

Brief Communication

Competitive feeding behavior interaction between a Dogfish Shark (*Squalus acanthias*) and a Pinniped (*Phoca vitulina*)

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Abstract

Competition between species within a specific environment has been linked to their behavior or morphological structures. It has also been theorized that foraging predators will choose certain prey based on a high energy return for low physiological output. As well, in certain species of shark (spiny dogfish), *Squalus acanthias*, it has been proven under controlled conditions that they will change their feeding behavior and prey type based on competition with other species. However, showing such behaviors in the natural environment is difficult. Photographic evidence was taken of a dogfish, *Squalus acanthias* and harbor seal, *Phoca vitulina*, competing for the same prey in Burrard Inlet, British Columbia. This photographic evidence demonstrates what has been shown under controlled conditions that the *Squalus acanthias* will change its feeding behavior to maximize its successful hunting of various prey and in direct competition with other species. This is also the first known recorded observance of an interaction between these 2 species while they were competitively foraging. [JMATE. 2012;5(2):6-8]

Key words: Scavenging, Competition, Spiny Dogfish, Harbor Seal, Photographic evidence

Introduction

In any environment, competition and predation are basic constituents that can describe the role that an individual plays or their influence on the community structure (8, 10). The interaction or feeding strategies of numerous marine species varies between direct predator-prey encounters to competitive hunting for the same food source (5). When it comes to feeding strategies, ecological and evolutionary theories have given rise to species being classified as specialists (limited diet/prey or live in specific environments) or generalists (large variety of prey or live in several environments) and there is still ongoing controversy as to the benefits of being one or the other (12). Being classified as a predator or a prey is based on varied performance or physiological factors such as speed of prey or predator, morphology, energy acquisition versus

energy loss, habit, or behavior (3).

Being able to document in the wild any type of interaction between top marine species competing for the same prey or food is very difficult to prove (6). Therefore there are few recorded instances of predator marine species with similar feeding habits competing or scavenging for the same food in their natural environment (6). Species of shark, like the spiny dogfish, *Squalus acanthias*, are known as generalists who feed on a wide range of prey such as small fish, bivalves, squid and ctenophores (4). Harbor seals, *Phoca vitulina*, is another generalist species that feeds upon similar prey (demersal fish, schooling fish, octopus or squid) as the dogfish and is considered as being at the same trophic carnivore level (level IV or greater) (2,9,11).

Numerous studies on captive animals have described theoretically how predators or prey would interact within their respective community structures, yet there are few reports about top predators interacting and competing for prey within their natural habitat. We describe, through a series of photographs, an interaction between a harbor seal and a dogfish scavenging from the same prey. These photographs may also prove what has only been hypothesized that the dogfish may learn or adapt new techniques to maximize its successful hunting of various prey items that may result in direct competition with another species.

Methods and Results

A series of photographs were taken showing a seal eating some unknown prey with a dogfish scavenging from the same prey on a clear August day in 2011. During a marine mammal census along the shoreline of Burrard Inlet, Vancouver, British Columbia (49° 18' 0" N, 123° 8' 24" W), a harbor seal (*Phoca vitulina*) was seen in the water eating some unknown prey at approximately 100-150 meters from shore (Figure 1a).



The seal was floating at the surface calmly eating its food when suddenly a spiny dogfish (*Squalus acanthias*) was seen rising to the surface with some of the seal's prey in its mouth (Figure 1b). The dogfish was not attacking the seal but it was clearly seen that the shark was scavenging pieces of food. Both animals shared the food and neither seemed intimidated by the other. This continued for approximately a minute and the shark was last seen diving away (Figures 1c, 1d). The seal continued peaceably eating for a few more minutes and dove below the surface.

All of the photographs were taken using a Canon Rebel XSI camera (Canon Inc., Japan) with a Canon zoom lens (55-250mm zoom lens)(Canon Inc., Japan). All of the photographs were sharpened and clarified using ADOBE Photoshop (version 7.01, Adobe Systems, USA).

Discussion

It is generally accepted that there are numerous limitations between research that is done on animals under captive/controlled conditions and research done on those living within their natural environment (7,14). Captive/controlled research allows for the control of any variables and explores the basic specific mechanisms of behavior but usually with a limited number of subjects (7). Research performed in natural conditions is usually observational in nature and may have small or large numbers of animals within the study. Therefore having concrete observational data taken from the natural environment proving or disproving captive/controlled research theory is invaluable.

It has been reported that under controlled conditions the spiny dogfish can vary their feeding mechanisms or techniques depending upon whatever



1 a



1 b



1 c



1 d

Figure 1: Competitive foraging by a spiny dogfish upon food captured by a harbor seal. In the series of photos (a, b, c, d), the dogfish is seen eating from the same food source that was held in the fore flippers of the harbor seal.

prey is available (15). The Atlantic dogfish species can use a variety of feeding techniques such as suction, ramming, and bite mechanisms interchangeably while feeding on herring (15). As well, the feeding behavior comprising of capture, transport, and manipulation of prey may also vary greatly between individuals depending on previous successful feeding events (15). Also selection of their prey may also depend on their age and sex (1,4). In the literature, there is no mention of this species scavenging or coming in direct competition for food with other species.

We believe that this is the first photographic evidence of the dogfish hunting for a new food source through scavenging. This may reveal a new hunting technique of the dogfish which was only previously reported in the literature under captive conditions (15). The photographic evidence presented identifies the spiny dogfish competing with another generalist species (harbor seal) for the same food, which has never been reported before. This behavior may also be another example of change in a community structure where a top generalist species is adapting in its search for a new food source somewhat similar to orcas preying upon new species of marine mammals (otters) (13).

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