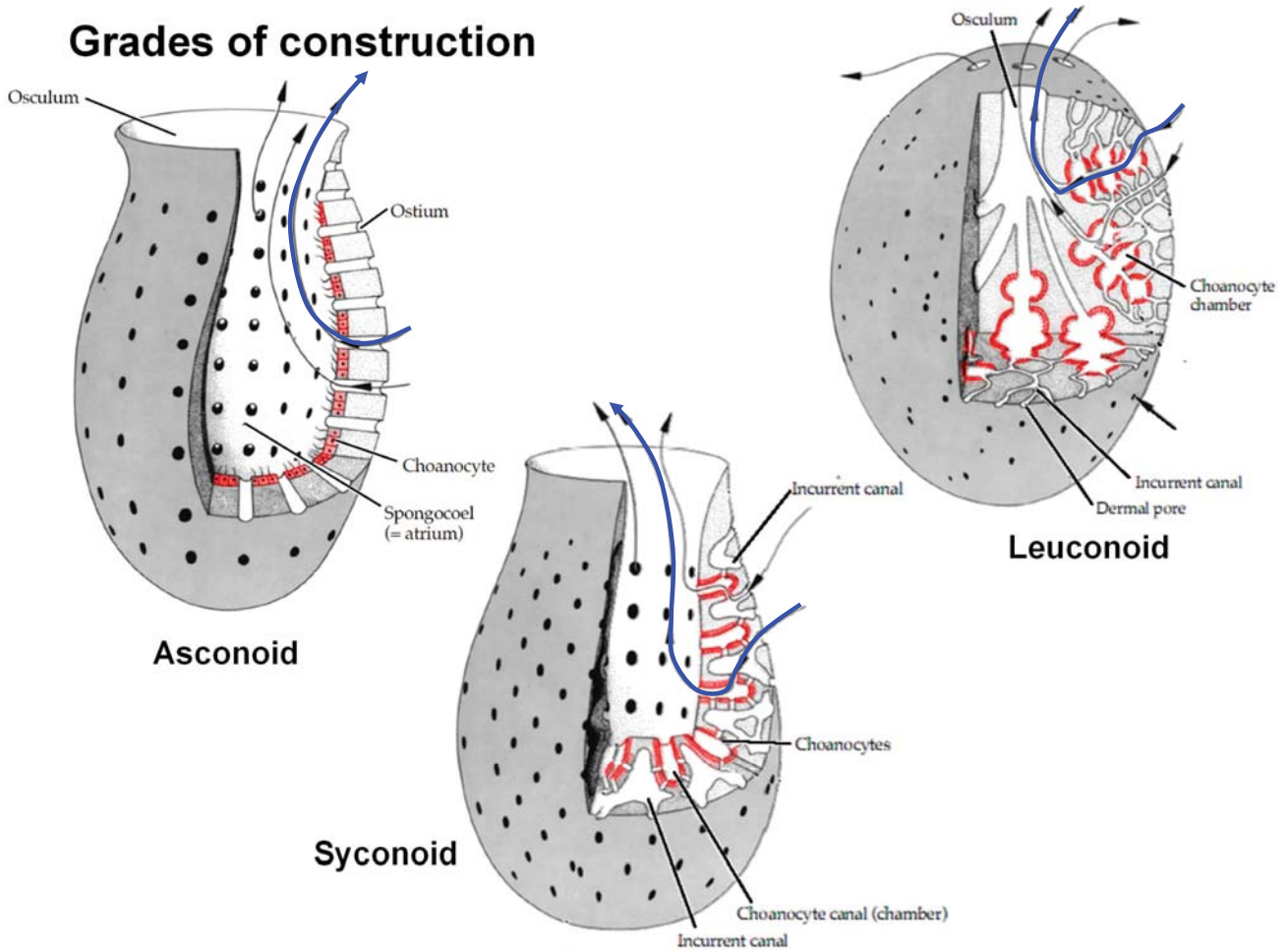
## What key traits did they inherit from their single-celled ancestors?

- nutrition
- volume regulation
- movement

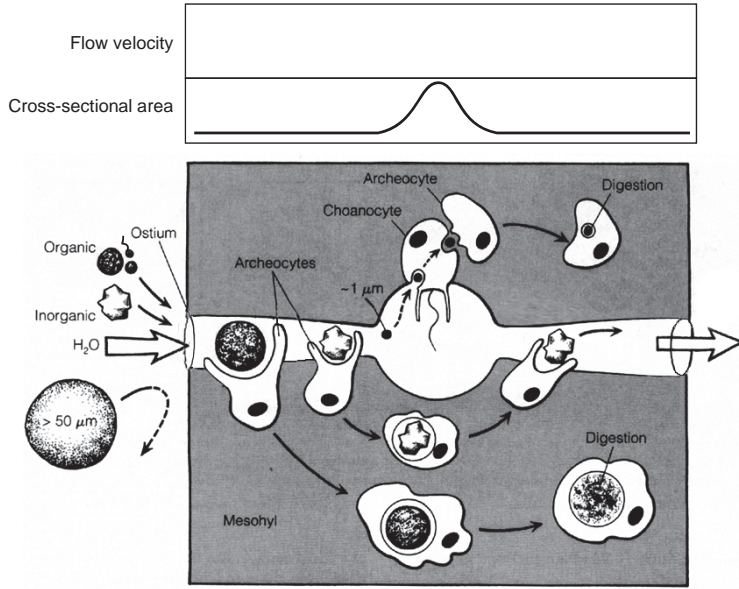




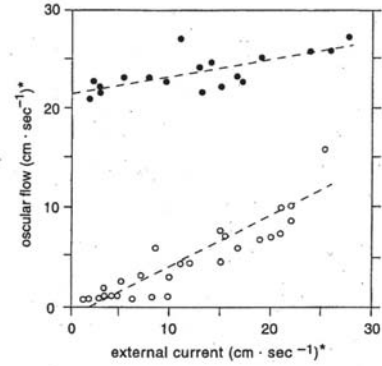
### Grades of construction



# Sponges play with flow



# Induced flow by Bernoulli's principle



**Figure 4.6**  
Influence of morphology on water flow through the marine sponge *Haliciona viridis*. (•) Velocity of water leaving sponge oscula for undisturbed sponges. (○) Data for sponges whose choanocytes were inactivated by immersing sponges in freshwater for several minutes.

$$V_{in} = V_{through} = V_{out}$$

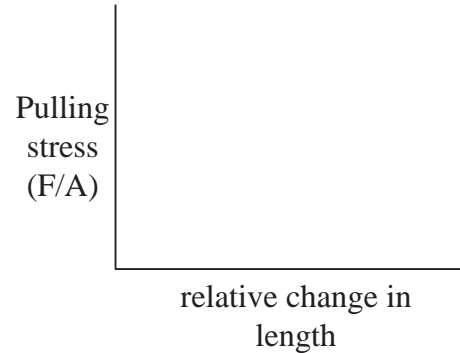
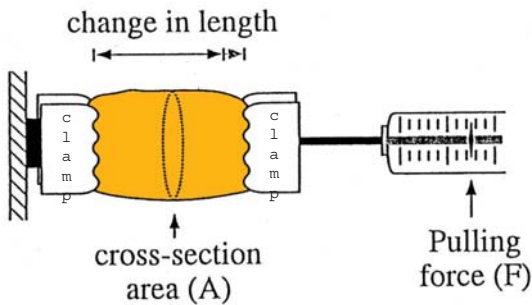
**Table 4.1** Water Transport Characteristics for a Marine Leuconoid Sponge.

The sponge on which the data are based had a total volume of 2.4 cm<sup>3</sup>. From LaBarbera, M., and S. Vogel. 1982. *Amer. Scient.* 70:54-60.

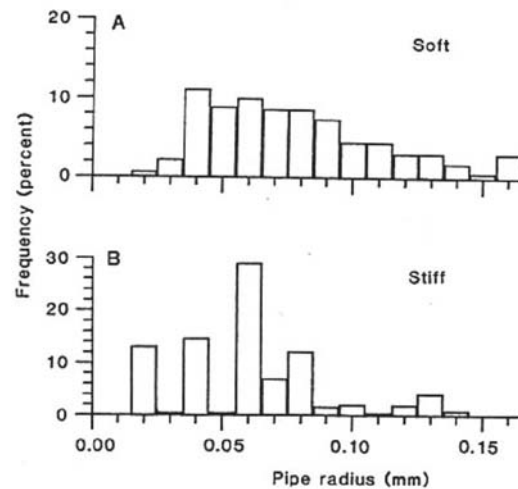
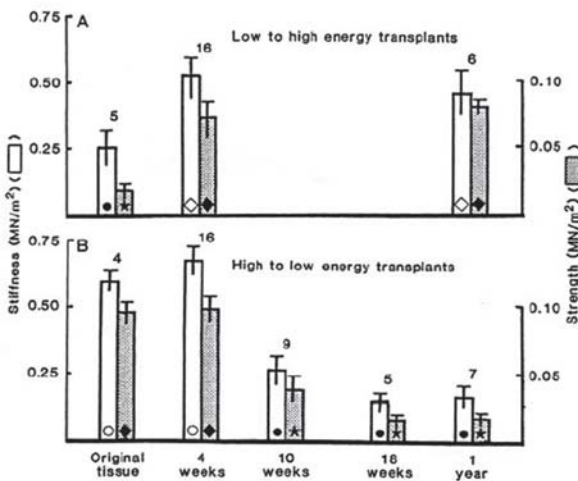
Anatomical feature	Approximate no. per sponge	Individual surface area (cm <sup>2</sup> )	Total area (cm <sup>2</sup> )	Water velocity (cm/sec)
ostia	940,000	$3.33 \times 10^{-6}$	3.14	0.057
flagellated chambers	$2.88 \times 10^7$	$7.06 \times 10^{-6}$	203.0	$8.69 \times 10^{-4}$
osculum	1.0	0.034	0.034	5.1

# Sponges play with form

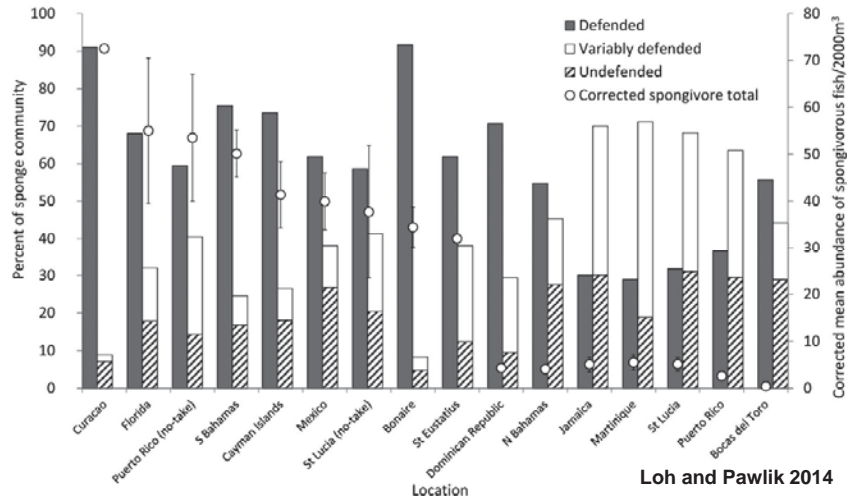
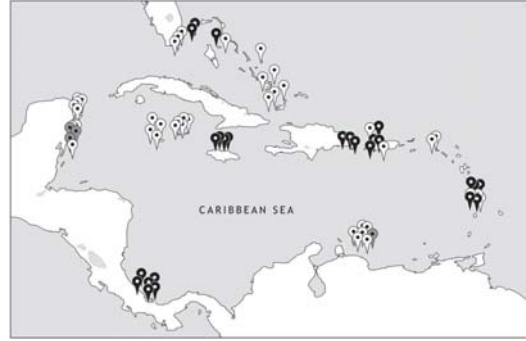
phenotypic plasticity (Palumbi 1984)



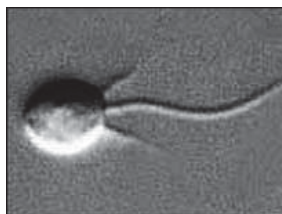
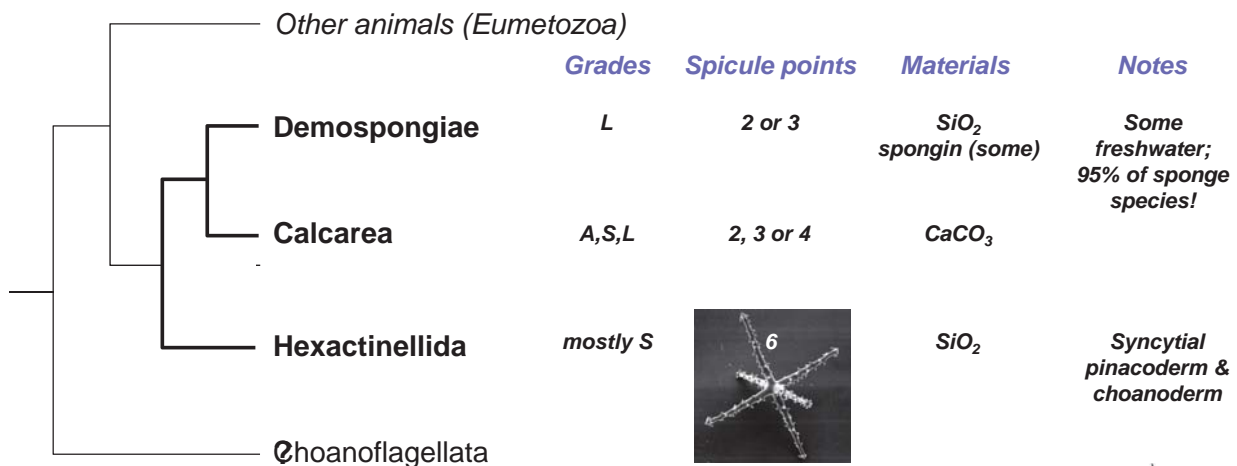
PALUMBI (1984)



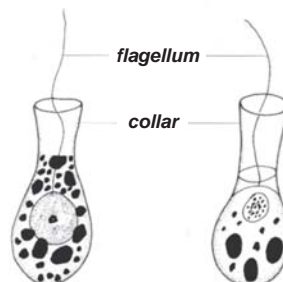
# Sponges play with chemistry: protection



# Sponge class characteristics and relationships

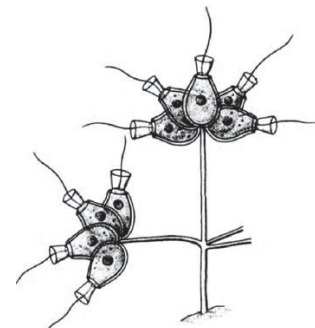


your closest non-animal relative



choanocyte

choanoflagellate



choanoflagellate colony