ORCAWALE 2008: Weekly Report

Report Dates: 26 October - 1 November 2008 Chief Scientist: *Jay Barlow* Leg 4 Cruise Leader: *Karin Forney*

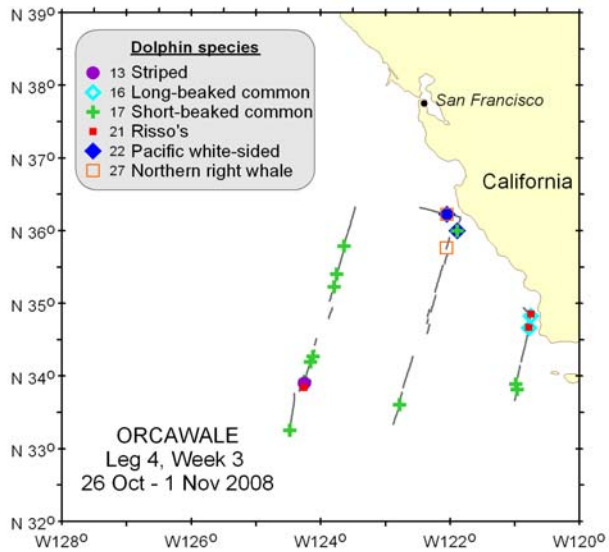
Weekly Science Summary
Karin Forney

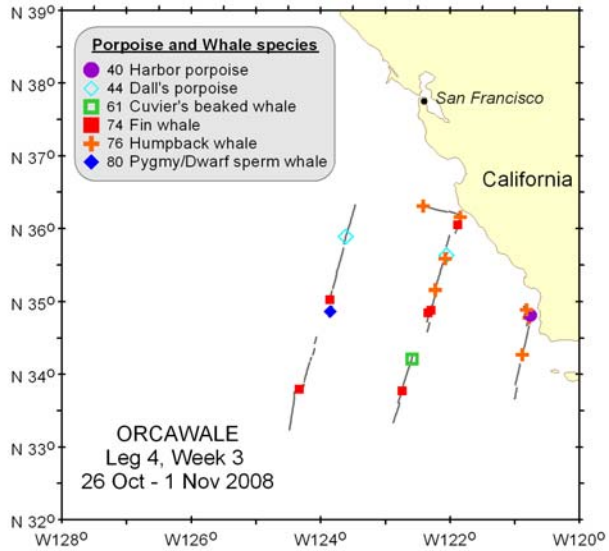
Our goal for the final week of Leg 4 was to complete several transect lines off central California. This is an area that will become increasingly stormy during the next few weeks, and our current weather forecast looked good. So we headed to Pt. Sur, hoping for sunny skies, calmer seas, lots of marine mammals, and maybe even a few endangered California Condors soaring above the Big Sur coastline. But as we approached the area during the night, we got our first clue that things would not go as planned -- the fog horn kept us awake all night sounding every 2 minutes. And sure enough, in the morning we were greeted with dense fog, preventing visual surveys. It's always something….

After reviewing weather options, I took us offshore suspecting the fog would lift earlier there, and luckily we were back on effort on a southbound transect line by early afternoon. During the next few days we continued to dodge areas of fog and wind, and we ultimately succeeded in completing all of our target transect lines (see figures at right).

As hinted last week, we had one notable observation on Sunday, Oct 26 -- a rare sighting of two pygmy or dwarf sperm whales (*Kogia breviceps* or *Kogia sima*). These two related species are cryptic, little sperm whales -- only about 3-4 meters in length. They usually surface inconspicuously and disappear again leaving almost no trace on the water's surface. In their offshore habitat, seas are rarely calm enough to detect *Kogia*, and we have not observed them during our coastwide surveys since 1993.

Species diversity was also high this past week, with eight dolphin species, two porpoise species, and four whale species recorded. The highlight of the week came on our last day off Pt. Conception: an enormous school of long-beaked common dolphins, *Delphinus capensis*, which stretched as far as the eye could see on both sides of the ship. One…two…three…four… many, many dolphins! A spectacular sight.





As the week concludes, we have arrived in San Francisco, to take a break and restock supplies before the final leg of ORCAWALE. Lisa Ballance will join the team as cruise leader. We also bid farewell to Tina Yack, Jason Blackburn, Elizabeth Becker, and Andrey Suntsov. It's been a pleasure leading this excellent team, and I wish everyone well for Leg 5!

Marine Mammal Effort Summary.

Date	Start time Stop time	Start location Stop location	Distance surveyed (nm)	Average Beaufort
102608	0736 1820	N36:19.50 W123:28.05 N34:46.95 W123:52.89	83.8	1.8
102708	0741 1749	N34:31.16 W124:04.03 N33:14.41 W124:29.28	64.8	3.0
102808	0739 1524	N33:20.10 W122:52.86 N34:15.89 W122:34.72	53.4	5.2
102908	1248 1800	N36:19.12 W122:28.21 N35:55.74 W121:55.64	41.3	4.0
103008	0736 1751	N35:54.24 W122:00.67 N34:35.40 W122:21.37	72.8	4.4
103108	0730 1742	N33:39.75 W121:00.28 N34:56.19 W120:51.49	71.4	4.0
102608	0736 1820	N36:19.50 W123:28.05 N34:46.95 W123:52.89	83.8	1.8

Marine Mammal Sighting Summary.

Code	Species	Common name	No. sightings
013	*Stenella coeruleoalba*	Striped dolphin	1
016	*Delphinus capensis*	Long-beaked common dolphin	2
017	*Delphinus delphis*	Short-beaked common dolphin	12
021	*Grampus griseus*	Risso's dolphin	3
022	*Lagenorhynchus obliquidens*	Pacific white-sided dolphin	2
027	*Lissodelphis borealis*	Northern right whale dolphin	2
040	*Phocoena phocoena*	Harbor porpoise	1
044	*Phocoenoides dalli*	Dall's porpoise	2
061	*Ziphius cavirostris*	Cuvier's beaked whale	1
070	*Balaenoptera* sp.	Unidentified rorqual	1
074	*Balaenoptera physalus*	Fin whale	6
076	*Megaptera novaeangliae*	Humpback whale	7
077	Unid. dolphin	Unidentified dolphin	1
078	Unid. small whale	Unidentified small whale	1
079	Unid. large whale	Unidentified large whale	1
080	*Kogia* sp.	Pygmy or dwarf sperm whale	1
096	Unid. cetacean	Unidentified cetacean	1
177	Unid. small delphinid	Unidentified small dolphin	2
CU	*Callorhinus ursinus*	Northern fur seal	31
MA	*Mirounga angustirostris*	Northern elephant seal	13
Total			**91**

Cetacean Biopsy Report
Suzanne Yin, Allan Ligon, and Rich Pagen

Species	Common name	No. weekly samples	No. weekly takes	Total samples	Total takes
Balaenoptera physalus	Fin whale	5	7	25	37
Berardius bairdii	Baird's beaked whale	0	0	1	1
Delphinus capensis	Long-beaked common dolphin	12	25	19	37
Delphinus delphis	Short-beaked common dolphin	16	32	109	275
Delphinus sp.	Unidentified common dolphin	0	0	3	4
Globicephala macrorhynchus	Short-finned pilot whale	0	0	4	5
Lagenorhynchus obliquidens	Pacific white-sided dolphin	0	0	25	49
Lissodelphis borealis	Northern right whale dolphin	2	2	12	25
Orcinus orca	Killer whale	0	0	2	9
Total		**33**	**64**	**200**	**442**

Photo Report
Jim Cotton and Chris Cutler

Risso's dolphin with tooth-rake scars.

It has been a fine week for photography, with 77 new photo identifications from 16 different sightings. Among several highlights were two schools of Risso's dolphin with 21 animals documented. In the photo above, the "Etch-A-Sketch' gone wild" tooth-rake scars from other males cover the body of this male Risso's dolphin. The long-beaked common dolphin (right) was but one member of a massive school of dolphins creating an Escher-like mosaic as they moved through the water.

Long-beaked common dolphin, *Delphinus capensis*.

Fin whales, *Balaenoptera physalus*.

The fin whale head-shot (top) shows the black line of the mandibular symphysis between the two sides of the bicolored skin surrounding the jaw. But what is really interesting in the photo is the maxilla – which appears to be decorated with gold-leaf. The best shot of the lot, by Jim Cotton, captured another fin whale lunging on its side as a biopsy dart sailed over it.

Was the target simply too small ☺ -- actually a biopsy was obtained soon thereafter. Among the many details revealed in this photo, such as the pleated throat, the eye, and the chevron pattern, is what is probably diatomaceous growth on the leading edge of the pectoral flipper.

Photography Summary.

Common Name	Weekly Totals		Cruise Totals	
	Sightings Photographed	Individual IDs	Sightings Photographed	Individual IDs
Pacific white-sided dolphin	0	0	14	69
Northern right whale dolphin	0	0	9	6
Short-beaked common	6	28	49	211
Long-beaked common	2	20	8	43
Bottlenose dolphin	0	0	1	1
Striped dolphin	0	0	4	4
Dall's Porpoise	0	0	1	0
Risso's dolphin	2	21	2	21
Sperm Whale	0	0	1	2
Baird's beaked whale	0	0	3	12
Sei whale	0	0	3	9
Fin whale	3	5	41	83
Blue whale	0	0	18	27
Humpback whale	3	3	16	21
Killer whale	0	0	4	37
Cuvier's beaked whale	0	0	1	1
Pilot whale	0	0	1	39
Total	**16**	**77**	**285**	**619**

Seabirds

Michael Force and Sophie Webb

Seeing five species of waterfowl out on the open ocean in a single day is unusual in itself, but, on that same day, we saw even more lost migrants: Savannah Sparrow, a flock of five Cliff Swallows, and a Red-winged Blackbird. That happened to be the same day we made last week's pronouncement that fall migration was winding down! Well, it isn't. Okay? We can add even more: Brant, European Starling and a Mourning Dove, all adding up to a big week in the birding department—41 species—making this our second biggest week of ORCAWALE 2008. Why this is so isn't entirely clear although location has a lot to do with it. Transects this week sampled both offshore and nearshore aquatic habitats, and it is this variety that equates to a high number of species found, reflected also in a relatively high daily average of 15 species. Moreover, waterfowl as a group tend to be late migrants, having the ecological advantage of being able to linger longer at northerly latitudes, at least until the first heavy freeze sends them south. Other species of note includes the Red-billed Tropicbird. We know you're all crying out to know what those five species of waterfowl were: Cackling Goose, Gadwall, Green-winged Teal, Northern Pintail and Greater Scaup.

Female Red-winged Blackbird on the lookout from the foremast light. Photo: Sophie Webb

Acoustics Squeakly Report
Tina Yack and Elizabeth Becker

This week we surveyed tracklines off of the central coast of California. We were fortunate to have mostly good weather and acoustics has stayed busy all week (see map on next page). Our efforts have resulted in approximately 55 hours of acoustic recording effort and 34 hours of monitoring effort (Table 1). During this time, there were 86 acoustic encounters, approximately 21% of which matched visual sightings (Table 2). The highlights of this week's acoustic adventures include; two humpback encounters, five fin whale encounters, one sperm whale encounter, six short beaked common dolphin encounters, one Risso's dolphin encounter, one Cuvier's beaked whale encounter, and three mixed dolphin schools.

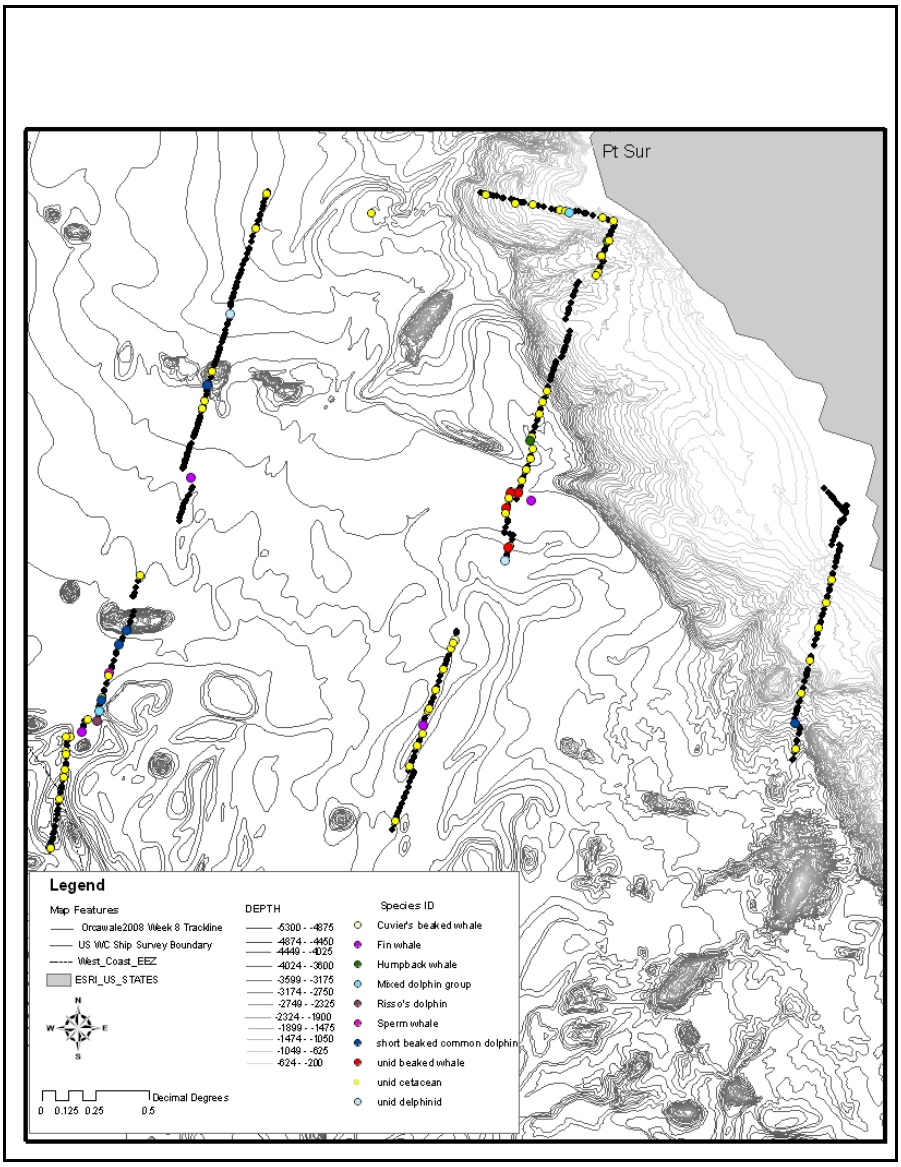
This week marks the end of my journey on the ORCAWALE '08 cruise and I will bid farewell to my shipmates in San Francisco. Elizabeth Becker will also be departing the ship in San Francisco (thanks for all of your help Elizabeth!). Not to worry though, acoustics operations will be turned over to the lab's resident acoustic guru, Shannon Rankin. I would like to take this opportunity to thank everyone who has helped make the acoustics project a success the last four legs; cruise leaders, fellow scientists, and the Captain and crew of the *McArthur II*. This has been an amazing experience and it has been a privilege to sail with such a *fantastic* team! I look forward to sailing on the *McArthur II* again soon!

Table 1. Rainbow Click recording effort (sample rate: 480 kHz: Hydrophones 4 and 5).

Date	Average Beaufort	Recording Start	Recording End	Recording Time	Monitoring Effort	Acoustic Encounters
10/26/2008	1.9	4.9	7:31	18:21	10:50	5:30
10/27/2008	3.0	6.4	7:30	18:15	10:45	7:00
10/28/2008	5.2	5.7	7:42	15:22	7:40	5:30
10/29/2008	4.0	5.6	8:09	18:04	9:55	7:00
10/30/2008	4.3	4.1	7:26	17:53	10:27	6:30
10/31/2008	4.0	3.3	7:29	12:53	5:24	2:30
11/1/2008	OFF	OFF	OFF	OFF	OFF	OFF
Total				55:01:00	34:00:00	86:00

Table 2. Acoustics encounters.

Species ID	No. of Acoustic Encounters
Short beaked common dolphin	6
Risso's dolphin	1
Mixed delphinid	3
Humpback whale	2
Fin whale	5
Sperm whale	1
Unid. beaked whale	4
Cuvier's beaked whale	1
Unid. cetacean	61
Unid. delphinid	2
Total	**86**



ORCAWALE 2008: Week 12 Acoustic Encounter Map

Squid Jigging Efforts

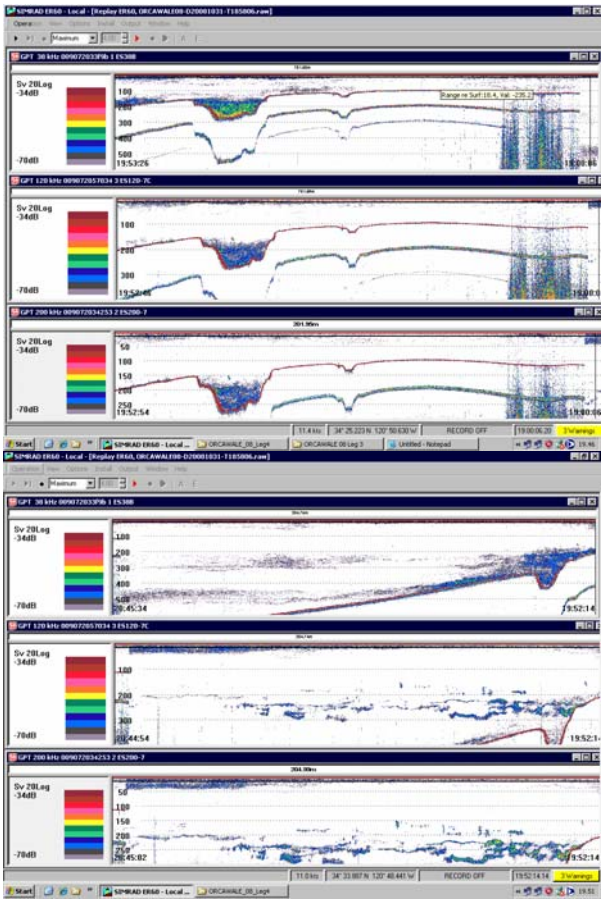
Jim Cotton, with help from Sophie Webb, Rich Pagen, Allan Ligon, Suzanne Yin, and Chris Cutler

Squid catch summary.

Date	Position	Squid collected	Weight (lbs)
10/26/2008	34:47N 123:53W	1	5
10/27/2008	33:13N 124:31W	0	N/A
10/29/2008	35:56N 127:56W	8	22,23,24,26,13,20,5,24
10/30/2008	34:35N 122:21W	0	aborted station

Oceanography
Ryan Driscoll and Justin Garver

We covered a lot of ground in the last week of Leg 4. In doing so we crossed some interesting hydrographic features and witnessed their ecological effects. Submarine canyons, shelves, seamounts, and banks often serve as hotspots for ecological activity. By interrupting currents, they can mix nutrient rich waters creating areas of high productivity, concentrating zooplankton, and providing rich benthic habitat. What this means for us on ORCAWALE is that when we pass these features, we often see an increase in marine mammal and sea bird activity. Some of these places, such as Cortez Bank or coastal submarine canyons, merit special occasions and we crowd the flying bridge, binoculars ready.



Our Simrad EK60 provides a visual example of what we mean. In the top panel at right, we are crossing perpendicularly to two separate canyons heading from the shore outward. At the bottom of each canyon one can see dense concentrations of plankton. At the same time on the flying bridge the observers spotted large schools of dolphins hovering above. In the lower panel, we are crossing onto the shelf. The deep scattering layer of plankton which has descended for the day is forced toward the surface as the sea floor rises.

Oceanography, this week, by the numbers.

Date	CTD	XBT	Surface chlorophylls	Bongo tows	HAB
10/26/2008	1	12	4	1	24
10/27/2008	1	3	3	1	18
10/28/2008	2	3	3	1	18
10/29/2008	0	2	2	1	12
10/30/2008	1	3	3	1	18
10/31/2008	2	3	3	1	18
Weekly total	**7**	**26**	**18**	**6**	**108**
Grand total	**73**	**297**	**269**	**64**	**1694**

Midwater Trawling Weekly Report
IKMT Leader: Andrey Suntsov; IKMT Assistant: Jason Blackburn

We finish this short leg with a total of 28 midwater trawls (13 shallow, 150-0m; 15 deep, 500-0 m). During this time we collected 4709 specimens of 48-50 midwater fish species from 21 families. Most frequently collected fishes, occurring in over 15 samples, were myctophids - *Diaphus theta*, *Lampanyctus regalis*, *Lampanyctus ritteri*, *Stenobrachius leucopsarus*, *Symbolophorus californensis*, *Tarletonbeania crenularis*, *Triphoturus mexicanus* and *Protomyctophum tompsoni*, bathylagid *Lipolagus okhotensis*, stomiatoid *Tactostoma macropus*, and *Cyclothone signata*. Numerically, this leg's sampling is dominated by three species (*Cyclothone signata*, *Stenobrachius leucopsarus* and *Diaphus thetha*), which formed 71% of the total catch. Similar to the previous leg, the lanternfish family was the most diverse (13 species), followed by hatchetfishes (6), bathylagids and gonostomatids (3) with most other groups represented by single species.

The last week of Leg 4 was relatively uneventful in terms of new fish records. We did manage to collect a small specimen of squaretail Tetragonurus cuvieri – a fish known to be inquiline with salps, which uses its very specialized dentition to trim the interior pieces of its gelatinous host.

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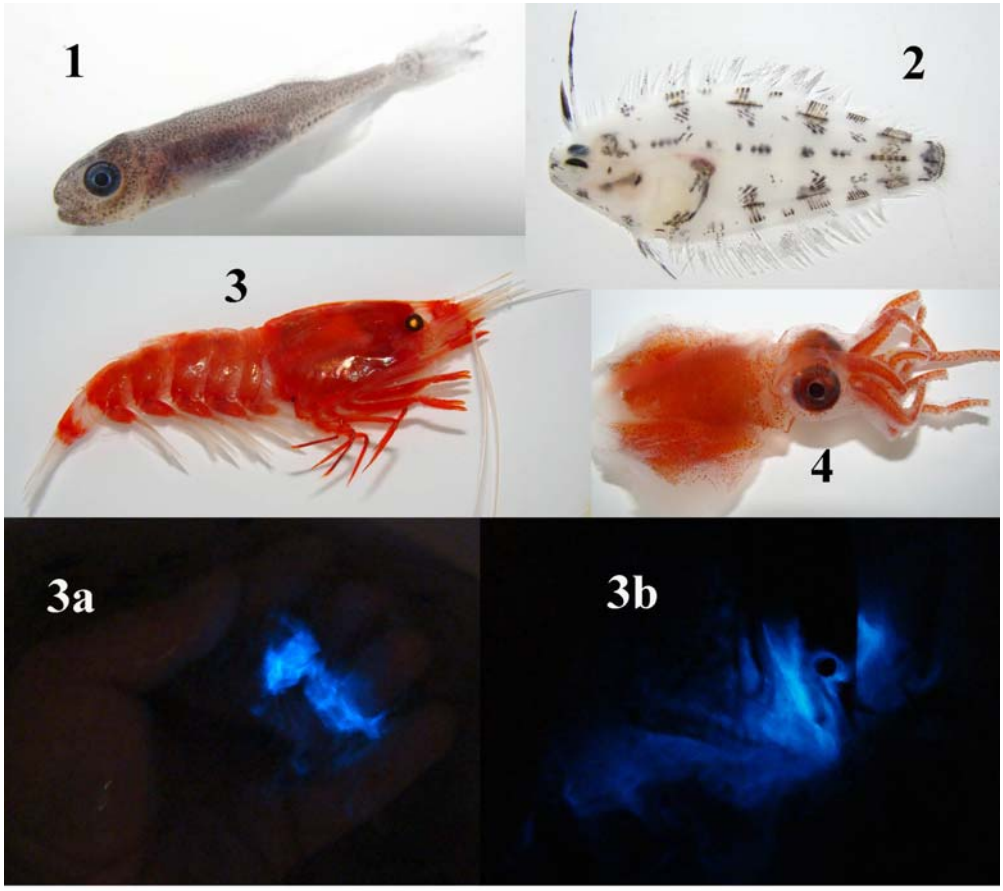

1 - *Tetragonurus cuvieri*; 2 - larval Pacific sanddab *Citharichthys sordidus;* 3 - *Oplophorus spinosus*; 3 a,b - bioluminescent fluid discharge of *O. spinosus*; 4 - eight arm squid *Octopoteuthis deletron*.

However, on two occasions our nights were really brightened by collecting some very interesting midwater invertebrates. One time, while pouring the contents of a trawl's cod end into a bucket, among regular short light flashes of myctophids and euphausiids I noticed a bright blue bioluminescent cloud discharge and thought that we caught another shiny tubeshoulder (described in one of our previous reports). However, the culprit for this amazing light show was not a fish this time, but a midwater decapod shrimp – *Oplophorus spinosus*. This particular shrimp was very cooperative, and in response to my squeezing and pinching would produce enough light to illuminate the bucket. The luminous material is produced in shrimp's liver and is exhaled from the mouth. Apparently, such a dramatic light production has had a strong selective advantage in evolution of deep-sea biota, emerging independently in such unrelated groups as holothuroids (sea cucumbers e.g. pelagic *Enypniastes eximia*), cephalopods (Heteroteuthis), vampyro-morphs (Vampyro-teuthis), fishes (tubeshoulders, Platytroctida), decapod shrimps and mysids (Gnathophausia) giving and excellent example of convergent evolution in oceanic midwaters.

Another unusual find this week was a small specimen of eight arm squid *Octopoteuthis deletron* (Fam. Octopoteuthidae), interesting for its possible defensive behavior. There is evidence that its arm tips, which bear small light organs, can be autotomized or easily break off when the animal is under attack. When this happens, flashing and wiggling piece apparently serves as a lure to detract the attacker allowing the squid to escape – the strategy not unlike that found in lizards! Our specimen also had most of arm tips missing.

In conclusion, I wish Pete Davison, who will be replacing me on Leg 5, a successful sampling and would also like to thank my assistant Jason Blackburn for staying up late at night and helping with our midwater operations

Midwater fishes collected with 6 ft IKMT during leg 4 of ORCAWALE
(28 tows, total numbers/frequency of occurrence)

Nemichthyidae
Nemichthys scolopaceus 3/3

Derichthyidae
Derichthys serpentinus 1/1

Bathylagidae
Leuroglossus stilbius 9/9
Lipolagus okhotensis 57/19
Pseudobathylagus milleri 7/5

Microstomatidae
Microstoma sp. 4/4

Platytroctidae
Gen. sp. 1/1

Gonostomatidae
Cyclothone signata 1691/15
yclothone pseudopallida 347/14
Cyclothone sp. 54/3

Phosichthyidae
Vinciguerria lucetia 14/5

Sternoptychidae
Argyropelecus sladeni 49/13
A. affinis 32/12
A. hemigymnus 27/10
Danaphos oculatus 55/13
Valenciennellus tripunctulatus 1/1
Sternoptyx spp. 2/2

Chauliodontidae
Chauliodus macouni 21/9

Melanostomiidae
Bathophilus sp. 1/1
Tactostoma macropus 25/15

Idiacanthidae
Idiacanthus antrostomus 30/12

Scopelarchidae
Benthalbella dentata 1/1

Notosudidae
Scopelosaurus harryi 2/2

Paralepididae
Lestidiops ringens 7/6

Myctophidae
Ceratoscopelus townsendi 28/9
Diaphus theta 475/27
Diogenichthys atlanticus 19/7
Lampanyctus regalis 43/18
Lampanyctus ritteri 147/27
Protomyctophum thompsoni 79/15
Stenobrachius leucopsarus 1182/27
Symbolophorus californensis 44/15
Tarletonbeania crenularis 87/18
Triphoturus mexicanus 81/15
unidentified 39/5

Melamphaeidae
Gen. sp. 26/16

Ophidiidae
Chilara taylori 1/1

Percichthyidae
Howella sp. 8/4