Crustaceans from the Charleston Bump Expedition

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The Charleston Bump is a deep-water, rocky bottom feature on the Blake Plateau southeast of Charleston, SC (Fig. 1). It includes areas of nearly vertical, 300-ft-high rocky scarps with outcrops and overhangs; other complex bottom, such as coral mounds; and flat hard bottom consisting of phosphorite-manganese pavement (Fig. 2). The Bump's topography deflects the Gulf Stream offshore, causing downstream eddies, gyres and upwellings that concentrate plankton, fishes and other organisms along thermal fronts downstream from the Bump, and therefore increase overall productivity.

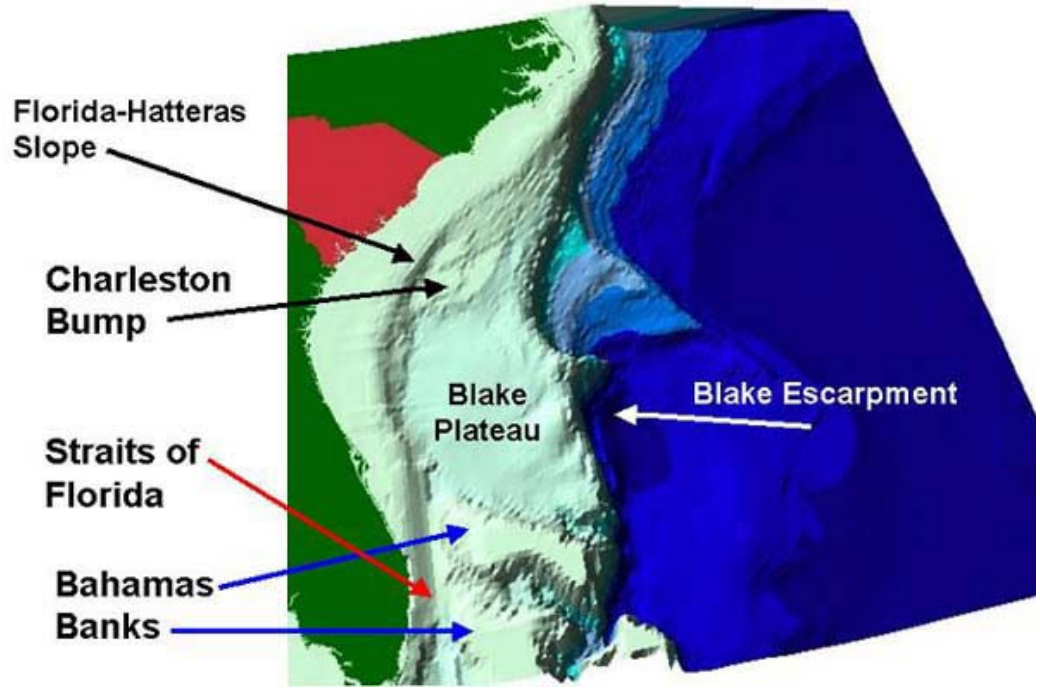

Fig. 1. The Charleston Bump is a deep-water, rocky bottom feature on the Blake Plateau southeast of Charleston, South Carolina.

The rocky relief features of the Bump, changing currents and unpredictable sea states make it a very difficult area to sample. However, the success of past investigations using the Johnson-Sea-Link and other manned and unmanned submersibles indicates an opportunity to continue to learn more about the Charleston Bump and how it functions as habitat for a diverse crustacean fauna.

In August, I had the pleasure to participate with staff from the Marine Resources Research Institute, University of South Carolina, University of Southern Mississippi and University of Georgia in a two week expedition funded by NOAA's Ocean Exploration program that focused on describing small habitat features created by the interaction of currents and erosion resistant features. The goal of the expedition was to characterize the fauna associated with steep rocky scarps, scour depressions, and other hard bottom areas. During the two weeks, numerous collections were made in an effort to examine assemblages associated with various habitats and with larger sessile invertebrates.

Fig. 2. The Charleston Bump is characterized by rocky substrate with many exposed ledges

Perhaps the most conspicuous and colorful mobile crustaceans encountered on our dives were crabs. Often seen on a rocky ledge or crawling among the coral branches and fan-shaped sponges, crinoids, and other sessile organisms that cover deep-sea coral mounds, the galatheid *Eumunida picta* and the portunid *Bathynectes longispina* were the larger crabs seen on our dives (Fig. 3). These colorful crabs largely ignored the submersible until we tried to collect them using either the suction device or the scoop sampler. They would then assume an agonistic stance with arms outstretched toward the source of disturbance in their normally dark world. The red coloration of both these crabs is quite striking among the creamy white coral - and under the harsh lights of a submersible. Not all of the crabs are large. Some make their homes within the bottom sediments, under ledges, or even within sponges and among the corals. These more cryptic inhabitants are not as visible as their large relatives, but they are nonetheless fascinating, having their own particular adaptations to the deep-water habitat where they reside.

Jerry McClelland of the University of Southern Mississippi investigated the diverse groups of small crustaceans that occurred in the rocks, sediment and sessile invertebrates collected during the expedition (Fig. 4). The most commonly occurring cryptic crustaceans among the "live rock" encrusting communities of the Charleston Bump are the Asellote isopods, which forage for food particles among the coral and hydroid stalks. When not feeding, they seek shelter from predators in the crevices among rocks, dead coral, and similar hiding places. Jerry, working in conjunction with Susan DeVictor from

the Southeastern Regional Taxonomic Center, spent many hours carefully extracting specimens by briefly dipping the live rock into a weak solution of sea water and formalin, causing the animals to rapidly vacate their hiding places. Water containing the animals was then strained through a fine mesh screen from which the specimens were removed for study.

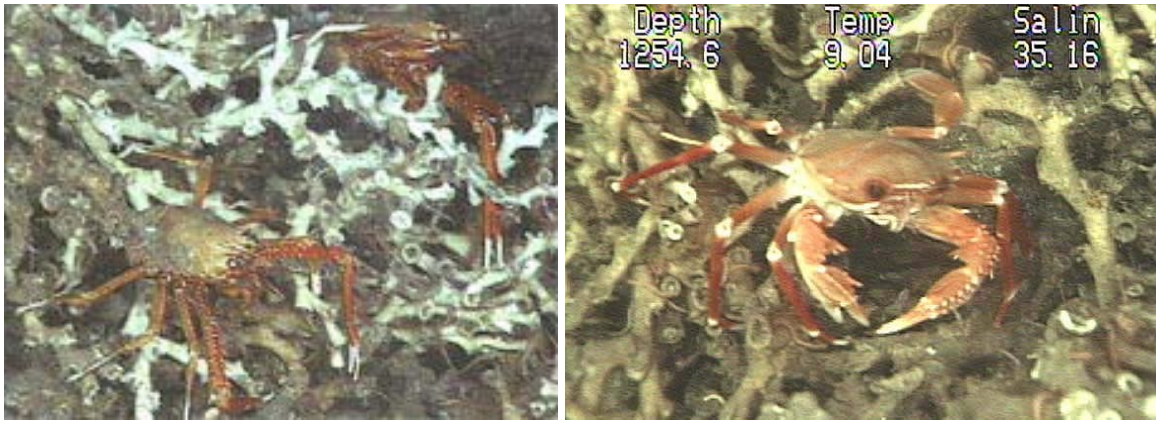

Fig. 3. These deep-water crabs (*Eumunida picta* and *Bathynectes longispina)* are commonly seen on the mounds of *Lophelia,* a deep-dwelling coral.

Fig. 4. Jerry McLelland from the University of Southern Mississippi spent many hours hunkered over his microscope taking photographs of both benthic and pelagic invertebrates on the cruise.

In addition to using the submersible to photograph and collect crustaceans, sampling activities that took place on the R/V *Seward Johnson* included measurement of temperature, salinity, oxygen content, and current speed and direction throughout the water column. This information will be used to describe the water column and dynamics of water flow at the Charleston Bump and to characterize the habitat of the organisms that we collected. We also used a neuston plankton net to collect small crustaceans and fishes in surface waters and a pipe dredge to collect organisms in the top few centimeters of sediment on the ocean bottom. I also deployed carrion traps in order to attract crustaceans that weren't readily collected by the submersible's scoop or suction samplers. In the early 1980s, I deployed carrion traps at depths of 194-212 m on ridge areas off the coast of South Carolina. The main organisms caught in these traps were crustaceans, most of which were necrophagous amphipods and isopods. I decided it would be

worthwhile to repeat the experiment on this cruise at the deep depths under the Charleston Bump.

The buckets that we deployed from the submersible were filled with dead oysters that would not only provide food for the scavengers of the deep, but would also provide a complex substrate within which the organisms could hide. The deployment of the buckets involved using the claw on the sub's mechanical arm to lift each baited bucket from the front basket of the sub. One bucket was placed at the bottom of a high relief ridge while the other was placed on top of the ridge.

Once the sub was secured back aboard the *Seward Johnson*, we took the carrion traps out of the front basket and carefully began to wash each oyster shell. Two species of shrimp, tentatively identified as *Plesionika and Heterocarpus sp.*, were in the bucket, as were hundreds of amphipods with bright orange eyes (Fig.5) . It isn't known from what distance these scavengers are attracted to the baited buckets, but clearly, they must have highly developed sensory receptors. Perhaps they make use of the currents that occur near the bottom and move in the direction of the bait's odor trail until they locate the odiferous food. It has been suggested that these amphipods move like hovering buzzards above the sediment surface until they locate the chemical plume of the odor and follow it either upstream or downstream of the current. The energetic cost of hovering or swimming may be offset by the use of fat deposits in the organism that keep it near buoyancy.

Fig.5. Crustaceans collected from the carrion traps deployed on the Charleston Bump.

Because of the uniqueness of the Charleston Bump and its importance in the life history of oceanic fishes like swordfish and wreckfish, it has been suggested that the Bump be incorporated into the U.S. National Marine Sanctuaries Program, or that some other type of ecosystem management be employed to protect the area's natural resources. Our expedition to the Charleston Bump will provide much more information on the invertebrates and the importance of the Bump's habitats to them. We have just begun to examine the videotapes from sub dives and the samples and data that were collected. Many more interesting findings will result in the months ahead as we work through the material from the expedition. I look forward to future expeditions to the slope where more exciting areas will be explored and new species collected.