DECAPOD CRUSTACEANS AND PYCNOGONIDS OF ROCAS ALIJOS

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INTRODUCTION

Decapod crustaceans and pycnogonids (commonly called sea spiders) could have reached Rocas Alijos as larval stages transported by currents, or as adults or larvae carried on drifting algae and other objects at the surface. Potential sources of recruits include the Pacific mainland coast and nearby islands of Baja California, the islands and reefs of Cape San Lucas and the southern Gulf of California, and the Revillagigedos Islands to the south.

The collections of the University of Southern California (Allan Hancock Foundation), Scripps Institution of Oceanography, and the California Academy of Sciences contain many specimens of decapods taken off Baja California. Large series of specimens were taken during cruises of the *Velero III* and *Velero IV* in 1933-1941 and 1954, the *Orca* in 1949-51, and the *Searcher* in 1971. Other specimens were taken during expeditions to the Revillagigedos Islands, field trips along the northern shore of Baja California, and recent diving trips near Cabo San Lucas. Hernandez-Aguilera et al. (1986) and Hernandez-Aguilera and Martinez-Guzman (1990) recently compiled new species records from the Revillagigedos Islands. However, there are no previously published records from Rocas Alijos, nor are there specimens of decapods or pycnogonids from there in any major museum. During the 1990 and 1993 Cordell Expeditions to Rocas Alijos, the author and others made various collections of invertebrates. The reports given here are the first documented records of decapods and pycnogonids from Rocas Alijos.

METHODS

Decapods and other arthropods were caught by hand or dip net or picked out of sponge samples and worm tubes. Sampling by baited crab and minnow traps also was attempted, but no identifiable decapods or pycnogonids were collected by these methods. Color notes and living color photographs were obtained when possible. Specimens were relaxed by leaving them in small dishes of sea water without aeration until the animals were dead. Specimens were preserved in 10% formalin in sea water aboard ship, later rinsed in fresh water and transferred to 70% ethanol. Decapods were deposited in the collections of the Allan Hancock Foundation, University of Southern California (USC), the California

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Academy of Sciences (CAS), the United States Museum of Natural History, Smithsonian Institution (USNM), and the Estacion Mazatlan of the Universidad Autonoma de Mexico (EMU). Identifications of anomurans and brachyurans were checked by Janet Haig and John Garth of the University of Southern California. Pycnogonids were sent to C. Allan Childs, who identified them and retained them for the collections of the Smithsonian Institution.

Common names used in this paper follow the usage of Kerstitch (1989) and Williams (1989), except for those in quotations, the common names that I am suggesting. Numbers of specimens were those examined by one of the listed identifiers or by myself; however, additional specimens of *Petrolisthes hians* and *Globopilumnus xantusii* later were picked out of sponge specimens but not counted. Unless otherwise noted, specimens were collected during the 1990 expedition.

RESULTS

Collected at Rocas Alijos were 20 species of decapods and 3 species of pycnogonids. Of these, *Synalpheus nobilii, Petrolisthes hians,* and *Globopilumnus xantusii* were the most abundant and widespread, occurring among rocks and in sponges from the intertidal zone to the lowest subtidal areas throughout the area.

Most of the species range from Rocas Alijos and the Gulf of California south to Panama, Colombia, or the Galapagos Islands. *Pachygrapsus crassipes* and *Paguristes ulreyi* range from Oregon or British Columbia south to the Gulf of California, but have not been reported previously from Rocas Alijos or nearby areas of Baja California. The species composition on the whole is more similar to that of the Revillagigedos Islands and Cape San Lucas than to that of the nearest coast of Baja California or most of the Gulf of California.

Class Crustacea
Order Decapoda
Section Caridea: shrimps
Family Alpheidae

Synalpheus nobilii Coutiere, 1909: "Nobili's snapping shrimp"
Reported range: Gulf of California to Galapagos Islands (Wicksten, 1983); Clarion Island (Hernandez-Aguilera et al., 1986), Indonesia (Banner and Banner, 1985).
Locations at Rocas Alijos: South Rock, reefs south of South Rock, 15-Fathom Pinnacle, among rocks, tubes, and sponges, low intertidal to 31 m, 16 specimens.
Natural history notes: *Synalpheus nobilii,* like other snapping shrimps, makes a loud snapping noise by use of the major chela. In life, the animals were an over-all translucent olive green or pale reddish brown. The tips of the chelae were dark, as was the visceral mass. The tail fan had a translucent orange fringe. One from south of South Rock lacked a rostrum.

Synalpheus townsendi mexicanus Coutiere, 1909: "Surian snapping shrimp". (The common name is derived from "Baja California Sur").
Reported range: Gulf of California, from Puerto Escondido to Cape San Lucas (Wicksten, 1983).
Location at Rocas Alijos: 15-Fathom Pinnacle, 31 m, in sponge, 5 specimens.
Natural history notes: In life, these small snapping shrimps were pale pink with a green visceral mass and eggs.

Alpheus paracrinitus Miers, 1881: smoothclaw snapping shrimp
Reported Range: Pantropical; eastern Pacific from southern Gulf of California to Galapagos (Kim and Abele, 1988).
Location at Rocas Alijos: Ridge north of North Rock, under rock in crevice, 33 m, 15 Feb. 1993, one specimen.
Natural history notes: In life, this small shrimp was marked with narrow bands of red chromatophores across the junction of each abdominal somite. The red-banded color pattern seems to be typical of this species.

Family Hippolytidae

Lysmata californica (Stimpson, 1866): red rock shrimp
Reported range: Rarely as far north as Tomales Bay, California; usually south of Point Conception to Galapagos Islands (Wicksten, 1983, 1990).
Location at Rocas Alijos: Ridge north of North Rock, under rock, 33 m, 15 Feb., 1993 one specimen.

Thor sp. nov.
A single specimen of an undescribed species of *Thor* was taken. The species is described in a separate paper in this volume (Wicksten, 1996).

Section Anomura
Family Paguridae

Pagurus benedicti (Bouvier, 1898): "Benedict's hermit crab"
Reported range: Magdalena Bay, Baja California to Galapagos Islands (Haig et al., 1970, as *P. galapagensis* [Boone, 1932]).
Location at the Rocas Alijos: Off South Rock, 22 m, among rocky rubble, one specimen.

Family Diogenidae

Paguristes ulreyi Schmitt, 1921: furry hermit crab
Reported range: British Columbia to Gulf of California (Hart, 1982).
Location at Rocas Alijos: 15-Fathom Pinnacle, 78 m, on sand, one specimen.

Family Porcellanidae

Petrolisthes hians Nobili, 1901
Reported range: Santa Maria Bay, Baja California; Gulf of California south to Ecuador (Haig, 1960).
Locations at Rocas Alijos: Virtually ubiquitous from the low intertidal zone to 31 m, among rocks and in sponges, 42 specimens.

Petrolisthes edwardsi (Saussure, 1853): "purple porcelain crab"
Reported range: Santa Maria Bay, Baja California south to Galapagos Islands (Haig, 1960).
Locations at Rocas Alijos: South of South Rock, 15-18 m, among rocks, 2 specimens.

Petrolisthes glasselli Haig, 1957: "Glassell's porcelain crab"
Reported range: Cape San Lucas, Baja California south to Galapagos Islands (Haig, 1960).
Location at Rocas Alijos: North of Middle Rock, 7 m, among rocks, one specimen; ridge north of North Rock, 33 m, under rock in crack, 15 Feb. 1993, one specimen.

Family Galatheidae

Pleuroncodes planipes Stimpson, 1860: pelagic red crab
Reported range: Rarely as far north as San Francisco, California; usually south of central Baja California, Gulf of California to Costa Rica (Schmitt, 1921, USC unpublished records).
Locations at Rocas Alijos: Collected at night light by dip net near surface, over 100 m deep water, off South Rock and near 15-Fathom Pinnacle, 13-14 Feb. 1993, 8 specimens. Another specimen was found in 1990 in the stomach of a mahi-mahi (*Coryphaena hippurus*), but not saved.

Section Brachyura
Family Majidae

Herbstia camptacantha (Stimpson, 1871): flat spider crab
Reported range: Cape San Lucas and Gulf of California to Oaxaca, Mexico (Garth, 1958); also Clarion Island (Hernandez-Aguilera et al., 1986).
Locations at the Alijos Rocks: South of South Rock, 15-Fathom Pinnacle, 15-37 m, two specimens; 15-Fathom Pinnacle, 69 m, among sponges, 14 Feb. 1993, one specimen.

Podochela veleronis Garth, 1958: "Velero spider crab"
Reported range: Gulf of California to Ecuador (Garth, 1958).
Location at Rocas Alijos: East of South Rock, 22 m, among algae, one specimen.
Natural history notes: When collected, the crab was decorated with pieces of algae on the carapace and walking legs.

Stenorhynchus debilis (Smith, 1871): Panamic arrow crab
Reported range: Magdalena Bay, Baja California; Gulf of California south to Galapagos Islands (Garth, 1958).
Location at Rocas Alijos: Five-Fathom Pinnacle, 18 m, on cliff, one specimen. An additional specimen representing a northern range extension was taken on 17 Feb. 1993 under a rock at 20 m, Abalone Point, Guadalupe Island.
Natural history notes: The specimen from Guadalupe Island was covered by tiny athecate hydroids, which appeared to have settled on the crab *in situ* rather than being placed by the crab itself.

Family Portunidae

Cronius ruber (Lamarck, 1818): blackpoint sculling crab
Reported range: Cedros Island, Baja California south to Peru (Garth and Stephenson, 1966).
Location at Rocas Alijos: Shallow subtidal zone of South Rock, inside spent artillery shell, two specimens.

Family Xanthidae

Globopilumnus xantusii (Stimpson, 1860): "Xantus's hairy crab"
Reported range: Cape San Lucas, Baja California to Galapagos Islands (Garth, 1946, as *Pilumnus xantusii*).
Locations at Rocas Alijos: Virtually ubiquitous, intertidal to 31 m, among rocks, worm tubes, and sponges, 24 specimens.

Daira americana Stimpson, 1860: "bumpy pebble crab"
Reported range: Cape San Lucas to Galapagos Islands (Garth, 1946), also Clarion Island (Hernandez-Aguilera et al., 1986).
Locations at Rocas Alijos: Off South Rock, 14 m; off North Rock, 15-23 m, under rocks, 8 specimens.
Natural history notes: Three bumpy pebble crabs were kept in aquaria for more than two years. These crabs rarely left holes in the rocks, where they remained during most of the daylight hours. They tended to occupy the same holes for weeks or months at a time, venturing out to grab food and promptly returning to the hole before eating. At Rocas Alijos, the crabs were found in cracks or under small rocks.

Family Grapsidae

Grapsus grapsus Linnaeus, 1758: Sally lightfoot
Reported range: San Benito Islands, Baja California to Galapagos Islands (Garth, 1946).
Location at Rocas Alijos: Upper splash zone of Middle Rock, 4 specimens.
Natural history notes: Three ovigerous females were collected.

Pachygrapsus crassipes Randall, 1839: striped shore crab
Reported range: Japan, Korea; Charleston, Oregon to Santa Margarita Island, Baja California, upper Gulf of California (Garth and Abbott, 1980).
Location at the Alijos Rocks: South Rock, intertidal zone, 2 specimens.

Plagusia depressa tuberculata Lamarck, 1818: "Pacific tidal spray crab"
Reported range: Indo-Pacific region from Arabian Sea to Hawaii; Cape San Lucas, Cocos Island, Clipperton Island (Garth, 1965).
Location at the Alijos Rocks: South Rock, splash zone, one specimen. Another specimen representing yet another eastern Pacific record was collected on floating driftwood off Panama in 1993 (David Owens, Texas A&M University, pers. comm.).

Class Pycnogonida

Family Pycnogonidae

Pycnogonum reticulatum Hedgpeth, 1948: "network sea spider"
Reported range: Florida, Carribean coast of Mexico to Venezuela; eastern Pacific in El Salvador (Child, 1979).
Location at Rocas Alijos: 15-Fathom Pinnacle, 50-60 m, one specimen.

Pycnogonum rickettsi Schmitt, 1934: "Ricketts' sea spider"
Reported range: Friday Harbor, Washington to Monterey (Haderlie et al., 1980), Anacapa Island, California (USC unpublished records).
Location at Rocas Alijos: 15-Fathom Pinnacle, 31 m, among sponges, one specimen.

Family Ammotheidae

Tanystylum sp.
Location at Rocas Alijos: Five-Fathom Pinnacle, 12-34 m, among sponges and hydroids, one specimen.
Remarks: C. A. Child considers this to be an undescribed species related to other species found along the coast of western Panama. He is working on a species description.

DISCUSSION

The fauna of decapods and pycnogonids at Rocas Alijos is depauperate relative to more sheltered coastal areas and islands. The strong surf, storm-swept shallow areas, and barren surge channels offer little food or shelter for motile animals such as these. The remote location of the rocks also probably has inhibited recruitment by larval stages. The 3 upper intertidal crabs (*Grapsus grapsus*, *Pachygrapsus crassipes*, and *Plagusia depressa*) all belong to the same family, and have the capability both as megalops larvae and as adults to ride on floating driftwood, kelp holdfasts, or other debris at the sea surface.

The decapod fauna of Rocas Alijos is primarily tropical in its affinities. Cold-water indicator species, such as shrimps of the genera *Pandalus* and *Heptacarpus*, kelp crabs (*Pugettia* spp.), and rock crabs (*Cancer* spp.) were absent. The 3 most abundant species belong to families best represented in tropical waters.

Additional species of decapods may remain to be collected at Rocas Alijos. Few samples were taken in the sand off the Pinnacles, where burrowing crabs and shrimps may occur. Capt. John Klein of the *Qualifier 105* reported that fishermen had trapped "lobsters" (probably *Panulirus* sp.) near the rocks, but these were not observed or collected. Divers also found fragments of the carapace of a large brachyuran crab near the rocks, but the smashed pieces could not be identified and were not saved.

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