How snakes find prey underwater: sea snakes use visual and chemical cues for foraging

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Supplementary Figures and Tables

Figure S1. Two species of *Hydrophis* sea snakes used in this study, *H. ornatus* (upper) and *H. melanocephalus* (lower). It is noted that these snakes are also described recently as *Chitulia ornata* and *Leioselasma melanocephala*, respectively (Wallach et al., 2014).

Figure S2. A picture of the sea snake tank in the Suma Aqualife Park, Kobe, Japan. Nine *Hydrophis* snakes used in this study are kept together in this tank. This tank is approximately 2.5m × 1.8m × 1.2m (width × depth × height) and filled with 5,400L of filtered seawater. The filtration pump used in this tank treats approx. 6,900L of water per hour.

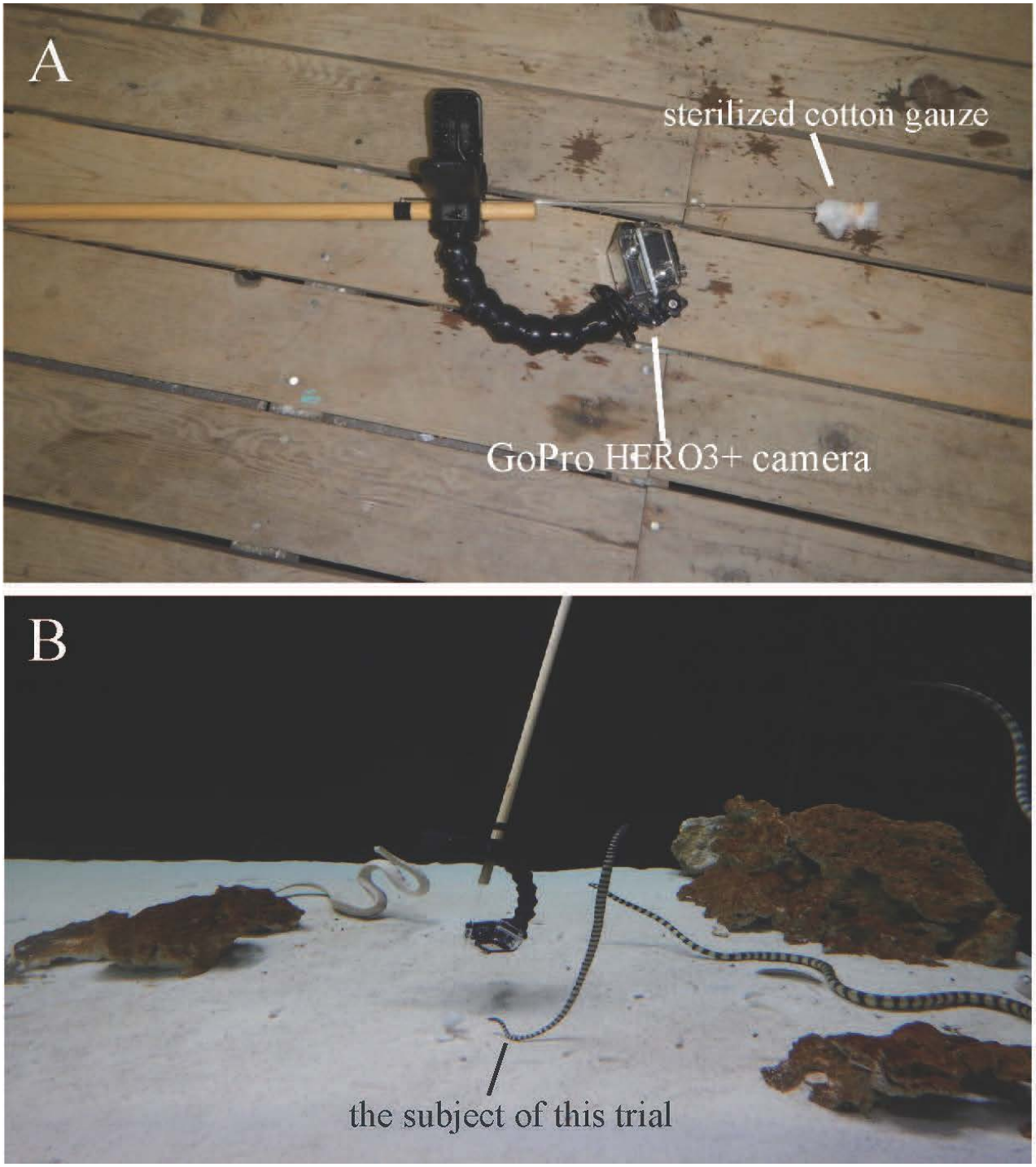

Figure S3. (**A**) A tool used for the chemical preference test. (**B**) A picture taken during a trial of the chemical preference test.

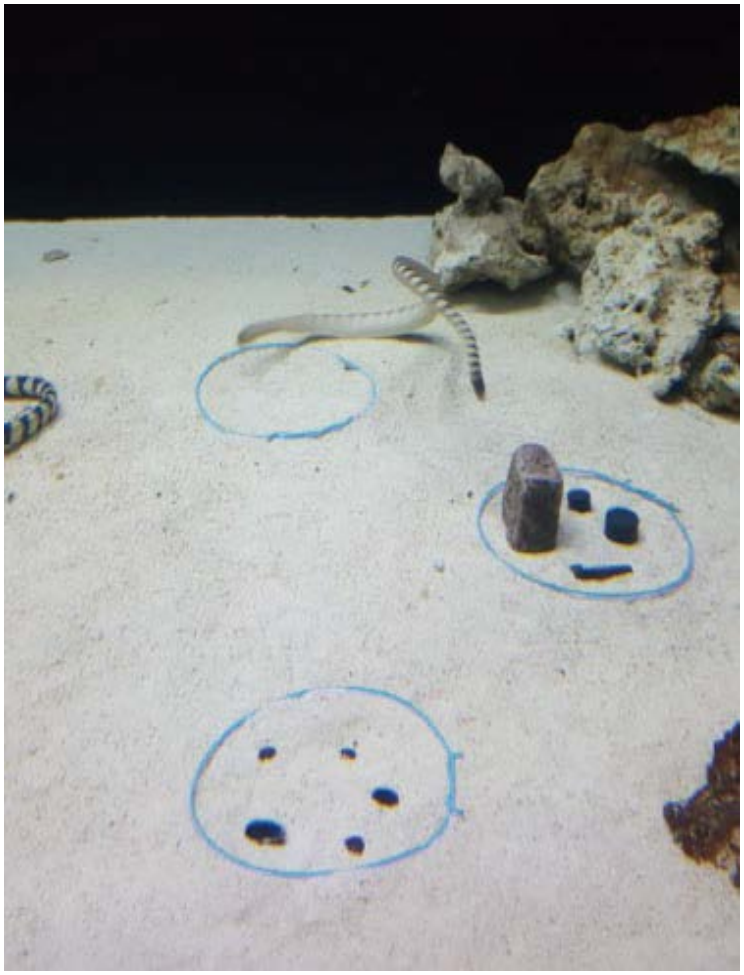

Figure S4. A picture taken during the visual preference test. Upper circle, control; middle, rock model; lower, hole model.

Table S1. *P*-values calculated in the chemical preference test. Note that all trials were treated independently (i.e., n=8). It is assumed that multiple observations from each individual will not be independent of one another. Therefore, we performed an 'unpaired' t-test to account for this by using a model where snakes were chosen randomly with replacement. *P*-values calculated using a 'paired' t-test (n=8, Table S3) and a non-parametric test based on mean value of observations from each individual (n=4, Tables S4) also show essentially same results.

	H. ornatus	*H. melanocephalus*
sand lance *Ammodytes personatus*	0.0079**	0.52
wrasse *Parajulis poecilepterus*	0.0019**	0.19
moray eel *Gymnothorax minor*	0.078	0.078
garden eel *Heteroconger hassi*	0.017*	0.027*
conger *Conger myriaster*	0.034*	0.0091**

** extremely significant (p<0.01)

* significant (p<0.05)

Table S2. *P*-values calculated in the visual preference test. For *p*-value calculation, alternative hypothesis is given as "true probability of pecking at the control model is less than 0.5".

		rock model	hole model
H. ornatus	individual 1	1.6E-10**	2.0E-8**
	individual 2	1.0E-6**	5.2E-16**
	individual 3	0.12	0.59
	individual 4	< 2E-16**	< 2E-16**
H. melanocephalus	individual 1	0.98	0.71
	individual 2	0.0011**	6.6E-12**
	individual 3	0.57	3.5E-10**
	individual 4	1.0	0.010*
	individual 5	4.6E-6**	< 2E-16**

** extremely significant (p<0.01)

* significant (p<0.05)

Table S3. *P*-values calculated using paired single-tailed t-test (n=8).

	H. ornatus	*H. melanocephalus*
sand lance *Ammodytes personatus*	0.0070**	0.58
wrasse *Parajulis poecilepterus*	0.0035**	0.14
moray eel *Gymnothorax minor*	0.088	0.10
garden eel *Heteroconger hassi*	0.048*	0.026*
conger *Conger myriaster*	0.027*	0.0082**

** extremely significant (p<0.01)

* significant (p<0.05)

Table S4. *P*-values calculated using single-tailed asymptotic Wilcoxon-Pratt signed rank test (n=4).

	H. ornatus	*H. melanocephalus*
sand lance *Ammodytes personatus*	0.034*	0.64
wrasse *Parajulis poecilepterus*	0.034*	0.047*
moray eel *Gymnothorax minor*	0.230	0.07
garden eel *Heteroconger hassi*	0.0720	0.034*
conger *Conger myriaster*	0.034*	0.034*

* significant (p<0.05)

Supplementary reference

Wallach V, Williams KL, Boundy J (2014) Snakes of the world: a catalogue of living and extinct species, CRC Press, Boca Raton