NMFS, Southwest Fisheries Center, Honolulu Laboratory, Honolulu, Hawaii: Insular Resources Investigation

Bruce C. Mundy

News about the early life history research at the NMFS Honolulu Laboratory was included in the first 1986 issue of the section's newsletter (vol. 7, no. 1). Since that report, new projects have begun and progress has been made on the continuing studies described previously.

Among the new projects not described earlier, George Boehlert and William Watson (Marine Ecological Consultants, Encinitas, California) are studing the distribution of ichthyoplankton at Johnston Atoll (lat. 16°, long. 169°), a very isolated small island southwest of the Hawaiian chain. Johnston Atoll is interesting because larvae of island associated fish species collected there must be autochthonous, an assumption that cannot be corroborated at most other islands, which are parts of chains or archipelagos. The ichthyoplankton collections at the atoll, collected in November 1984, are valuable for studies of retention and recruitment of larvae in island environments. Boehlert presented part of these data in a paper at the recruitment session of the December AGU/ASLO Ocean Sciences meeting in San Francisco.

David Somerton is investigating the biology of the nehu, *Encrasicholina purpureus*, a small anchovy important as bait in the Hawaiian tuna fishery. Somerton and Kevin Landgraf have obtained estimates of nehu population size in Pearl Harbor using the egg production method developed at the egg production method developed at the NMFS Southwest Fisheries Center laboratory in La Jolla. From weekly sampling of nehu eggs, larvae and adults in the harbor, yielding information about fecundity, spawning frequency, sex ratios and egg abundance, they estimate that the spawning stock averaged 1.55 tons, ranging between 0.58 and 3.91 tons, between May 1 and October 9, 1986. They have also found that nehu may alternate periods of frequent spawning lasting several weeks with periods of infrequent spawning. Potential relationships between spawning frequency and food (zooplankton) abundance are being investigated; nehu fecundity seems to be correlated with 0crustacean zooplankton abundance on a weekly time scale. Ultimately, this study is intended to determine if freshwater input into the harbor influences nehu stock size, and how planned alterations of that input will affect the nehu population. In conjunction with that survey, Russell Ito, at our Kewalo Basin laboratory, is developing techniques for spawning nehu and rearing their larvae. Somerton and Ito hope to find morphological indicators of age in nehu larvae that can be used in studies of growth and mortality in the Pearl Harbor populations. The reared nehu larvae will also be used in physiological studies planned for the future.

A cruise of the *Townsend Cromwell* is planned during May 1987 to compare the efficiency of light traps, neuston trawls and larger midwater trawls of small mesh as means of capturing juvenile reef fishes. We will use light traps developed in Australia by Peter Doherty. This study follows preliminary work conducted by Donald Kobayashi, a graduate student at the University of Hawaii who participated in the April 1986 cruise of the vertical distribution study. Don set small light traps in the vicinity of standard NMFS Honolulu Laboratory night-light fishing gear, and was very successful in collecting a variety of juvenile nearshore fishes. These juveniles have not been successfully collected with the 1 m^2 or smaller plankton nets used on our cruises. While light traps have been used frequently in freshwater environments, their use in open ocean areas is relatively new. We hope that this will be a productive technique for sampling larger larvae and juveniles, and for obtaining live specimens of juvenile reef fishes for experimental purposes.

In addition to the work on nehu, the Kewalo Basin laboratory has also been the site of research on live

larvae of other species. Tom Kazama and James Uchiyama are preparing a manuscript on the validation of using daily otolith growth rings for aging of larvae skipjack tuna, *Katsuwonis pelamis*. The validation was determined by using otoliths from reared larvae of known ages. Kazama has continued the work on skipjack and mahimahi, *Coryphaena hippurus*, reported in the earlier newsletter. Recent research has centered on the effects of temperature on the growth and survival of mahimahi larvae. He has also been rearing larvae of the taape, *Lutjanus kasmira*, to obtain information about growth and culture techniques that could be applied to deeper living snapper species which are commercially important in Hawaii. The aging of taape larvae using daily otolith rings has been validated.

The research reported in the earlier newsletter included two long-term projects at our laboratory: surveys of the fisheries resources at seamounts to the north of the Hawaiian Islands, and a study of the veritcal distribution of fish larvae at Oahu. Sampling at Hancock Seamont (lat. 30°, long. 179°) has continued, with bongo samples collected in July to obtain larval *Beryx splendens* for age analysis using otoliths, and with neuston samples collected in October to obtain more larval armorhead, *Pseudopentaceros wheeleri*.

Bruce Mundy presented a poster entitled "Larval development of the alfonsin, *Beryx splendens* (Berycidae, Beryciformes)" at the 66th annual meeting of the American Society of Icthyologists and Herpetologists in Victoria, B.C. The alfonsin larvae were identified from newly hatched reared specimens of known parentage, and from the meristics of large specimens. Identifying characters for *Beryx* larvae include the precocious development of elongate pelvic rays and dorsal spines, sparse pigment in an unusual pattern, and an S-shaped intestine about half the standard length. Head spine development is diagnostic for larger larvae. Within the Beryciformes, *Beryx* larvae are most similar to larvae Melamphaids. Larval beryciforms show a rich diversity of developmental characters that may provide much information on their interrelationships once the polarity of the character states can be established.

Boehlert and Mundy are continuing the study of the vertical distribution of ichthyoplankton around Oahu reported in the earlier newsletter. All four of the planned seasonal cruises (September 1985, December 1985, April 1986 and June 1986) have been completed. Analysis of the samples from the first cruise has given some interesting preliminary results. Tuna larvae are abundant in surface waters nearshore, as reported by previous workers in the region. Larvae of some nearshore fish families are most abundant nearshore, including the Lutjanidae and the highly abundant Gobiidae. Others, such as the Labridae, are more abundant in deeper water away from the immediate vicinity of the island than in areas near shore. While larvae of most mesopelagic species were most abundant 20-100 m deep in offshore areas, certain species, such as the myctophid *Lampadena urophaos*, were very abundant in the upper 20 m near the island. These few shallowly occurring mesopelagic species seem to account for the high abundances of oceanic larvae found near the island by previous researchers. Sorting and identification of the fish larvae from the remaining cruises is continuing.