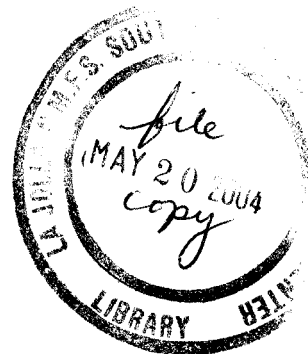


NOAA Technical Memorandum NMFS



DECEMBER 1983

**ANNOTATED REFERENCES TO TECHNIQUES CAPABLE
OF ASSESSING THE ROLES OF CEPHALOPODS
IN THE EASTERN TROPICAL PACIFIC OCEAN,
WITH EMPHASIS ON PELAGIC SQUIDS**

John B. Hedgepeth

NOAA-TM-NMFS-SWFC-39

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Southwest Fisheries Center

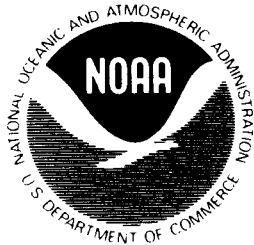
NOAA Technical Memorandum NMFS

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**U.S. DEPARTMENT OF COMMERCE
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National Marine Fisheries Service
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ANNOTATED REFERENCES TO TECHNIQUES CAPABLE OF
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INTRODUCTION

This annotated bibliography presents a list of publications relevant to pelagic cephalopod assessment, especially the assessment of epipelagic squids, in the eastern tropical Pacific Ocean (ETP). Pelagic cephalopods are important both to commercial fisheries (Voss 1973) and in their influences within oceanic ecosystems. In particular, epipelagic squids are found in stomachs of seabirds, fishes and marine mammals; and, squid are active predators of fishes, crustaceans and other marine organisms.

Two criteria were used for selection of articles. Articles concerning cephalopods were of primary interest. And because many of these animals have a cosmopolitan distribution, articles have been selected from worldwide sources. The second criterion was presentation of assessment techniques applicable to ETP cephalopods. Selection was not confined to methods which have been used solely within the ETP.

I have reviewed each article as thoroughly as time has permitted, and have compiled a summary of the article and a list of key words for each reference. I considered a wide variety of subjects to be relevant to the topic of assessment. Some pertinent subjects were capture gear and techniques, stock differentiation, trophic dynamics, identification of species, population modelling, growth and reproduction, distribution, and other censusing methods.

The references were entered into a microcomputer disk storage, using a format for a database program, Superfile (FYI 1982). This program is able to access publications and summarized information by using key words. In the future, as new papers are identified, this database will be updated.

There are about 500 key words which reference approximately 200 entries. Key words were selected to index publications by author, taxon and information type (such as gear type, ocean, etc.). Taxa used were family, genus and species. Species names use only the first initial of the genus. More complete species names are found in the index.

As an aid in locating articles by subject, each publication was placed into one of seven general categories, which are as follows:

- 1) Keys to identification
- 2) Summaries and surveys
- 3) Squid as prey for marine organisms
- 4) Commercial fisheries

- 5) Gear
- 6) Biology
- 7) Assessment techniques and population modelling

Accompanying each citation in the annotated bibliography is the number, between one and seven, which refers to one of the above general categories. These number codes follow a "*" at the beginning of the key words section of every citation.

Annotations summarize information relevant to cephalopod assessment in the ETP. As a result, sometimes the annotations are not summaries of the entire publication. In addition, key words may not represent all information mentioned by a publication. However, this annotated bibliography should allow workers in fields which deal with cephalopods to easily identify the relevant articles.

LITERATURE CITED

FYI. 1982. Superfile, User's Manual. FYI, Inc. Austin, Texas.

Voss, G. L. 1973. Cephalopod resources of the world. FAO Fisheries Circular (149). 75 pp.

ANNOTATED BIBLIOGRAPHY

ALLY, J. R. R., and S. A. Keck. 1978. A biochemical-genetic population structure study of market squid, Loligo opalescens, along the California coast. Calif. Dept. Fish and Game Fish Bull. (169):113-121.

Comparisons of allelic variation, using the enzyme phosphoglucomutase. There was no conclusive evidence of stock discrimination.

*6 ALLY J R R / KECK S A / L OPALESCENS / EASTPACIFIC / STOCK / JIGGING NET

ALVARIÑO, A., and J. R. Hunter. 1981. New records of Allopsis mollis Verrill (Cephalopoda, Octopoda) from the Pacific Ocean. Nautilus 95(1):26-32.

Description of two specimens of Allopsus mollis captured off Southern California. A. mollis is found in tropical and subtropical waters, and has a cosmopolitan distribution. This cephalopod was observed actively avoiding capture.

*6 ALVARIÑO A / HUNTER J R / OCTOPODA / DISTRIBUTION / TRAWL / EASTPACIFIC

ALVERSON, F. G. 1963. The food of yellowfin and skipjack tunas in the eastern tropical Pacific Ocean. Inter-American Tropical Tuna Commission Bulletin 7(5):294-367.

A tuna feeding habits study from fish supplied by canneries and caught by both bait boats and purse-seiners. Yellowfin prey were by volume: fish (47%), crustaceans (45%) and cephalopods (8%), by occurrence: crustaceans (76%), fish (54%) and cephalopods (33%). Skipjack food items were by volume: crustaceans (59%), fish (37%) and cephalopods (3%), by occurrence: crustaceans (76%), fish (36%) and cephalopods (13%). Onychoteuthids, ommastrephids and unidentified squid were the main squid food of yellowfin. However, skipjack fed primarily on enoploteuthids and cranchids.

*3 ALVERSON F G / FISH / FEEDING HABITS / LOLIGO / A MORRISII / LINE / A HOYLEI / ONYKIA / O BANKSII / T RHOMBUS / OMMASTREPHESES / O GIGAS / S OUALANIENSIS / ETP / OCTOPODA / D DANAE / PURSE SEINE

AMARAL, E. H., and H. A. Carr. 1980. Experimental fishing for squid with light in Nantucket Sound. Marine Fisheries Review 42(7-8):51-56.

An experiment utilizing incandescent lights and mercury vapor lamps to capture longfinned squid, Loligo pealei. Squid congregated in the periphery of illumination but catches by jigging were poor except on one occasion. Netting of squid proved unsuccessful due to the erratic behavior of the squid.

*5 AMARAL E H / CARR H A / LIGHTS / JIGGING / NET / L PEALEI / ATLANTIC

AMOS, D., and R. DeMello. 1982. Application of multi-frequency echo sounders to squid detection. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston, Massachusetts. Unipub. pp. 45-53.

Suggests methods for setting sounder controls (time varied gain, swept time constant, and pulse duration). Squid aggregations appeared as plumes or stripes, depending on settings and vessel movement.

*7 AMOS D / DEMELLO R / SONAR / TRAWL

ANONYMOUS. 1980. Australian squid fishery- resource, gear and methods. Department of Primary Industry, Fisheries Division, Fisheries Report (29). 16 pp.

A description of squid jigging operations. Lighting, jigging speed, line size, parachute anchoring, vessel construction and other areas discussed.

*5 PACIFIC / FISHING / N SLOANI GOULDI / S AUSTRALIS / JIGGING / LIGHTS / TRAWL / GILLNET

ANONYMOUS. 1981. The biology and resource potential of cephalopods, summary of recommendations, Melbourne, Australia, March 1981. National Museum of Victoria. Victoria Institute of Marine Sciences. VIMS Publication (VMP-28). 11 pp.

Summary of workshop on cephalopod biology and resources, dealing primarily with Australian applications. Topics included were taxonomy, ecology, biology, fisheries biology and assessment. Report states gill net fishing is three times more efficient than jigging.

*6 PACIFIC / JIGGING / GILLNET / ASSESSMENT / SEPIIDAE / LOLIGINIDAE / OMMASTREPHIDAE / OCTOPODIDAE

ANONYMOUS. 1982a. Report on the squid workshop. Southwest Fisheries Center Administrative Report H-82-7. (NMFS, SWFC, La Jolla, Ca.)

A summary of six talks on squid fisheries and resources in the Pacific Ocean. Fisheries mentioned were off California, Hawaii, Peru and Japan. Sea bird stomach samples, gonad evaluations, jigging, trawling, and gillnetting provided assessment information on Hawaiian squids.

*7 D GIGAS / L OPALESCENS / EASTPACIFIC / ETP / PACIFIC / T PACIFICUS / O BARTRAMII / CRANCHIA / ARCHITEUTHIS / SEPIOTEUTHIS / T RHOMBUS / O BOREALIJAPONICUS / H PELAGICUS / S OUALANIENSIS / SEABIRDS / TRAWL / FEEDING HABITS / GILLNET / N HAWAIIENSIS / GONATUS / GONATOPSIS / S LUMINOSA / JIGGING / LINE / CRANCHIIDAE / LEPIDOTEUTHIDAE / LIGHTS / MASTIGOTEUTHIDAE / ONYCHOTEUTHIDAE / ASSESSMENT / HISTIOTEUTHIDAE / OCTOPOTEUTHIDAE / THYSANOTEUTHIS / ABRALIA / ABRALIOPSIS / ELEDONELLA / HETEROTEUTHIS / HISTIOTEUTHIS / HYALOTEUTHIS / LEACHIA / LIOCRANCHIA / MEGALOCRANCHIA / ONYCHOTEUTHIS / PYROTEUTHIS / SANDALOPS / REPRODUCTION

ANONYMOUS. 1982b. Squid drift gillnet fishery. Fisheries Agency. INPFC Document Ser. No. 2498. 21 pp.

A short description of drift gillnet fishing for Ommastrephes bartramii by Japanese vessels. History, operation and regulation of the fishery are discussed.

*4 PACIFIC / FISHING / GILLNET / JIGGING / DISTRIBUTION / SEASONAL / O BARTRAMII

ANONYMOUS. 1983. Squid drift gill net fishing- reviews and prospects. The Minato Shinbun, Jan. 12 1983.

Japanese newspaper account of interactions within the squid drift gillnetting fleet. Gillnetters wanted to move west of a 170°E regulatory limit and into the fishery exploited by squid jigging vessels. Korean and Taiwanese gillnetters sometimes set nets contrary to the east-west Japanese deployment. Also, non-Japanese vessels were not restricted by the 170°E demarcation.

*4 GILLNET / JIGGING / PACIFIC / FISHING

ARNOLD, G. P. 1979. Squid, a review of their biology and fisheries. Ministry of Agriculture, Fisheries and Food, Directorate of Fisheries Research Laboratory Leaflet No. 48, Lowestoft, UK. ISSN 0072-6699. 38 pp.

A summary of squid fisheries and biology with numerous references to pertinent literature. Subjects discussed are systematics, biology, distribution, fisheries, fishing techniques, marketing, management and resource potential.

*2 ARNOLD G P / WORLDWIDE / TRAWL / NET / JIGGING / LIGHTS / PUMP / LAMPARA FISHING / ASSESSMENT / DISTRIBUTION / REPRODUCTION / SEASONAL / GROWTH / VERTICAL / SQUID DIET / FEEDING HABITS / MARINE MAMMALS / PACIFIC / ATLANTIC / EASTPACIFIC / ETP / MEDITERRANEAN / SEABIRDS / FISH

ASHMOLE, M. J. and N. P. Ashmole. 1968. The use of food samples from sea birds in the study of seasonal variation in the surface fauna of tropical oceanic areas. Pacific Science 22(1):1-10.

A proposal to show variations in surface fauna by capture and analysis of regurgitations of sea birds. The diet of four species of sea birds consisted mainly of flying fish, juvenile scombrids and ommastrephid squids. Comparisons showed that sea birds sample some food groups more efficiently than do trawls or yellowfin tuna.

*3 ASHMOLE N P / ASHMOLE M J / SEASONAL / SEABIRDS / PACIFIC / ASSESSMENT / OMMASTREPHIDAE / ENOPLOTEUTHIDAE / FISH / FEEDING HABITS / TRAWL

ASHMOLE, N. P. 1968. Body size, prey size, and ecological segregation in five sympatric tropical terns (Aves: Laridae). Systematic Zoology 17:292-304.

A description of feeding habits of five tern species found on Christmas Island. Differences in prey composition are related to feeding patterns

and anatomical structure of tern species.

*3 ASHMOLE N P / SEABIRDS / PACIFIC / FEEDING HABITS

ASHMOLE, N. P., and M. J. Ashmole. 1967. Comparative feeding ecology of sea birds of a tropical oceanic island. Peabody Museum of Natural History Bulletin (24):1-131.

Report of 1963-1964 food habits survey of 8 seabird species using 800 samples collected on Christmas Island. Frequency of occurrence of fish varied 45%-97%, and of squid 34%-97%. Nearly all squid were ommastrephids, Symplectoteuthis spp. Comparisons were made with stomach contents observations of 191 surface caught yellowfin (from Reintjes and King 1953).

*3 ASHMOLE N P / ASHMOLE M J / PACIFIC / SEABIRDS / FEEDING HABITS / FISH / SYMPLECTOTEUTHIS / LOLIGO / ABRALIA / OMMASTREPHIDAE / OCTOPODA

BALCH, N., T. Amaratunga, and R. K. O'Dor (eds.). 1978. Proceedings of the workshop on the squid Illex illecebrosus. Dalhousie University, Halifax, Nova Scotia, May, 1978; and a bibliography on the genus Illex. Fisheries and Environment Canada. Fisheries and Marine Service Technical Report (833). 27 chapters.

A review of the history of the fishery, population assessment, biology, and research dealing with the Atlantic Ocean ommastrephid squid, Illex illecebrosus. Includes 23 papers.

*2 BALCH N T / AMARATUNGA T / ODOR R K / ATLANTIC / I ILLECEBROSUS / ASSESSMENT / FISHING / IDENTIFICATION / REPRODUCTION / JIGGING / DISTRIBUTION / MODEL / TRAWL / T PACIFICUS

BEDDINGTON, J. R., and R. M. May. 1980. Maximum sustainable yields in systems subject to harvesting at more than one trophic level. Mathematical Biosciences 51:261-281.

Extensions of a simple predator-prey model to multispecies approaches: krill-squid-sperm whales, krill-penguins-baleen whales. In the multispecies approach, both krill and sperm whales cannot sustain harvest based on individual maximum sustainable yields.

*7 BEDDINGTON J R / MAY R M / MODEL / MARINE MAMMALS / FEEDING HABITS / SQUID DIET

BEDDINGTON, J. R., and R. M. May. 1982. The harvesting of interacting species in a natural ecosystem. Scientific American 247(5):62-69.

Article which suggests that Antarctic krill surplus, available after whale stock depletion, has contributed to increases of populations of remaining baleen whales, seals, penguins, sea birds, fishes and squid. Contrasting with smoother patterns of change in whale populations, fishes and squids of the Gulf of Thailand show substantial fluctuations, because fish have high mortality rates and few age classes.

*6 BEDDINGTON J R / MAY R M / FEEDING HABITS / MARINE MAMMALS / SEABIRDS / FISH / SQUID DIET / ANTARCTIC / INDIAN

BELYAYEV, G. M. 1962. Rostra of cephalopods in oceanic bottom sediments. Deep Sea Research 11(1):113-126.

Report of abundances of cephalopod beaks from collections made in the Indian and Pacific Oceans (1954-1961). Because squid beaks are not preserved for very long, rostra represent recent species. Densities (which were up to several thousand beaks per square meter) allow comparative quantification of squid resources. Results show untapped squid resources in coastal areas of the Indian Ocean.

*7 BELYAYEV G M / ASSESSMENT / DREDGE / DISTRIBUTION / G FABRICII / G MAGISTER / OCTOPODOTEUTHIS / ARCHITEUTHIS / T PAVO / HISTIOTEUTHIDAE / INDIAN / PACIFIC / EASTPACIFIC / DISTRIBUTION / A MOLLIS / MARINE MAMMALS FEEDING HABITS

BEN-YAMI, M. 1976. Fishing with light. FAO Fishing Manual. Fish News Books, Surrey, England. 121 pp.

A history and review of fishing with light, with a worldwide coverage. Lighting and fishing gear are described for squid fishing, as well as for other species such as herring, anchovy, mackerel, saury, kilka and sardinella.

*5 BEN-YAMI M / WORLDWIDE / PUMP / LIGHTS / JIGGING / PACIFIC / EASTPACIFIC FISHING

BERNARD, F. R. 1980. Preliminary report on the potential commercial squid of British Columbia. Canadian Technical Report of Fisheries and Aquatic Sciences (942). 51 pp.

Review of fishing gear, processing, biology and identification. Exploratory fishing during fall 1979 by two Japanese research vessels, in conjunction with the Canadian government, is reported.

*7 BERNARD F R / EASTPACIFIC / L OPALESCENS / O BOREALIJAPONICUS / O BARTRAMII / B MAGISTER / JIGGING / LIGHTS / SONAR / NET / GILLNET / IDENTIFICATION

BERNARD, F. R. 1981. Canadian west coast flying squid experimental fishery. Canadian Industry Report of Fisheries and Aquatic Sciences (122). 23 pp.

Description of squid gillnet operations for catching Ommastrephes bartramii. Investigative catches by two Japanese vessels, that fished across the northeast Pacific, including off Vancouver Island, are presented.

*7 BERNARD F R / GILLNET / EASTPACIFIC / O BARTRAMII / MIGRATION / ETP / DISTRIBUTION

BERRY, S. S. 1912. A review of the cephalopods of Western North America. Bulletin of the United States Bureau of Fisheries 30:269-336.

A survey of cephalopods collected from San Diego to Alaska, which presents species descriptions and notes on distributions. The review includes a key to identification of known regional cephalopods, and 25

plates of illustrations.

- *1 BERRY S S / EASTPACIFIC / L OPALESCENS / S OUALANIENSIS / OCTOPODA / IDENTIFICATION

BERRY, S. S. 1914. The Cephalopoda of the Hawaiian Islands. Bulletin of the United States Bureau of Fisheries 32:255-362.

A key to and descriptions of cephalopods found in the Hawaiian Islands region. Includes illustrations and 11 plates.

- *1 BERRY S S / PACIFIC / IDENTIFICATION / DISTRIBUTION / O BANKSII / S OUALANIENSIS / OCTOPODA

BERZIN, A. A. 1971. The Sperm Whale. Translated from Russian by Israel Program for Scientific Translations, Jerusalem 1972. Keter Press, Jerusalem. 294 pp.

Chapter 12, "Feeding", includes methodology for studying stomach contents and summaries of feeding habits investigations from worldwide areas. Stomach contents from Pacific Ocean sources have yielded 25 cephalopod and 37 fish species, the major portion being squids.

- *3 BERZIN A A / PACIFIC / ETP / EASTPACIFIC / INDIAN / ATLANTIC / ANTARCTIC MARINE MAMMALS / FEEDING HABITS / M ROBUSTA / D GIGAS / G BOREALIS / ONYCHOTEUTHIS / OCTOPUS

BLACKBURN, M. 1968. Micronekton of the eastern tropical Pacific Ocean: family composition, distribution, abundance, and relations to tuna. Fishery Bulletin 67(1):71-115.

A report of volumes of fishes, crustaceans, and cephalopods collected in the eastern tropical Pacific (1958-1961) in standard night hauls, in order to assess possible tuna prey. The study assumed that prey assessment could indicate the presence of yellowfin or skipjack tuna in unfished areas. Dominant cephalopods were Abraliopsis morisi and Leachia eschscholtzi, but cephalopods amounted to only 5% of the micronekton. Comparisons with stomach contents showed that micronekton surveyed was moderately different.

- *3 BLACKBURN M / ASSESSMENT / SEASONAL / FEEDING HABITS / FISH / DISTRIBUTION / NET / ETP / P GIARDI / PTERYGIOTEUTHIS / A MORRISII / ABRALIOPSIS / ABRALIA / ONYCHOTEUTHIS / O BANKSII / LEACHIA / L ESCHSCHOLTZI / PYRGOPSIS / L REINHARDTI / TEUTHOWENIA / C SICULUS / CTENOPTERYX / OCTOPODOTEUTHIS / HISTIOTEUTHIDAE / OMMASTREPHIDAE

BLACKBURN, M., R. M. Laurs, R. W. Owen, and B. Zeitzschel. 1970. Seasonal and areal changes in standing stock of phytoplankton, zooplankton and micronekton in the eastern tropical Pacific. Marine Biology 7:14-31.

Results of the 1967-1968 Eastropac oceanographic cruises, quantified to identify seasonal changes in chlorophyll a, zooplankton, and micronekton. Only night catches were quantified because daytime catches were one tenth the amount. Significant differences were seen in fish-cephalopod micronekton in the eastern cruise portion, based on latitude and

longitude but not on season.

- *7 BLACKBURN M / LAURS R M / OWEN R W / ZEITZCHEL B / DISTRIBUTION / NET / ETP / ASSESSMENT / SEASONAL

BLACKBURN, M., and R. M. Laurs. 1972. Distribution of forage of skipjack tuna (Euthynnus pelamis) in the eastern tropical Pacific. NOAA Technical Report NMFS SSRF-649. 16 pp.

Areal presentation of concentrations of skipjack tuna forage, in ml per 1000 cubic meters, from data collected during EASTROPAC expeditions, 1967-1968. As reported, tuna forage was the lumped biomasses of species such as epipelagic fishes, crustaceans and cephalopods, collected in micronekton nets.

- *3 BLACKBURN M / LAURS R M / FISH / FEEDING HABITS / DISTRIBUTION / ETP

BLACKBURN, M., and R. E. Thorne. 1974. Composition, biomass and distribution of pelagic nekton in a coastal upwelling area off Baja California, Mexico. *Tethys* 6(1-2):281-290.

A 1973 survey of species composition and biomass of pelagic nekton, off Baja California. Since catches were principally galatheid crabs, acoustic data was related to biomass of the crabs.

- *7 BLACKBURN M / THORNE R E / SONAR / NET / ASSESSMENT

BLOTT, A. J. 1980. Experimental pair trawling for squid in New England. *Marine Fisheries Review* 42(7-8):57-59.

A description of a squid bottom pair trawl. Mesh size and towing speed are discussed. Report suggests that mesh size should not be greater than 9-10 inches, and towing speed might be 3.5-4 knots.

- *5 BLOTT A J / TRAWL / ATLANTIC / L PEALEI

BLUNT, C. E. 1960. Observations on the food habits of longline caught bigeye and yellowfin tuna from the tropical eastern Pacific 1955-1956. *California Fish and Game* 46(1):69-80.

Results of stomach contents examinations of 40 bigeye and 18 yellowfin tuna caught by longlines in the ETP. Bigeye prey items by volume were: cephalopods 63.2%, fish 21.6%, and crustaceans 15.1%. Doscoedicus gigas represented 50% of the volume of bigeye stomach contents. Food of yellowfin by volume were: crustaceans 50.8%, fish 36.3%, and cephalopods 12.9%. Portunid crabs and Auxis sp. were the main constituents of yellowfin diet.

- *3 BLUNT C E / FEEDING HABITS / ETP / D GIGAS / FISH / LONGLINE

BOLETZKY, S. V. 1977. Diets for cephalopods. Unedited Manuscript, finished in August 1977, for the formerly planned CRC Handbook on Nutrition and Food. 32 pp.

A summary of results of studies, of a number of investigators, on

cephalopod feeding, primarily in laboratory culture.

- *6 BOLETZKY S V / SQUID DIET / SEPIIDAE / OCTOPODIDAE / S LESSONIANA / S SEPIODEA / L VULGARIS / L OPALESCENS / L PEALEI / L PLEI / D BLEEKERI / L BREVIS / I ILLECEBROSUS / T PACIFICUS

BURCZYNSKI, J. 1982. Introduction to the use of sonar systems for estimating fish biomass. FAO Technical Paper (191) Rev. 1:89 pp.

Basic principles involved in acoustic surveys of fish stocks. Coverage includes elementary acoustics, target strengths, integration of signals, calibration and quantification.

- *7 BURCZYNSKI J / SONAR / ASSESSMENT

BURUKOVSKI, R. N., T. V. Zouyev, Ch. M. Nigamatullin, and M. A. Tsybal. 1977. Methodology principles for plotting scales of reproductive maturing systems in female squids, based on Stenoteuthis pteropus (Cephalopoda, Ommastrephidae). Zoologicheskii Zhurnal 56:1781-1791. Translated from Russian. Available from: Language Services Branch, National Marine Fisheries Service, Washington, D.C.

Six stages of maturity are presented, with conditions of nidanental glands, ovary development, gonad coefficients, oviducts, and maturation coefficients.

- *6 BURUKOVSKI R N / ZOUYEV T V / NIGAMATULLIN CH M / TSYMBAL M A / S PTEROPUS / REPRODUCTION

CADDY, J. F. 1981. Some factors relevant to management of cephalopod resources off West Africa. FAO, CECAF/TECH/81/37 (En). 46 pp.

History leading to development of present cephalopod fisheries off West Africa, and management conclusions and recommendations. Report indicates that cephalopods are highly opportunistic and have expanded into niches once occupied by sparid fishes.

- *7 CADDY J F / TRAWL / O VULGARIS / SEPIA / ATLANTIC / FISHING

CALLIET, G. M., K. A. Karpov, and D. A. Ambrose. 1979. Pelagic assemblages as determined from purse seine and large midwater trawl catches in Monterey Bay and their affinities with the market squid, Loligo opalescens. CalCOFI Report 20:21-30.

An investigation, using recurrent group analysis, of commercial anchovy purse-seine catches and midwater trawls to determine species co-occurrences with Loligo opalescens. Anchovy hauls showed strong association between L. opalescens and Engraulis mordax, while Merluccius productus was the only squid associate in both shallow and deep midwater trawls. No species had significant affinity with squid in winter midwater trawls.

- *7 CALLIET G M / KARPOV K A / AMBROSE D A / L OPALESCENS / TRAWL / PURSE SEINE / DISTRIBUTION / SEASONAL / EASTPACIFIC / ASSESSMENT

CHRISTOFFERSON, J. P., A. Foss, W. E. Lambert, and B. Wedge. 1978. An electrophoretic study of select proteins from the market squid, Loligo opalescens Berry. Calif. Dept. of Fish and Game Fish Bull. (169):123-133.

An attempt to distinguish subpopulations of L. opalescens by enzyme assay. Data could not verify if subpopulations existed.

*6 CHRISTOFFERSON J P / FOSS A / LAMBERT W E / WEDGE B / STOCK / L OPALESCENS / EASTPACIFIC

CLARKE, S. H., and B. E. Brown. 1979. Trends in biomass of finfishes and squids in ICNAF subarea 5 and statistical area 6, 1964, as determined from research vessel survey data. *Investigacion Pesquera* 43(1):107-122.

Calculations of stratified mean catch per tow and population variance, based on autumn bottom trawl surveys off New England. Although finfishes declined during 1963-1974, squid abundance appeared to increase. Total biomass estimates show declines of 47-51% from 1964-1975; and increases from 1975.

*7 CLARKE S H / BROWN S E / I ILLECEBROSUS / L PEALEI / ASSESSMENT / ATLANTIC / TRAWL

CLARKE, M. R. 1962. The identification of cephalopod "beaks" and the relationship between beak size and total body weight. *Bulletin of the British Museum (Natural History)* 8(10):421-480, plates 13-22.

Methods for squid (and octopod) identification and weight estimation, using beak characteristics. Family and species beak descriptions, regressions of total body weight on rostral length, keys to families by upper and lower beak characters, and photographs of beaks are presented.

*1 CLARKE M R / IDENTIFICATION / MORPHOMETRICS / OMMASTREPHIDAE / ONYCHOTEUTHIDAE / HISTIOTEUTHIDAE / ARCHITEUTHIDAE / GONATIDAE / ENOPLOTEUTHIDAE / OCTOPODOTEUTHIDAE / THYSANOTEUTHIDAE / CHIROTEUTHIDAE / CRANCHIDAE / LOLIGINIDAE / SEPIIDAE / SEPIOLIDAE / OCTOPODIDAE / ARGONAUTIDAE

CLARKE, M. R. 1965. Large light organs on the dorsal surfaces of the squids Ommastrephes pteropus, 'Symplectoteuthis oualaniensis' and 'Dooscidicus gigas'. *Proc. Malac. Soc. Lond.* 36:319-321.

Description of photogenic organs, present in young females and males of O. pteropus. Pacific S. oualaniensis were not found to possess a similar organ, while those of the Indian Ocean did. Contrary to previous report, D. gigas did not possess the organ, which may indicate stock differentiation.

*6 CLARKE M R / O PTEROPUS / S OUALANIENSIS / D GIGAS / STOCK

CLARKE, M. R. 1966. A review of the systematics and ecology of oceanic squids. *Advances in Marine Biology* 4:93-300.

An extensive review of the distribution, depth, and life history of oceanic squid, presented in taxonomic sequence. Predators, sizes as

presented by mantle length, and depth distribution of families are summarized. Because many oceanic squid are fast swimmers, and are able to evade sampling gear, squid ecology is poorly known.

- *2 CLARKE M R / WORLDWIDE / TRAWL / FISH / SEABIRDS / MARINE MAMMALS / FEEDING HABITS / SQUID DIET / GROWTH / REPRODUCTION / DISTRIBUTION / SEASONAL / VERTICAL / ETP / EASTPACIFIC / PACIFIC / PARASITE / INDIAN / ATLANTIC / MEDITERRANEAN / ARCTIC / ANTARCTIC / NET / S OUALANIENSIS / D GIGAS / O BARTRAMII / O BANKSII / P GIARDI / C SCABRA / S LUMINOSA / M ROBUSTA / O CARRIBAEA / H PELAGICA

CLARKE, M. R. 1972. New technique for the study of sperm whale migration. *Nature*, London 238(5364):405-406.

Report of evidence that male sperm whales larger than about 37 feet migrated from the Antarctic before being caught off Durban. Evidence came from examination of stomach contents of female, young male, and large bull whales. The percentage of Antarctic cephalopod beaks from males increased with the size of the whale. Possible explanations are that larger whales migrate further south, or that smaller whales take longer to travel from the Antarctic.

- *3 CLARKE M R / MARINE MAMMALS / FEEDING HABITS / ANTARCTIC / ATLANTIC / DISTRIBUTION / MIGRATION

CLARKE, M. R. 1977. Beaks, nets and numbers. *Symp. Zool. Soc. Lond.* (38):89-126.

A number of comparisons of cephalopod assessment results. Sampling techniques included were nets (Engels midwater trawl, Isaacs-Kidd midwater trawl, rectangular midwater trawl, British Columbia midwater trawl, and ring nets), stomachs (whales, porpoises, birds, seals, sharks, and tuna), and surface observations. Curves of cumulative species composition versus family, by region, show differences due to sampling techniques. Clarke concludes that there are more cephalopods than net sample analysis alone suggests.

- *7 CLARKE M R / FEEDING HABITS / TRAWL / MARINE MAMMALS / SEABIRDS / FISH / ATLANTIC / PACIFIC / EASTPACIFIC / ANTARCTIC / INDIAN / NET / ASSESSMENT WORLDWIDE

CLARKE, M. R. 1980. Cephalopoda in the diet of sperm whales of the southern hemisphere and their bearing on sperm whale biology. *Discovery Reports* 37:1-324.

A study of sperm whale feeding on cephalopods, from stomach samples collected at South Africa, Australia, South Georgia, and the south Atlantic. Presentation of cephalopod occurrence was by size and sex of whales, by cumulative percentages, by region and by season. Report shows regressions of cephalopod wet weights on beak lengths, and presents systematics and ecology of collected cephalopods, with descriptions and illustrations of flesh remains and lower beaks.

- *3 CLARKE M R / MARINE MAMMALS / FEEDING HABITS / DISTRIBUTION / SEASONAL / ANTARCTIC / ATLANTIC / PACIFIC / INDIAN / MORPHOMETRICS / ARCHITEUTHIS / TODARODES / KONDAKOVIA / MOROTEUTHIS / VAMPYROTEUTHIS / ALLOPSUS /

LIOCRANCHIA LEPIDOTEUTHIS / OCTOPOTEUTHIS / TANGIA / CHIROTEUTHIS /
MESONYCHOTEUTHIS / GALITEUTHIS / CYCLOTEUTHIS / CRYSTALLOTEUTHIS /
GONATUS / PHOLIDOTEUTHIS / TAONIS / HISTIOTEUTHIS / ANCISTROCHEIROS /
MASTIGOTEUTHIS / DISCOTEUTHIS / PHASMATOPSIS

CLARKE, M. R. 1981. The squid factor. Working paper for Workshop on the
Biology and Resource Potential of Cephalopods, Melbourne, Australia,
March 1981. National Museum of Victoria, Victoria Institute of Marine
Sciences. 14 pp.

Presentation of the use of stomach contents examinations to provide
information directly relevant to food web studies. Lower trophic
dynamics can be provided by study of stomachs of cephalopods caught in
nets or collected from predator stomachs. Beak identification (with body
weight regressions on beak size) can overcome estimation problems due to
partial digestion. From the study of cephalophages, total cephalopod
population may be estimated.

*7 CLARKE M R / MARINE MAMMALS / SEABIRDS / FISH / FEEDING HABITS /
ASSESSMENT / SQUID DIET

CLARKE, M. R. and J. D. Stevens. 1974. Cephalopods, blue sharks and
migration. J. Mar. Biol. Ass. U.K. 54(3):949-957.

Report of stomach contents of 151 blue sharks caught off Cornwall and in
the Bay of Biscay. Oceanic cephalopod remains in sharks caught off
Cornwall could indicate recent migration of the sharks to that area.
Sharks ate many cephalopod species rarely caught in research nets.

*3 CLARKE M R / ASSESSMENT / STEVENS J D / FISH / FEEDING HABITS / ATLANTIC
T MEGALOPS / PHASMATOPSIS / H REVERSA / H BONNELLII / T EBLANAE /
O CAROLI / G FABRICII / OCTOPOTEUTHIS / ROSSIA / S OFFICINALIS /
E CIRRHOSA / HISTIOTEUTHIS

CLARKE, M. R., N. MacLeod, and O. Paliza. 1976. Cephalopod remains from the
stomachs of sperm whales caught off Peru and Chile. J. Zool., Lond. 180:
477-493.

Comparisons with data from Nesis (1973a) showed that sperm whales sampled
larger and different squids than did trawls. The presence of Gonatus and
Mesonychoteuthis may have indicated northward migration from the
Antarctic. Lower beaks of six species are described and lower beak
length frequency distributions are presented for all cephalopods sampled.

*3 CLARKE M R / MACLEOD N / PALIZA O / EASTPACIFIC / IDENTIFICATION / ETP /
MARINE MAMMALS / FEEDING HABITS / HISTIOTEUTHIS / D GIGAS / CHIROTEUTHIS
OCTOPOTEUTHIS / T DANAE / G ANTARCTICUS / A LESUEURI / SYMPLECTOTEUTHIS /
T MEGALOPS / PHASMATOPSIS / M HAMILTONI / MOROTEUTHIS / PSYCHROTEUTHIS /
V INFERNALIS

CLARKE, M. R. and T. K. Kristensen. 1980. Cephalopod beaks from the stomachs of two northern bottlenosed whales (Hyperoodon ampullatus). J. Mar. Biol. Ass. U.K. 60:151-156.

Squid lower beaks identified and squid weights estimated in stomachs of two bottlenosed whales stranded off Denmark. Although Gonatus fabricii made up 99% and 74% of the lower beaks found in the two whales, total cephalopod composition may indicate whale movements. Vampyroteuthis remains in one whale may show southward migration.

*3 CLARKE M R / KRISTENSEN T K / MARINE MAMMALS / FEEDING HABITS / ATLANTIC G FABRICII / T PAVO / T MEGALOPS / HISTIOTEUTHIS / OCTOPOTEUTHIS / CHIROTEUTHIS / T SAGITTATUS / L GRIMALDII / V INFERNALIS

CLARKE, M. R., N. MacLeod, H. P. Castello, and M. C. Pinedo. 1980. Cephalopod remains from the stomach of a sperm whale stranded at Rio Grande do Sul in Brazil. Marine Biology 59:235-239.

Examination of cephalopod beaks from the stomach of a stranded 34 ft male sperm whale. Regressions of cephalopod weight on lower rostral lengths allowed comparisons of species by weight. Species composition indicated that the whale had migrated from the Antarctic and had fed along the way on South American cephalopods from the continental slope.

*3 CLARKE M R / MACLEOD N / CASTELLO H P / PINEDO M C / FEEDING HABITS / MARINE MAMMALS / MORPHOMETRICS / MIGRATION / ATLANTIC / ANTARCTIC

CLARKE, M. R. and N. MacLeod. 1980. Cephalopod remains from sperm whales caught off western Canada. Marine Biology 59:241-246.

A study of cephalopod beaks collected from 20 sperm whales processed at Vancouver Island, B.C. On the average, seven beaks were identified per stomach. Food items were predominately gonatids and onychoteuthids, but with a small number of histioteuthids and octopoteuthids. A lower beak identification is given for Gonatus fabricii.

*3 CLARKE M R / MACLEOD N / MARINE MAMMALS / FEEDING HABITS / G FABRICII / EASTPACIFIC / IDENTIFICATION

CLARKE, M. R., and F. Trillmich. 1980. Cephalopods in the diet of fur seals of the Galapagos Islands. J. Zool., London 190:211-215.

A study of regurgitations, from seven adult fur seals, surveyed the cephalopod portion of stomach contents (squid, fish and nematodes). Out of 275 lower squid beaks, 96% were Onychoteuthis banksi. The distribution of lower rostral lengths of O. banksi was presented. Squid which made up diet, by weight, were O. banksi (73%), ommastrephids (26%), and other (1%).

*3 CLARKE M R / TRILLMICH F / FEEDING HABITS / MARINE MAMMALS / ETP / SEABIRDS / O BANKSII / MASTIGOTEUTHIS / S OUALANIENSIS / O BARTRAMII

CLARKE, M. R., and P. A. Prince. 1981. Cephalopod remains in regurgitations of black-browed and grey-headed albatrosses at South Georgia. Br. Antarct. Surv. Bull. (54):1-7.

A study of cephalopods from regurgitations of both chick and adult albatrosses. Most likely, birds fed at dusk and dawn, as indicated from the cephalopod species and habits.

*3 CLARKE M R / PRINCE P A / SEABIRDS / FEEDING HABITS

CLARKE, M. R., and N. MacLeod. 1982a. Cephalopod remains from the stomachs of sperm whales caught in the Tasman Sea. Memoirs of the National Museum Victoria (43):25-42.

Cephalopod sampling, via 66 sperm whale stomach contents from animals caught commercially. Results indicate that cephalopods make up a larger portion of the standing stock of nekton than net sampling would suggest.

*3 CLARKE M R / MACLEOD N / MARINE MAMMALS / FEEDING HABITS / PACIFIC

CLARKE, M. R., and N. Macleod. 1982b. Cephalopod remains in the stomachs of eight Weddell Seals. Br. Antarct. Surv. Bull. (57):33-40.

A first detailed study of the cephalopod diet of Weddell seals indicated that all squids identified, except one, were also part of sperm whale diets. While many squids found in seal stomachs were also prey of albatrosses, the proportions and diversities of squid species varied considerably.

*3 CLARKE M R / MACLEOD N / BIRDS / MARINE MAMMALS / FEEDING HABITS / ANTARCTIC

COHEN, E., M. Grosslein, M. Sissenwine, F. Serchuk, and R. Bowman. 1981. Stomach content studies in relation to multispecies fisheries analysis and modeling for the Northwest Atlantic. International Council for Exploration of the Sea. ICES C.M. 1981/G:66.

General summary of multispecies approaches which use models of predator-prey relations, for Gulf of Maine and Georges Bank fishes. Importance was placed on pre-recruit predation and feeding habits studies.

*7 COHEN E / GROSSLEIN M / SISSEWININE M P / SERCHUK F / BOWMAN R / MODEL / FEEDING HABITS / FISH / ATLANTIC

COLEMAN, N., and D. Hobday. 1982. Squid not vital in the diets of commercially important fish from SE Australia. Australian Fisheries 41(11):6-8.

Food habits survey of commercial fishes showed that arrow squid was not an essential prey item. Investigation followed concern that squid fishing might affect other fisheries.

*3 COLEMAN N / HOBDAY D / PACIFIC / FISH / FEEDING HABITS

COURT, W. G. 1980. Japan's squid fishing industry. *Marine Fisheries Review* 42(7-8):1-9.

Presentation of the background and present state of Japan's squid fisheries. After 1969, with declining CPUE, the Todarodes pacificus fishery was regulated, but resource management has been neglected. Other squid fisheries are concentrated in New Zealand and off the east coast of North and South America. Test fishing ventures have been sent to Ecuador, Mexico, New Zealand, and Australia. Recently, Japan's quota of imported squid has increased; in 1978, 122,000 tons was imported, of which 1,900 tons was Loligo opalescens.

*4 COURT W G / PACIFIC / ATLANTIC / T PACIFICUS / O BARTRAMII / L PEALEI / I ILLECEBROSUS / I ARGENTINIUS / N SLOANI GOULDI / JIGGING / TRAWL / GILLNET / FISHING

DAWE, E. G. 1981. Overview of present progress towards aging short-finned squid (Illex illecebrosus) using statoliths. *Journal of Shellfish Research* 1(2):193-195.

Review of the preparation of statoliths and interpretation of growth rings, from the literature dealing with Illex illecebrosus, Loligo opalescens and Gonatus fabricii. Back calculations based on growth rings have consistently underestimated mantle lengths. Suggestions to avoid such shortcomings, in this method of aging, are presented.

*6 DAWE E G / ATLANTIC / EASTPACIFIC / AGING / I ILLECEBROSUS / G FABRICII / L OPALESCENS / GROWTH

DEWEES, C. M., and R. J. Price. 1983. The California squid fishery. Cooperative Extension, Division of Agricultural Sciences, University of California, Leaflet 21330. 15 pp.

A general overview of the California fishery for Loligo opalescens. Contains annotated bibliography with 27 references.

*4 DEWEES C M / PRICE R J / EASTPACIFIC / L OPALESCENS / FISHING / LIGHTS / NET / LAMPARA / SONAR / PURSE SEINE / PUMP / D GIGAS

ENGEL, H. H. 1975. Commercial trawling gear used for squid fishing in the North Atlantic (Japanese gear excluded). *FAO Fisheries Reports* (170) Supplement 1:133-141.

Description of several types of bottom trawls, with dimensions and meshsizes. Best type was a medium opening bottom trawl (6 to 7 m vertical opening) with long wings.

*5 ENGEL H H / TRAWL / FISHING / L PEALEI / ATLANTIC

EVANS, W. E. 1975. Distribution, differentiation of populations, and other aspects of the natural history of Delphinus delphis Linnaeus in the Northeastern Pacific. Ph.D. dissertation, University of California, Los Angeles. 145 pp.

Contains section entitled "Diet, diving and feeding behavior", in which

diets of "southern California continental borderland" dolphins are described. Fall and winter collected animals contained 63% fish and 37% squid (99% Loligo opalescens), while spring and summer collections contained 70% fish, 23% cephalopods (85% onychoteuthids and 15% L. opalescens), and 7% crustaceans. Comparison of food availability was made with commercial fish catches.

- *3 EVANS W E / EASTPACIFIC / MARINE MAMMALS / FEEDING HABITS / L OPALESCENS ONYCHOTEUTHIDAE

FAO. 1979. Mammals in the Seas. Volume II. Pinniped Species Summaries and Report on Sirenians. FAO Fisheries Series No. 5, Volume II. 15 pp.

Contains papers which include references to predation upon cephalopods (South American Sea Lion, South American Fur Seal, and California Sea Lion).

- *3 FAO / MARINE MAMMALS / FEEDING HABITS / ETP / EASTPACIFIC

FAO. 1982. Report of the special working group on cephalopod stocks in the northern region of CECAF. CECAF/ECAF Series 82/24 (En). 178 pp.

Report of cephalopod fisheries off northwest Africa. Production models, catch statistics, length frequency analyses, gear selectivity and biology are discussed. Both Fox and Schaefer models suggest that stocks are overexploited. Appendices are in French and Spanish.

- *7 FAO / O VULGARIS / S OFFICINALIS / L VULGARIS / MODEL /ASSESSMENT / GROWTH / REPRODUCTION / ATLANTIC / STOCK

FIELDS, W. G. 1965. The structure, development, food relations reproduction, and life history of the squid Loligo opalescens Berry. Calif. Dept. Fish and Game, Fish Bulletin 131. 108 pp.

Monograph on the common, coastal east Pacific loliginid, Loligo opalescens. Descriptions of growth, reproduction, fisheries, and predator-prey relations are included.

- *6 FIELDS W G / L OPALESCENS / GROWTH / REPRODUCTION / SEASONAL / DISTRIBUTION / MORPHOMETRICS / SQUID DIET / FISH / MARINE MAMMALS / FEEDING HABITS / EASTPACIFIC / PARASITE

FIELDS, W. G., and V. A. Gauley. 1972. A report on cephalopods collected by Stanford Oceanographic Expedition 20 to the eastern tropical Pacific Ocean September to November 1968. Veliger 15(2):113-118.

A survey which collected 17 cephalopods, on the 1968 cruise of the RV Te Vega. Collection methods used were Tucker trawl, bongo net, handline and regurgitations of a Colombian booby.

- *2 FIELDS W G / GAULEY V A / ETP / MORPHOMETRICS / OCTOPUS / JAPETELLA / A AFFINIS / B ABYSSICOLA / B BACIDIFERA / D GIGAS / S OUALANIENSIS / H PFEFFERI / SYMPLECTOTEUTHIS

FILIPPOVA, Yu. A. 1971. The distribution of squids in the pelagic waters of the world ocean. Izdatel'stvo "Nauka", Moskva:89-101. Translated from Russian. Available from: Language Services Branch, National Marine Fisheries Service, Washington, D.C.

Distribution of squids based on 3,000 specimens, collected by research and fishing vessels, 1959-1967, from 272 stations worldwide.

*2 FILIPPOVA YU A / DISTRIBUTION / ATLANTIC / PACIFIC / INDIAN / ANTARCTIC / ETP / EASTPACIFIC / LOLIGO / S OUALANIENSIS / O BARTRAMII / D GIGAS / MIGRATION / WORLDWIDE

FISCUS, C. H. 1982. Predation by marine mammals on squids of the eastern North Pacific Ocean and the Bering Sea. Marine Fisheries Review 44(2):1-10.

Survey of squid from examination of stomach contents of northern fur seals, Dall's porpoise, Pacific white-sided dolphins, saddleback dolphins, killer whales, and sperm whales, from central California to the Bering Sea. Based on frequent occurrences, Loligo opalescens, Onychoteuthis borealijaponicus, Berryteuthis magister, and Gonatopsis borealis could probably support northern commercial fisheries.

*3 FISCUS C H / EASTPACIFIC / MARINE MAMMALS / FEEDING HABITS / L OPALESCENS / O BOREALIJAPONICUS / O BARTRAMII / GONATUS / BERRYTEUTHIS / GONATOPSIS / M ROBUSTA / CHIROTEUTHIS / ABRALIOPSIS / OCTOPOTEUTHIS / OCTOPUS

FISCUS, C. H., and R. W. Mercer. 1982. Squids taken in surface gillnets in the North Pacific Ocean by the Salmon Investigations Program, 1955-72. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., NOAA Tech. Memo. NMFS F/NWC-28. 32 pp.

A report of incidental catches of squids in salmon research gillnets, in latitudes 40 N to 60 N, and longitudes 125 W to 180 W. Gillnet mesh was between 64 and 133 mm stretch measure, and catches were greatest in 64 and 83 mm meshes. O. borealijaponicus was most abundant and could probably support a jig fishery; and, O. bartramii presented a potential for commercial gillnetting.

*7 FISCUS C H / MERCER R W / EASTPACIFIC / GILLNET / G BOREALIS / J HEATHI / O BOREALIJAPONICUS / GONATUS / BERRYTEUTHIS / O BARTRAMII / CHIROTEUTHIS

FLORES, E. E. C. 1972. Handline fishing for squid in the Japan Sea. FAO Fisheries Circular (142):1-6.

A description of squid jigging gear and fishing operations on Japanese vessels.

*5 FLORES E E C / LINE / JIGGING / PACIFIC / FISHING

FLORES, E. E. C. 1982. Light attraction in squid fishing. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston, Massachusetts. Unipub. pp. 55-68.

Review of the use of lights for attracting squid during jigging

operations. Paper discusses incandescent, mercury, halogen, fluorescent, and underwater lighting. Differences in squid response to the various light types probably results from species related reactions.
*5 FLORES E E C / LIGHTS / JIGGING / PUMP / PURSE SEINE / FISHING

FLORES, E. E. C., S. Igarashi, and T. Mikami. 1978. Studies on squid behavior in relation to fishing. III. On the optomotor response of squid, Todarodes pacificus Steenstrup, to various colors. Bull. Fac. Fish. Hokkaido Univ. 29(2):131-140.

Study which suggests the absence of color vision in squid. An extension of these results can be applied to squid line fishing; rather than color, contrast of the jig against the surrounding water would be most important.

*6 FLORES E E C / IGARASHI S / MIKAMI T / JIGGING / T PACIFICUS

GAEVSKAYA, A. V. 1976. On the helminthofauna of the Atlantic squid Ommastrephes bartrami, Le Sueur. Biological Fisheries Research in the Atlantic Ocean. 1976. AtlanNIRO, Works, 69:89-96. Translated from Russian by M. O. Pierson. (Provided by F. G. Hochberg, Museum of Natural History, Santa Barbara, Ca.)

Study found that O. bartrami of the South Atlantic was infected by one trematode species, three cestodes and two nematodes, which are described. Probable developmental cycles are presented.

*6 GAEVSKAYA A V / PARASITE / O BARTRAMII / ATLANTIC

GAEVSKAYA, A. V. 1977. Features of the trematodofauna of cephalopod molluscs. Materials of the Scientific Conferences of the All-Union Helminthological Society. Vol. 29, "Trematoda and Trematozoa". Moscow:12-17. Translated from Russian by M. O. Pierson. (Provided by F. G. Hochberg, Museum of Natural History, Santa Barbara, Ca.)

Paper states that extent and intensity of infection is significantly higher in oceanic Atlantic Ocean ommastrephids than in neritic species, and that tropical squids have higher infection rates than temperate ones.

*6 GAEVSKAYA A V / PARASITE / ATLANTIC / OMMASTREPHIDAE / SQUID DIET

GAEVSKAYA, A. V., and Ch. M. Nigamatullin. 1976. Biotic relationships of Ommastrephes bartrami (Cephalopoda, Ommastrephidae) in the North and South Atlantic. Zool. Zhur. 55(12):1800-1810. Translated from Russian by M. O. Pierson. (Provided by F. G. Hochberg, Museum of Natural History, Santa Barbara, Ca.)

Paper reports a correspondence of the trophic and parasitic relationships of Ommastrephes bartrami. Most of the helminthofauna of this squid were similar in the North and South Atlantic although the squid stocks have been separate for 15-20,000 years.

*6 GAEVSKAYA A V / NIGAMATULLIN CH M / O BARTRAMII / ATLANTIC / PARASITE / DISTRIBUTION / SQUID DIET / FISH / MARINE MAMMALS / FEEDING HABITS / STOCK

GASKIN, D. E., and M. W. Cawthorn. 1967. Squid mandibles from the stomachs of sperm whales (Physeter catodon) captured in the Cook Strait region of New Zealand. N.Z. J. Mar. Freshwat. Res. 1:59-70.

Identifications of cephalopod lower beaks found in two sperm whales. Beaks were separated into 11 types, and then types were compared to beaks obtained from whole squid.

*3 GASKIN D E / CAWTHORN M W / MARINE MAMMALS / FEEDING HABITS / MOROTEUTHIS N SLOANI / H COOKIANA / ARCHITEUTHIS / S BILINEATA / OCTOPODA / PACIFIC / IDENTIFICATION

GREENBLATT, P. 1981. Sources of acoustic backscattering at 87.5 kHz. J. Acoust. Soc. Am. 70(1):134-142.

Investigation, which utilized three different approaches, to determine sources of backscattering from the oceanic backscattering layer. Although the approaches (one theoretical, two sampling) gave similar results, there were some discrepancies between approaches. Backscattering sources were fish, squid, and large zooplankton. Fish and squid were found early in the evenings, while euphausids appeared later at night.

*7 GREENBLATT P / SONAR / ASSESSMENT / EASTPACIFIC / NET

GREENBLATT, P. 1982. Distributions of volume scattering observed with an 87.5 kHz sonar. J. Acoust. Soc. Am. 71(4):879-885.

Upward and downward migrations of fish, squid, and plankton were measured with a horizontally aimed 87.5 kHz sonar. Resolution was between 17 and 400 m. Scattering strengths of upward migrations were stronger than of downward migrations, and may indicate that organisms were more concentrated during upward migrations.

*7 GREENBLATT P / SONAR / EASTPACIFIC / ASSESSMENT

GREENLAW, C. F. 1979. Acoustical estimation of zooplankton populations. Limnol. Oceanogr. 24(2):226-242.

Report of acoustical estimation of the size distribution and abundance of euphausids, using measurements at several frequencies.

*7 GREENLAW C F / SONAR / ASSESSMENT

GRIEB, T. M., and R. D. Beeman. 1978. A study of spermatogenesis in the spawning population of the squid, Loligo opalescens. Cal. Dept. of Fish and Game Fish Bull. (169):11-33.

Description of male squid reproductive system and maturation, using electron microscopy of testicular tissue or spermatophores. Results suggest that males spawn just once, and then die.

*6 GRIEB T M / BEEMAN R D / L OPALESCENS / REPRODUCTION / EASTPACIFIC

HAMABE, M., T. Kawakami, T. Watabe, and T. Okuya. 1975. Views on the development of overseas squid pole and line fishing. Prog. Rep. Squid Fish. Survey World (5):129-137. Translated from Japanese in: Canadian Translation of Fisheries and Aquatic Sciences (4585). 35 pp. Available from: Language Services Branch, National Marine Fisheries Service, Washington, D.C.

Overview of surumeika (Todarodes pacificus) fishing, including a history leading to the development of present jigging methods, and biological information. Also, Japanese overseas squid fishing operations, such as for Doscoedus gigas, are summarized.

*4 HAMABE M / KAWAKAMI T / WATABE T / OKUYA T / T PACIFICUS / LIGHTS / JIGGING / D GIGAS / REPRODUCTION / GROWTH / ATLANTIC / PACIFIC / ETP / MIGRATION / FISHING

HAMABE, M., C. Hamuro, and M. Ogura. 1982. Squid jigging from small boats. FAO Fishing Manuals. Fishing News Books, Surrey, England. 72 pp.

Description of squid jigging gear and its operation. Lighting, jig types, vessel layouts, and squid processing are among the topics discussed.

*5 HAMABE M / HAMURO C / OGURA M / JIGGING / LIGHTS / FISHING

HANLON, R. T., R. F. Hixon, J. W. Forsythe and J. P. Hendrix, Jr. 1979. Cephalopods attracted to experimental night lights during a saturation dive at St. Croix, U.S. Virgin Islands. The Bulletin of the Malacological Union 1979:53-58.

Three types of lighting were used to attract squids: surface incandescent, surface quartz-iodide and underwater mercury vapor. Four species were collected from the underwater habitat which was operated at depths between 13 and 40 m.

*5 HANLON R T / HIXON R F / FORSYTHE J W / HENDRIX J P / LIGHTS / ATLANTIC / A VERANYI / OMMASTREPHES / LOLIGO / S SEPIOIDEA

HARRIS, M. P. 1973. The biology of the waved albatross Diomedea irrorata of Wood Island, Galapagos. Ibis 115(4):483-510.

A study of the ecology and biology of waved albatross, from colonies on the Galapagos Islands. A food habit survey, using regurgitations, showed that squid was a major diet item. About 80% of squid beaks were histioteuthids and octopoteuthids; however, ommastrephids comprised the major fraction of biomass, from estimates of mean weights based on beak sizes.

*3 HARRIS M P / FEEDING HABITS / SEABIRDS / ETP / S OUALANIENSIS / CALLITEUTHIS / ONYCHOTEUTHIS / MOROTEUTHIS / PHOLIDOTEUTHIS / HISTIOTEUTHIDAE / OCTOPODOTEUTHIDAE / OMMASTREPHIDAE / CHIROTEUTHIDAE / ONYCHOTEUTHIDAE / ENOPLOTEUTHIDAE / ONYCHOTEUTHIDAE / PHOLIDOTEUTHIDAE

HERRING, P. J. 1977. Luminescence in cephalopods and fish. Symp. Zool. Soc. Lond. (38):127-159.

Contains a list of cephalopod genera containing luminous species. Presents illustrations of the positions of light organs on 25 cephalopods.

*6 HERRING P J / IDENTIFICATION / SYMPLECTOTEUTHIS / OMMASTREPES / GONATUS ONYCHOTEUTHIS / HISTIOTEUTHIS / OCTOPOTEUTHIS / ABRALIOPSIS / CRANCHIA / LOLIGO / BATHYTEUTHIS / GALITEUTHIS

HESS, S. C., and R. B. Toll. 1981. Methodology for specific diagnosis of cephalopod remains in stomach contents of predators with reference to the broadbill swordfish, Xiphias gladius. Journal of Shellfish Research 1 (2):161-170.

Presentation of techniques used to identify 15 cephalopod species, from a feeding habits study of 65 broadbill swordfish caught off Florida. Methods can be applied to other predators and other oceanic areas, because there were a number of cosmopolitan cephalopod species.

*3 HESS S C / TOLL R B / IDENTIFICATION / PACIFIC / INDIAN / MEDITERRANEAN / FISH / FEEDING HABITS / ATLANTIC / O BANKSII / A LESUEURI / T MASSYAE / ARCHITEUTHIS / H DOFLEINI / C SICULUS / O PTEROPUS / O ANTILLARUM / T RHOMBUS / C SCABRA / J DIAPHANA / ARGONAUTA

HOCHBERG, F. G. 1974. Southern California records of the giant squid, Moroteuthis robusta. Tabulata 7:83-85.

Details of seven specimens collected in the Santa Barbara Channel from 1967-1974. M. robusta is a major prey of sperm whales.

*2 HOCHBERG F G / EASTPACIFIC / M ROBUSTA / SQUID DIET

HOCHBERG, F. G., Jr., and W. G. Fields. 1980. Cephalopoda: the squids and octopuses. pp. 429-444. In R. H. Morris, D. P. Abbott, and E. C. Haderlie eds. Intertidal Invertebrates of California.

Review of cephalopod biology, followed by descriptions of California species.

*2 HOCHBERG F G / FIELDS W G / EASTPACIFIC / R PACIFICA / L OPALESCENS / D GIGAS / M ROBUSTA / OCTOPODA / PARASITE

HOYLE, W. E. 1904. Reports on the Cephalopoda. Bulletin of the Museum of Comparative Zoology at Harvard College 63(1). 71 pp.

Collection of cephalopods from the 1891 Albatross cruise in the ETP, and a smaller collection from the Albatross 1899-1900 across the tropical Pacific. Contains 12 plates, and descriptions of light organs of two squids.

*2 HOYLE W E / ETP / PACIFIC / OCTOPODA / L DIOMEDEA / S OUALANIENSIS / B ABYSSICOLA / M DENTATA / O CARRIBAEA / A HOYLEI / ABRALIOPSIS / P GIARDI / C REVERSA / C SCABRA / TAONIS

HUEY, L. M. 1930. Capture of an elephant seal off San Diego, California, with notes on stomach contents. *J. Mammal.* 11(2):229-231.

Stomach of a large male elephant seal, harpooned by swordfish fishermen, contained sharks, skates, ratfish and squid.

*3 HUEY L M / MARINE MAMMALS / FEEDING HABITS / EASTPACIFIC / L OPALESCENS

HURLEY, A. C. 1978. School structure of the squid *Loligo opalescens*. *Fishery Bulletin* 76:433-442.

Behavioral study of schooling of *Loligo opalescens* in laboratory experiments. Measurements of angular orientation suggested that larger squid create more cohesive schools than do smaller ones. Vision was the primary sensing system involved in schooling.

*6 HURLEY A C / L OPALESCENS / DISTRIBUTION / CAMERA

HURLEY, G. V., and D. E. Waldron. 1978. 1977 Population estimates for the squid (*Illex illecebrosus*) in ICNAF Subarea 4 from the International Fishery in 1977. Fisheries and Environment Canada. Fisheries and Marine Service Technical Report (833). Chapter 6, 10 pp.

A summary of population estimates, using three models: areal expansion, Leslie-Delury method and cohort analysis. Leslie and cohort analysis yielded similar estimates, while areal expansion gave a much larger estimate.

*7 HURLEY G V / WALDRON D E / I ILLECEBROSUS / MODEL / ASSESSMENT / ATLANTIC TRAWL

HURLEY, G. V., and P. Beck. 1979. The observation of growth rings in statoliths from the ommastrephid squid, *Illex illecebrosus*. *The Bulletin of the Malacological Union* 1979:23-29.

An examination of "growth" rings in squid statoliths using both scanning electron microscopy and light microscopy. Study found good prediction of mantle lengths from ring counts, but back calculated lengths were much lower than expected values.

*6 HURLEY G V / BECK P / ATLANTIC / GROWTH / AGING / I ILLECEBROSUS

IGARASHI, S., and T. Mikami. 1978. Studies on the mechanization of squid angling fishery. II. A comparison of the fish-hook movement by hand crank and automatic machine. *Bull. Fac. Fish. Hokkaido Univ.* 29(1):19-24.

Report of study which showed that there was no difference in motion between hand crank and automatic machines, when the latter was operated at medium speed with a jerking motion. In Japanese, with English abstract and figure captions.

*5 IGARASHI S / MIKAMI T / JIGGING

IVERSEN, R. T. B. 1962. Food of albacore tuna, *Thunnus germon* (Lacepede), in the central and northeastern Pacific. U.S. Fishery Bulletin 62(214):459-481.

A study of albacore prey from 544 fish collected from 1950 to 1957, by longline, trolling and gillnet. Food items were (by method of capture and volume): longline- fish (47%), squid (41%), and crustaceans (7%); gillnet- fish (34%), squid (62%), and crustaceans (2%); trolling- fish (79%), squid (11%), and crustaceans (6%). Amounts of squid in albacore stomachs, collected in equatorial regions, increased with distance from land.

*3 IVERSEN R T B / FISH / FEEDING HABITS / PACIFIC / LONGLINE / LINE / GILLNET / OCTOPODIDAE / ARGONAUTIDAE / LOLIGINIDAE / SEPIOTEUTHIS / SEPIOLIDAE / ONYCHOTEUTHIDAE / ENOPLOTEUTHIDAE / OMMASTREPHIDAE / SYMPLECTOTEUTHIS / BRACHIOTEUTHIS / CRANCHIIDAE

IVERSON, I. L. K. 1971. Albacore food habits. California Department of Fish and Game Fish Bulletin 152:11-46.

A survey of albacore stomachs from the 1968 and 1969 seasons, in three areas: southern California, central California, and Oregon-Washington. Digestion of squids obscured their impact in diet, but an index of relative importance showed squid second to fish.

*3 IVERSON I L K / EASTPACIFIC / FISH / FEEDING HABITS / L OPALESCENS / O BOREALIJAPONICUS / M ROBUSTA / A FELIS / O SICULA / GONATUS / GONATOPSIS / LEACHIA / H HETEROPSIS / D GIGAS / M DENTATA / V INFERNALIS / O CALIFORNIANA / ARGONAUTA / O TUBERCULATA / O BIMACULATUS

IVERSON, I. L. K., and L. Pinkas. 1971. A pictorial guide to beaks of certain eastern Pacific cephalopods. Calif. Dept. Fish and Game Fish Bull. 152: 83-105.

A guide to the identification of 20 species of cephalopods, utilizing upper and lower beaks. Size, and front and side views are provided.

*1 IVERSON I L K / PINKAS L / IDENTIFICATION / L OPALESCENS / M ROBUSTA / O BOREALIJAPONICUS / A FELIS / O SICULA / H HETEROPSIS / G ANONYCHUS / GONATUS / GONATOPSIS / D GIGAS / M DENTATA / C SCABRA / LEACHIA / R PACIFICA / V INFERNALIS / O CALIFORNIANA / ARGONAUTA / O TUBERCULATA / O BIMACULATUS

JAPAN MARINE FISHERY RESOURCE RESEARCH CENTER. 1978. Report of feasibility study 1978 on squid jigging fisheries in the Southwestern Pacific Ocean. JARMAC Report (19). 178 pp.

The results of a cooperative survey between Japan and Australia, which utilized a vessel equipped with 28 squid jigging machines and 60 lights of 21 kW total output. Catch of squid over a 120 day period was 120,672 kg *Nototodarus sloani gouldi*, and 3,608 kg *Todarodes filippovae*. Mantle length, body weight, sex, maturity, and stomach contents were sampled. Recaptured tagged squid, and catches showed limited migration during that fishing period.

*7 N SLOANI GOULDI / T FILIPPOVAE / JIGGING / LIGHTS / TAGGING / PACIFIC /

NET / SQUID DIET / ASSESSMENT

JEFFERTS, K., and W. Pearcy. 1979. Distribution and biology of cephalopods from the northeast Pacific Ocean. Interim Report to NMFS, Northwest and Alaska Fisheries Center. Contract (03-7-208-25070) Phase II.

Report of cephalopods, collected during rockfish surveys, in 36 (out of 267 total) bottom trawl hauls. Dominant species were Beryteuthis magister (57%) and Octopus spp. (31%).

*2 JEFFERTS K / PEARCY W G / EASTPACIFIC / TRAWL / O CALIFORNIANA / OCTOPUS R PACIFICA / G BERRYI / M ROBUSTA / G MADOKAI / B MAGISTER

JUANICO, M. 1980. Developments in South American fisheries. Marine Fisheries Review 42(7-8):10-14.

A description of the present state of squid fisheries in South America. Statistics for all fisheries, including squid, are presented, according to country and from 1970 to 1978. On the Pacific coast, the major squid species landed has been Dosidicus gigas, with a lesser amount of Loligo. Because of exportation, traditional food preferences, and marketing, there is little demand for squid by South Americans.

*4 JUANICO M / EASTPACIFIC / ETP / ATLANTIC / D GIGAS / L GAHI

JUANICO, M. 1982. Squid spatial patterns in two species mixed fishery off southern Brazil. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston, Massachusetts. Unipub. pp. 69-79.

Trawl assessment of two lolignid squids showed that only few of one species type were found with the other, although a non-parametric co-occurrence index indicated high spatial overlap. Both species showed high patchiness.

*7 JUANICO M / L PLEI / L BRASILIENSIS / TRAWL / ASSESSMENT

JUHL, R. 1955. Notes on the feeding habits of subsurface yellowfin and bigeye tunas of the eastern tropical Pacific Ocean. California Fish and Game 41(1):99-101.

Summary of stomach contents of five bigeye and ten yellowfin tuna caught by longline gear. Prey volumes for the entire sample were 58.7% fish, 27.2% squid, and 15.0% portunid crabs.

*3 JUHL R / ETP / FISH / FEEDING HABITS / D GIGAS

KANCIRUK, P. 1982. Hydroacoustic biomass estimation techniques. Environmental Sciences Division Publication (2019). Prepared for Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission. Available from National Technical Information Service, U.S. Department of Commerce. 279 pp.

Background information and possible use of sonar biomass estimation in power plant applications. Includes 430 references to varied literature

including pelagic studies, equipment, signal processing, statistical analyses, and more.

*7 KANCIRUK P / SONAR

KARPOV, K. A., and G. M. Calliet. 1978. Feeding dynamics of Loligo opalescens. Calif. Dept. of Fish and Game Fish Bull. (169):45-65.

Similar to Karpov and Calliet (1979). See annotation for content.

*6 KARPOV K A / CALLIET G M / L OPALESCENS / EASTPACIFIC / TRAWL / SQUID DIET

KARPOV, K. A., and G. M. Calliet. 1979. Prey composition of the market squid, Loligo opalescens Berry, in relation to depth and location of capture, size of squid, and sex of spawning squid. CalCOFI Report 20:51-57.

Investigation of squid feeding habits, in the Monterey Bay area, from squid collected in bottom trawls during the day, and in midwater trawls both at night and day. Squid fed mainly on crustaceans; size of squid made little difference to prey composition, but depth of capture showed different feeding strategies.

*6 KARPOV K A / CALLIET G M / L OPALESCENS / EASTPACIFIC / SQUID DIET / TRAWL

KASHIWADA, J., and C. W. Recksiek. 1978. Possible morphological indicators of population structure in the market squid, Loligo opalescens. Calif. Dept. of Fish and Game Fish Bull. (169):99-111.

Thirteen measurements of body parts and four sexual maturity codes were used to investigate possible geographic subpopulations of squid. Two measurements clearly indicated sexual dimorphism. Data may indicate three geographic groups: Baja California, northern and central California, and Puget Sound.

*6 KASHIWADA J / RECKSIEK C W / MORPHOMETRICS / L OPALESCENS / EASTPACIFIC / STOCK / TRAWL / JIGGING / NET

KASHIWADA, J., C. W. Recksiek, and K. A. Karpov. 1979. Beaks of the market squid, Loligo opalescens, as tools for predator studies. CalCOFI Report 20:65-69.

Regressions of squid mantle lengths on various squid beak measurements. Comparisons of body size- beak dimension relationships, from squids caught at Monterey and Southern California, revealed no significant differences between areas.

*6 KASHIWADA J / RECKSIEK C W / KARPOV K A / L OPALESCENS / EASTPACIFIC / MORPHOMETRICS

KATO, S., and J. E. Hardwick. 1975. The California squid fishery. FAO Fisheries Reports (170) Supplement 1:107-127.

Summary of the Loligo opalescens fishery off California. A short description of the squid's life history is given, followed by a review of the Southern California and Monterey area fisheries. Fishing methods were by brailing under lights, by hydraulic pumps, by purse seining, and by lampara, a roundhaul net. Fishing regulations prohibit the use lights or purse seines in the Monterey area. Squid in both areas have been located by associated marine mammals and seabirds.

*4 KATO S / HARDWICK J E / L OPALESCENS / EASTPACIFIC / SQUID DIET / FISH / MARINE MAMMALS / FEEDING HABITS / DISTRIBUTION / SEASONAL / GROWTH / REPRODUCTION / PUMP / LIGHTS / LAMPARA / NET / PURSE SEINE / SONAR / DIPNET / JIGGING / FISHING

KAWAGUCHI, T., and T. Nazumi. 1972. Echo-traces of squid, Ommastrephes sloanei pacificus, in the central waters of Japan Sea. FAO Fisheries Circular (142):15-25.

Examples of echo-traces obtained from 14, 28, 50, 75, and 200 kHz sounders on Japanese research vessels in the Sea of Japan. Report concluded that squid could be recorded throughout the day, whether the ship was underway or stopped.

*7 KAWAGUCHI T / NAZUMI T / SONAR / ASSESSMENT / PACIFIC

KAWAKAMI, T. 1976. Squids found in the stomachs of sperm whales in the Northwestern Pacific. Sci. Rep. Whales Res. Inst. (28):145-151.

A collection of five squid species, found in the stomachs of eight sperm whales captured off Japan in 1972.

*3 KAWAKAMI T / MARINE MAMMALS / FEEDING HABITS / M ROBUSTA / GONATUS / G BOREALIS / O BARTRAMII / H DOFLEINI / PACIFIC

KAWAKAMI, T. 1980. A review of sperm whale food. Sci. Rep. Whales Res. Inst. (32):199-218.

Review reports that cephalopods predominate in sperm whale diets. Cephalopod species are reported by oceanic region, and consist of 36 genera (31 squid genera) and 19 families.

*3 KAWAKAMI T / MARINE MAMMALS / FEEDING HABITS / PACIFIC / ATLANTIC / INDIAN / ANTARCTIC / A LESUEURI / OCTOPOTEUTHIS / T DANAE / MOROTEUTHIS / PSYCHROTEUTHIS / G ANTARCTICUS / CYCLOTEUTHIDAE / HISTIOTEUTHIS / D GIGAS SYMPLECTOTEUTHIS / CHIROTEUTHIS / T MEGALOPS / PHOLIDOTEUTHIDAE / VAMPYROTEUTHIS / OCTOPODIDAE

KAWAMURA, A. 1971. Influence of chasing time to stomach contents of baleen and sperm whales. Sci. Rep. Whales Res. Inst. (23):27-36.

Of 895 whales, 3.6% were observed to vomit food (16.8% of sperms, 1.1% of seis, and 0.785 of fins). Fin and sperm whales were observed to vomit squid.

*3 KAWAMURA A / PACIFIC / MARINE MAMMALS / FEEDING HABITS

KAWAMURA, A. 1980. A review of food of balaenopterid whales. Sci. Rep. Whales Res. Inst. (32):155-197.

Review indicates that squids play a minor role in the diet of some balaenopterid whales. References to the literature are categorized by oceanic region.

*3 KAWAMURA A / PACIFIC / ATLANTIC / INDIAN / ANTARCTIC / MARINE MAMMALS / FEEDING HABITS / O SLOANI PACIFICUS / O BANKSII / B ANONYCHUS / GONATUS

KING, J. E., and I. I. Ikehara. 1956. Comparative study of food of bigeye and yellowfin tuna in the central Pacific. U.S. Fishery Bulletin 57(108): 61-85.

An examination of stomachs from 439 yellowfin and 166 bigeye tuna, collected by longline from 1950-1953 in the central Pacific. Food of yellowfin were by volume: fish (62%), squid (29%), other mollusks (7%), and crustaceans (1%). Bigeye prey were: fish (62%), squid (33%), other mollusks (3%), and crustaceans (2%). The diet of yellowfin and bigeye tuna was similar, and the study concludes that both species have the same feeding habits.

*3 KING J E / IKEHARA I I / PACIFIC / FISH / FEEDING HABITS / LONGLINE / LOLIGO / SEPIOTEUTHIS / ONYCHOTEUTHIDAE / ABRALIA / OMMASTREPHES / NOTOTODARUS / OMMASTREPHIDAE / SEPIOLIDAE / CRANCHIIDAE / L GLOBULA / OCTOPODIDAE / A BOTTGERI / ARGONAUTIDAE

KING, J. E., and R. T. B. Iversen. 1962. Midwater trawling for forage organisms in the central Pacific 1951-1956. U.S. Fish and Wildlife Service Fishery Bulletin 62(210):271-321.

Species compositions of 274 hauls, utilizing four types of midwater trawls, in order to monitor juvenile tunas and tuna food resources. Comparisons with yellowfin tuna stomach contents showed that trawls did not sample tuna prey (which included ommastrephid and lolignid squids).

*3 KING J E / IVERSEN R T B / TRAWL / ENOPLOTEUTHIDAE / PTERYGIOTEUTHIS / O BANKSII / HISTIOTEUTHIDAE / ASSESSMENT / DISTRIBUTION / PACIFIC / ETP / FISH FEEDING HABITS / MASTIGOTEUTHIS / CRANCHIIDAE / L GLOBULA / LIOCRANCHIA / HELIOCRANCHIA / MEGALOCRANCHIA / CHIOTEUTHIDAE / ENOPLOTEUTHIS / ABRALIOPSIS / ABRALIA / A TRIGONURA / A ASTROSTICTA / A MORRISII / P GIARDI / P MICROLAMPAS / P MAGARITIFERA / ONYCHOTEUTHIDAE / OCTOPODOTEUTHIS / HISTIOTEUTHIS / C MELEAGROTEUTHIS / BENTHOTEUTHIS / CTENOPTERYX / BRACHIOTEUTHIS / OMMASTREPHIDAE / S OUALANIENSIS / CHIOTEUTHIS / C IMPERATOR / DORATOPSIS / C SCABRA / L VALDIVIAE / DESMOTEUTHIS / CORYNOMMA / EUZYGAENA / E PACIFICA

KLETT TRAUlsen, A. 1981. Estado actual de la pesqueria del calamar gigante en el estado de Baja California Sur. Departamento de Pesca, Instituto Nacional de la Pesca, Centro de Investigaciones Pesqueras de la La Paz, Mexico. Serie Cientifica (21):7-28.

Report of fishing of giant squid, Dosidicus gigas, which has become a prospective major fisheries resource in the Gulf of California. Squid landings, for 1980, are presented according to eight areas, and by season. Landings of squid were 552 tons in 1978, 2,510 tons in 1979, and 8,180 tons in 1980.

*4 KLETT TRAUlsen A / D GIGAS / ETP / JIGGING / FISHING / DISTRIBUTION

KLETT, A. 1982. Jumbo squid fishery in the Gulf of California, Mexico. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston, Massachusetts. Unipub. pp. 81-100.

Report is essentially an English translation of Klett Traulsen (1981). See reference for annotation.

*4 KLETT TRAUlsen A / D GIGAS / ETP / JIGGING / FISHING / DISTRIBUTION

KNIPE, J. H., and R. D. Beeman. 1978. Histological observations on oogenesis in Loligo opalescens. Calif. Dept. of Fish and Game Fish Bull. (169):23-33.

A study which found no evidence for single spawning. However, no site for future spawning was found either.

*6 KNIPE J H / BEEMAN R D / L OPALESCENS / REPRODUCTION / EASTPACIFIC

KORZUN, Y. V., K. N. Nesis, C. M. Nigamatullin, A. A. Ostapenko, and M. A. Pinchukov. 1979. New data on the distribution of squids, family Ommastrephidae, in the world ocean. Oceanology 19(4):472-475.

Report of distributional data on ommastrephid species, compiled from several Russian research cruises. Worldwide occurrences are reported for both cosmopolitan and endemic species.

*2 KORZUN Y V / NESIS K N / NIGAMATULLIN CH M / OSTAPENKO A A / PINCHUKOV M A / WORLDWIDE / DISTRIBUTION / ATLANTIC / PACIFIC / INDIAN / ETP / T ANGOLENSIS / N SLOANI / O BARTRAMII / E LUMINOSA / H PELAGICA

KOYAMA, T. 1975. Japanese trawling gear for octopus and squid. FAO Fisheries Reports (170) Supplement 1:128-132.

Description of Japanese octopus trawling gear (West Africa) and squid (Loligo, Northwest Atlantic) trawling gear, with dimensions and meshsizes.

*5 KOYAMA T / TRAWL / OCTOPUS / SEPIA / LOLIGO / ATLANTIC / FISHING

KRISTENSEN, T. K. 1980. Periodical growth rings in cephalopod statoliths. Dana 1:39-51.

Relation of concentric growth rings in Gonatus fabricii statoliths to growth and time. Methods of preparation and interpretation are presented. Besides daily increments, fortnightly and monthly bands were seen.

*6 KRISTENSEN T K / ATLANTIC / G FABRICII / AGING / GROWTH

KUBODERA, T., and T. Okutani. 1981. The systematics and identification of larval cephalopods from the northern North Pacific. Research Institute of North Pacific Fisheries, Hokkaido University, Special Volume:131-159.

Descriptions of 13 larval cephalopods, and keys to their identification.

*1 KUBODERA T / OKUTANI T / EASTPACIFIC / PACIFIC / IDENTIFICATION / TRAWL / ENOPLOTEUTHIDAE / GONATIDAE / OCTOPUS / JAPETELLA

KUBODERA, T., and H. Yoshida. 1981. The gill-net mesh selectivity for flying squid, Ommastrephes bartrami (Lesueur). Research Institute of North Pacific Fisheries, Faculty of Fisheries, Hokkaido University, Special Volume, Contribution (137):181-190.

Report of mesh selectivity, in catching Ommastrephes bartrami, using a salmon research gillnet. Mesh sizes varied from 42 to 157 mm. Gillnets were non-selective for squid having 18-50 cm dorsal mantle lengths. Catching efficiency for squid was higher than for salmon. In Japanese with English abstract.

*7 KUBODERA T / YOSHIDA H / O BARTRAMII / GILLNET / ASSESSMENT / PACIFIC

LAEVASTU, T., and H. A. Larkins. 1981. Marine fisheries ecosystem, its quantitative evaluation and management. Fishing News Books Ltd., Farnham, UK. 162 pp.

Description of large scale approach to ecosystem simulation. Model used was a top down (upper end of the food pyramid), biomass based one. Equilibrium biomasses in the Bering Sea are presented for present and natural state conditions, for 20 groups or species, including squid.

*7 LAEVASTU T / LARKINS H A / MODEL / ASSESSMENT / EASTPACIFIC / FISH / MARINE MAMMALS / GONATIDAE / FEEDING HABITS / SQUID DIET / GROWTH / MIGRATION / REPRODUCTION

LANGE, A. M. T. 1980. Yield-per-recruit analyses for squid, Loligo peali and Illex illecebrosus, from the northwest Atlantic. Journal of Shellfish Research 1(2):197-207.

Simulation of the effects of fishing on Atlantic squid, using a modified Ricker yield-per-recruit model for two cohorts. Mesh size of capture gear and monthly values of growth, spawning, fishing, and natural mortality are incorporated into the model. Yield-per-recruit increased with mesh sizes larger than used in the present fishery.

*7 LANGE A M T / ASSESSMENT / MODEL / ATLANTIC / L PEALEI / I ILLECEBROSUS GROWTH / REPRODUCTION

LANGE, A. M. T., and M. P. Sissenwine. 1980. Biological considerations relevant to the management of squid (Loligo pealei and Illex illecebrosus) of the northwest Atlantic. Marine Fisheries Review 42(7-8):23-38.

Discussion of the distributions, reproduction, growth, life cycles, food web relations, and fisheries of northwest Atlantic squid. Length

frequency analyses and research cruise abundances (stratified mean weights per tow) are reported. A dynamic pool model (Sissenwine and Tibbetts 1977), to simulate fishing effects on abundances, is presented.

- *7 LANGE A M T / SISSENWINE M P / ATLANTIC / L PEALEI / I ILLECEBROSUS / GROWTH / REPRODUCTION / MODEL / TRAWL / ASSESSMENT / MORPHOMETRICS / FEEDING HABITS / SQUID DIET

LAUGHLIN, R. A., and R. J. Livingston. 1982. Environmental and trophic determinants of the spatial/ temporal distribution of the brief squid (Lolliguncula brevis) in the Apalachicola estuary (North Florida USA). Bulletin of Marine Science 32(2):489-497.

Abundance of an estuarine-tolerant squid, Lolliguncula brevis, in relation to salinity, temperature, and food availability. Squid abundance was determined using repetitive otter trawls at speeds of 1.5 m/sec.

- *7 LAUGHLIN R A / LIVINGSTON R J / ATLANTIC / L BREVIS / ASSESSMENT / TRAWL SQUID DIET

LEE, B. 1981. A preliminary study of oocyte development and fecundity in the oceanic squid, Symplectoteuthis oualaniensis Lesson (Cephalopoda: Ommastrephidae) from the eastern tropical Pacific. Masters of Arts Thesis, San Francisco State University. 74 pp.

Five stages of gonad development were described, and gross characteristics were related to oocyte maturity. Specimens for the study were captured using squid jigs and dipnets, and then frozen or preserved chemically until examination. Relationships between dorsal mantle length and gonad length, nindamental gland length, and body weight were presented.

- *6 LEE B / ETP / S OUALANIENSIS / REPRODUCTION / GROWTH / MORPHOMETRICS / JIGGING

LIPINSKI, M., and O. Wrzesinski. 1982. Some observations on the behavior of squid (Cephalopoda: Ommastrephidae) during squid jigging operations. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston Massachusetts. Unipub. pp. 137-144.

Observations of four Atlantic Ocean ommastrephid squids made while fishing with hand operated jigging machines. Blue light failed to attract squid, while red light reduced feeding activity; catch was best when no color filters were on white halogen lamps. Buildup, depth and concentration was measured by a 30 kHz sounder. Illex illecebrosus and Martialia hyadesi formed massive and stationary concentrations, while Ommastrephes spp. remained close to the light/shadow interface in weakly defined groups and then congregated at 350-400 m at dawn.

- *5 LIPINSKI M / WRZENSINSKI O / ATLANTIC / LIGHTS / JIGGING / MARINE MAMMALS SEABIRDS / SQUID DIET / I ILLECEBROSUS / M HYADESI / O PTEROPUS / O BARTRAMII

LONG, D., and W. F. Rathjen. 1980. Experimental jigging for squid off the Northeast United States. *Marine Fisheries Review* 42(7-8):60-66.

Description of exploratory squid jigging for *Illex illecebrosus*, on two Polish research vessels, during August and September 1979, off Cape Cod. Report describes gear and techniques (jigs, line, automatic jigging machines, lighting, fishing and processing). Average squid catches, per night, were 2850 kg and 2130 kg for the two vessels.

*5 LONG D / RATHJEN W E / JIGGING / I ILLECEBROSUS / LIGHTS / ATLANTIC / ASSESSMENT

LOVE, R. H. 1971. Measurements of fish target strength: a review. *U.S. Fishery Bulletin* 69(4):703-715.

Discussion of the acoustic target strength of fish. Variations of target strength depend on aspect of individual fish. Interference effects and quantification are also discussed.

*7 LOVE R H / SONAR / ASSESSMENT

LU, C. C., and M. Dunning. 1982. Identification guide to Australian Arrow Squid (Ommastrephidae). Victorian Institute of Marine Sciences. VIMS Technical Report (2). 30 pp.

A guide which features diagnostic characteristics of eight ommastrephid squids. Also included are brief descriptions of some non-ommastrephid squids found in Australian waters.

*1 LU CC / DUNNING M / IDENTIFICATION / OMMASTREPHIDAE / O BARTRAMII / S OUALANIENSIS / S LUMINOSA / O VOLATILIS / H PELAGICA / T FILIPPOVAE / N GOULDI / T EBLANAE

MATSUI, T., Y. Teramoto, and Y. Kaneko. 1972. Target strength of squid. *FAO Fisheries Circular* (142):27-29.

Comparisons from 50 and 200 kHz soundings taken around the long axis of *Loligo* and *Trachurus japonicus* and with the use of polar diagrams. The target strength of squid was less than of fish, while the number of lobes and fluctuations of echo strength were greater for squid.

*7 MATSUI T / TERAMOTO Y / KENKO Y / SONAR / LOLIGO

MATSUMOTO, W. M. 1982. The status of the squid fisheries in the United States of America. NOAA, NMFS, Southwest Fisheries Center Administrative Report H-82-5. 20 pp.

Presentation of domestic U.S. fisheries for squid and their potential, in the Western Atlantic, Gulf of Mexico, and Eastern Pacific. Much of the U.S. catch has been exported or used for bait due to lack of domestic demand; and, foreign vessels have taken much of the squid caught in U.S. waters. Sources of squid fisheries statistics are given.

*4 MATSUMOTO W M / ATLANTIC / EASTPACIFIC / L OPALESCENS / D GIGAS / PUMP / LAMPARA / TRAWL / JIGGING / L PEALEI / L PLEI / L BREVIS / I ILLECEBROSUS / O PTEROPUS / P ADAMI / S OUALANIENSIS / O BARTRAMII /

O BOREALIJAPONICUS / B MAGISTER / G BOREALIS / G ONYX / G FABRICII /
ASSESSMENT / FISHING

MAY, R. M., J. R. Beddington, C. W. Clark, S. J. Holts, and R. M. Laws. 1979.
Management of multispecies fisheries. *Science* 205(4403):267-277.

Presentation of yield models which incorporate predator-prey interactions: whale-krill, whale-seal-krill, and whale-cephalopod-krill. One outcome of these models is that the MSY for single species approaches is greater than for multispecies.

*7 MAY R M / BEDDINGTON J R / CLARK C W / HOLTS S J / LAWS R M / MODEL /
MARINE MAMMALS / FEEDING HABITS / SQUID DIET

MCGOWAN, J. A. 1954. Observations on the sexual behavior and spawning of the squid, Loligo opalescens, at La Jolla, California. *Calif. Dept. Fish and Game Fish Bull.* 40(1):47-54.

SCUBA diving observations of squid copulation and egg-laying. A higher proportion (63%) of dead and dying adult squid were males. Eggs were reared in the laboratory and required 30-35 days to hatch.

*6 MCGOWAN J A / EASTPACIFIC / L OPALESCENS / REPRODUCTION / GROWTH

MCGOWAN, J. A. 1967. Distributional atlas of the pelagic molluscs in the California current region. *Mar. Res. Comm. Calif. Coop. Ocean. Fish. Invest. Atlas* (6):218 pp.

An atlas of Thecosomata, Heteropoda and Cephalopoda, taken by zooplankton tows on six cruises from 25°N to 45°N in the California current region. Distributions are given for nine larval cephalopod species.

*2 MCGOWAN J A / DISTRIBUTION / EASTPACIFIC / ETP / OCTOPUS / ABRALIOPSIS /
G FABRICII / L OPALESCENS / P GIARDI / P PACIFICA / O BANKSII /
OCTOPODOTEUTHIS / C VERANYI

MCGOWAN, J. A., and T. Okutani. 1968. A new species of enoploteuthid squid, Abraliopsis (Watsenia) felis, from the California current. *Veliger* 11 (1):72-79.

Description of A. felis, which was the most abundant squid in a larval cephalopod survey off California. Records of ETP species, A. affinis, are presented.

*6 MCGOWAN J A / OKUTANI T / MORPHOMETRICS / IDENTIFICATION / EASTPACIFIC /
ETP / A AFFINIS / A FELIS

MCHUGH, J. L. 1952. The food of albacore (Germo allunga) off California and Baja California. *Bull. Scripps Inst. Oceanog.* 6(4):161-172.

A food habits survey of 321 Pacific coast albacore, caught during the summers of 1949 and 1950. Food items were, by volume: Pacific saury 50%, squids 12%, Pleuroncodes planipes 11%, euphausiids 7%, and northern anchovy 4%; by occurrence in stomachs: squids 80%, sauries 55%,

euphausids 54%, amphipods 43%, P. planipes 27%, and rockfish 22%.
Absence of oegopsid squid normally caught near surface was thought to indicate that albacore may feed at some depth.

- *3 MCHUGH J L / FISH / FEEDING HABITS / EASTPACIFIC / ABRALIOPSIS / PYRGOPSIS / O BANKSII / ONYCHOTEUTHIS / OCTOPODA / GONATUS / P MICROLAMPAS / GONATOPSIS / O NIELSENI / ENOPLOTEUTHIDAE / CRANCHIIDAE / PTERYGIOTEUTHIS / CHIROTEUTHIDAE / OMMASTREPHIDAE / LOLIGO / OCTOPODOTEUTHIS

MCINNIS, R. R, and W. W. Broenkow. 1978. Correlations between squid catches and oceanographic conditions in Monterey Bay, California. Calif. Dept. of Fish and Game Fish Bull. (169):161-170.

Survey which showed a time lag of 18 months between temperature and squid catch, which is consistent with life-span estimates.

- *7 MCINNIS R R / BROENKOW W W / L OPALESCENS / EASTPACIFIC / DISTRIBUTION

MEARNS, A. J., D. R. Young, R. J. Olson, and H. A. Schafer. 1981. Trophic structure and the cesium-potassium ratio in pelagic ecosystems. CalCOFI Rep. 22:99-110.

Measurements of Cs/K and assignments of trophic levels (based in part on comparisons of indices of relative importance) showed that Cs/K ratios increased with trophic level, in two Pacific Ocean ecosystems, one in the ETP and one in the Southern California Bight. Loligo opalescens ratios clustered into a primary carnivore group, while Symplectoteuthis oualaniensis ranked somewhat higher, midway to the next trophic level.

- *3 MEARNS A J / YOUNG D R / OLSON R J / SCHAFFER H A / ETP / EASTPACIFIC / S OUALANIENSIS / L OPALESCENS / SQUID DIET / FISH / FEEDING HABITS / MARINE MAMMALS

MERCER, M. C. 1975. Modified Leslie-DeLury population models of the long finned pilot whale (Globicephala melaena) and annual production of the short-finned squid (Illex illecebrosus) based upon their interaction at Newfoundland. J. Fish. Res. Board Can. 32:1145-1154.

Population estimations (for years 1947, 1952, and 1955) of long finned pilot whales in the North Atlantic, derived by methods of Leslie and DeLury, and assuming the catchability of whales was proportional to the catch of squid. Based on whale stock sizes, their consumption of squid is calculated. A conclusion drawn is that the depletion of whales has released squid to fisheries and other predators.

- *7 MERCER M C / MARINE MAMMALS / FEEDING HABITS / TRAWL / JIGGING / ASSESSMENT / MODEL / I ILLECEBROSUS / ATLANTIC

MERCER, R. W. 1981. Proceedings of the squid workshop, sponsored by the Resource Assessment and Conservation Division Northwest and Alaska Fisheries Center. NWAFC Processed Report 81-11. 34 pp.

Presentation of papers by several persons, dealing with squid resources. Percy suggested large midwater trawls for pelagic sampling. Laevastu

treated squid as a general group, part of an ecosystem model in which he estimated 400 million tons based on sperm whale consumption. Other topics covered were trophic relations with fur seals, seabirds, and cetaceans, food consumption and growth of Todarodes pacificus, and larval assessment.

- *2 MERCER R W / TRAWL / MODEL / ASSESSMENT / FEEDING HABITS / MARINE MAMMALS SEABIRDS / EASTPACIFIC / PACIFIC

MESNIL, B. 1977. Growth and life cycle of squid, Loligo pealei and Illex illecebrosus, from the Northwest Atlantic. Set. Pap. Int. Comm. N.W. Atlan. Fish. (2):55-69.

Squid assessment by trawl surveys on the Scotian Shelf, Georges Bank and adjacent areas. Mean lengths, after separating sexes, were used to estimate growth and reproductive cycles.

- *7 MESNIL B / ATLANTIC / GROWTH / REPRODUCTION / L PEALEI / I ILLECEBROSUS / ASSESSMENT / TRAWL

MOREJOHN, G. V., J. T. Harvey, and L. T. Krasnow. 1978. The importance of Loligo opalescens in the food web of marine vertebrates in Monterey Bay, California. Calif. Dept. of Fish and Game Fish Bull. (169):67-98.

Investigation of L. opalescens as prey for marine mammals, fishes and seabirds, from stomach contents analyses. Comparisons of various food categories were made using an index of relative importance. Food webs are presented. Energy requirements and food utilization was determined for sooty shearwaters.

- *3 MOREJOHN G V / HARVEY J T / KRASNOW L T / EASTPACIFIC / FISH / L OPALESCENS / FEEDING HABITS / MARINE MAMMALS / SEABIRDS / OCTOPODA / GONATUS / H HETEROPSIS / O DELETRON / O BOREALIJAPONICUS / O SICULA / ENOPLOTEUTHIDAE / OMMASTREPHIDAE / HISTIOTEUTHIDAE / OCTOPOTEUTHIDAE / ONYCHOTEUTHIDAE / ARCHITEUTHIDAE / THYSANOTEUTHIDAE / CRANCHIIDAE / SEPIOLIDAE / ARGONAUTA

MURAKAMI, K., Y. Watanabe, and J. Nakata. 1981. Growth, distribution and migration of flying squid (Ommastrephes bartrami) in the North Pacific. Research Institute of North Pacific Fisheries, Hokkaido University, Special Volume:161-179.

Based on length frequency distributions, four modal classes were found. Winter and spring migrations corresponded to different developmental patterns. In Japanese with English Abstract and Figure captions.

- *7 MURAKAMI K / WATANABE Y / NAKATA J / PACIFIC / DISTRIBUTION / GROWTH / MIGRATION / O BARTRAMII

NESIS, K. N. 1970. The biology of the giant squid of Peru and Chile, Doscidicus gigas. Oceanology 10(1):108-118.

Report of the distribution and biology of Doscidicus gigas, from collections made by a Soviet research vessel during 1968. Concentrations of giant squid were densest from the equator to 18°S and up to 250 miles

offshore. This paper presents regressions of mantle length on upper beak length, diet, fecundities, reproductive structures, mating and growth. Squid ate mainly myctophids. Sizes at age were: 20-35 cm (one year), and 30-50 cm (two years), while larger squid were three to four years old.

*6 NESIS K N / ETP / D GIGAS / DISTRIBUTION / NET / TRAWL / JIGGING / MORPHOMETRICS / REPRODUCTION / IDENTIFICATION / GROWTH / SQUID DIET / FISH / FEEDING HABITS / MARINE MAMMALS

NESIS, K. N. 1971. The family Gonatidae- abundant squids of the North Pacific (their distribution, systematics and phylogeny. pp 63-69. In I. M. Likharev ed. Molluscs, Trends, Methods and Some Results of Their Investigation. Academy of Sciences USSR. Translated from Russian. (Provided by F. G. Hochberg, Museum of Natural History, Santa Barbara, Ca.)

Description of gonatid morphologies, which suggests diphyletic taxonomic structure.

*6 NESIS K N / GONATIDAE

NESIS, K. N. 1972. Oceanic cephalopods of the Peru current: horizontal and vertical distribution. *Oceanology* 12:426-437.

Zoogeography of 41 cephalopod species collected off South and Central America on two Soviet research cruises during 1967 and 1968. Only three of 37 oceanic cephalopods were not tropical species. Based on collections and other published works, the report delineated 13 epipelagic, epimesopelagic and mesopelagic species, and 22 mesobathypelagic, bathypelagic and bathyabysal species.

*2 NESIS K N / TRAWL / NET / JIGGING / DISTRIBUTION / VERTICAL / REPRODUCTION / ETP / EASTPACIFIC / O BANKSII / T ANGOLENSIS / A AFFINIS / S OUALANIENSIS / T GRACILIS / A HIANIS / C SICULUS / D GIGAS / P GIARDI / P GEMMATA / C VERANYI / L REINHARDTI / L PACIFICA / H PFEFFERI / ARGONAUTA / J DIAPHANA / HISTIOTEUTHIS / G ANTARCTICUS

NESIS, K. N. 1973a. Cephalopods of the eastern equatorial and southeastern Pacific. *Trud. Inst. Okean. Adak. Nauk. SSR* 94:188-240.

Collection of 41 cephalopod species during two Soviet research cruises. Of 37 oceanic species, 27 were tropical or tropical-subtropical, two were cosmopolitan and two were known from the Atlantic. Zoogeography, vertical distribution, reproduction, fecundity and larval development are discussed. In Russian with English abstract. (See Nesis (1972) for English presentation of similar, but reduced, content).

*2 NESIS K N / DISTRIBUTION / ONYKIA / S OUALANIENSIS / C SCABRA / L REINHARDTI / L INTERMEDIA / M ABBYSICOLA / A PELAGICUS / A AFFINIS / A FALCO / J DIAPHANA / A HIANIS / ARGONAUTA / P GIARDI / O NIELSENI / O BANKSII / H PFEFFERI / E PYGMAEA / B RIISEI / B ABYSSICOLA / C VERANYI / V DANAE / L PACIFICA / G PACIFICA / H CORONA CERASINA / M DENTATA / D DISCUS / B LYROMMA / L GAHI / V INFERNALIS / P GEMMATA / G ANTARCTICUS / T ANGOLENSIS / B BACIDIFERA / V RICHARDI / T GRACILIS / D GIGAS / REPRODUCTION / C SICULUS / VERTICAL / ETP / EASTPACIFIC / BENTHOCTOPUS

NESIS, K. N. 1973b. Taxonomy, phylogeny and evolution of squids of the family Gonatidae (Cephalopoda). Zool. Zh. 52(11):1626-1638. Translated from Russian by Translation Bureau Multilingual Services Division, Canada. Fisheries and Marine Service Translation Series (3272). 26 pp.

Systematics and diversity of gonatid squids. Diversity is highest in boreal Pacific waters. Gonatids are found in the tropics only in relatively cold waters off western America.

*2 NESIS K N / GONATIDAE / DISTRIBUTION / G BOREALIS / GONATUS

NESIS, K. N. 1977a. Population structure of the squid Stenoteuthis oualaniensis (Lesson 1980) (Ommastrephidae) in the tropical western Pacific. Akademia Nauk SSSR:15-27. Translation from the Russian, Language Services Branch, National Marine Fisheries Service, Washington D.C. 13 pp.

Investigation of the population structure of S. oualaniensis to test the hypothesis that two forms live in the central Indo-Pacific. Gear used in the 1975 research cruises were lights, jigs, cast nets, Isaacs-Kidd trawls (for larvae), and otter trawls. Report concluded that there exists a large late-maturing form, and a smaller early-maturing form (not found in the eastern Pacific). Mantle lengths, sex, maturity, stomach contents and morphology (spinal photophore) were measured. Principal food were myctophids and their own juveniles.

*6 NESIS K N / S OUALANIENSIS / JIGGING / NET / TRAWL / VERTICAL / ASSESSMENT / GROWTH / DISTRIBUTION / LIGHTS / REPRODUCTION

NESIS, K. N. 1977b. Geographic groups of pelagic cephalopods in the western tropical Pacific. Trudy Institute of Oceanography 107:7-14. Translated from Russian for the Smithsonian Institution and the National Science Foundation, Washington, D.C.

Report of collections of squids from the western tropical Pacific, using Isaacs-Kidd midwater trawls (for meso- and bathypelagic species), and nets, jigs and trawls (for epipelagic squids). Zoogeographical complexes were widely tropical, strictly tropical (equatorial and central), equatorial central and non-tropical. Differences with ETP fauna were attributed to species impoverishment in the eastern Pacific.

*2 NESIS K N / PACIFIC / DISTRIBUTION / TRAWL / NET

NESIS, K. N. 1978. Comparison of cephalopod faunas along the coasts of Central America. (Abstract). Malacological Review 11:63.

Caribbean and Gulf of Mexico, and ETP cephalopod fauna were found to have a high degree of similarity (28 common species). However, ETP nektobenthic and neritic-oceanic fauna were depauperate compared with Atlantic areas. Full lists of fauna were published in Tr. Inst. Okeanol. Akad. Nauk SSSR, 1975, 100:274-280, 285-286.

*2 NESIS K N / DISTRIBUTION / ATLANTIC / ETP / LOLIOLOPSIS / DOSCIDICUS / DRECHSELIA / FROEKENIA / EUAXOCTOPUS

NESIS, K. N. 1982. *Kratkii Opredelitel' Golovonogikh Mollyuskov Mirovogo Okeana. Legkaia i Pishchevaia Promyshlennost'*. 360 pp. (Provided by F. G. Hochberg, Museum of Natural History, Santa Barbara, Ca.)

Title translates: Short Identification Keys to Cephalopods of the World's Oceans. Book is a cephalopod monograph which contains many illustrations useful in identifying squids. In Russian.

*1 NESIS K N / WORLDWIDE / IDENTIFICATION

OGURA, M. 1976. Fishing tackle and fishing efficiency in squid jigging. *FAO Fisheries Reports (170) Supplement 1:99-102.*

Report of the effectiveness of color, material and size of jigs, and diameter and condition of monofilament line on jigging for squid. Red and orange jigs worked best, while green and fluorescent ones were poorest. 1.17 mm diameter line fished less efficiently than 0.84 mm line (in a catch ratio of 1:2), and chafing of lines reduced fishing efficiency to half after four days.

*5 OGURA M / JIGGING / T PACIFICUS

OGURA, M. and T. Nasumi. 1976. Fishing lamps and light attraction for squid jigging. *FAO Fisheries Reports (170) Supplement 1:93-98.*

Review of the use of light attraction for fishing, with jigging gear, for Todarodes pacificus. Results showed that squid congregated 20-25 m below the vessel in a dark zone, and attacked jigs in the boundary between light and dark. Comparisons showed mercury vapor lamps to have better performance than incandescent lights. Squid lower limit of light sensitivity was reported to be 0.1 lux.

*5 OGURA M / NASUMI T / LIGHTS / T PACIFICUS / JIGGING

OKUTANI, T. 1974. Epipelagic decapod cephalopods collected by micronekton tows during the EASTROPAC Expedition, 1967-1968. *Bull. Tokai Reg. Fish. Res. Lab., (80):29-118.*

Survey of 28 species of oegopsid cephalopods, sampled by 5' X 5' micronekton net tows, from Mexico to Chile as far west as 126°W. Numbers of specimens, descriptions, and distribution of species are discussed.

*2 OKUTANI T / ETP / EASTPACIFIC / DISTRIBUTION / IDENTIFICATION / NET / TRAWL / A AFFINIS / L REINHARDTI / L SCHNEEHAGENII / O BANKSII / P GIARDI H PFEFFERI / C SCABRA / T CHUNI / TEUTHOWENIA / A FALCO / C SICULUS / A ANDAMANICA / B ABYSSICOLA / O CARRIBAEA / H DOFLEINI / T DANAE / P FISHERI / T ALESSANDRINII / B RIISEI / ENOPLOTEUTHIS / MASTIGOTEUTHIS / C VERANYI / H MELEAGROTEUTHIS / C PICTETI / NEOTEUTHIS

OKUTANI, T. 1977. Stock assessment of cephalopod resources fished by Japan. *FAO Fisheries Technical Paper (173).* 62 pp.

Worldwide geographic survey of cephalopods fished by Japan, as well as promising catchable stocks. Report reviews population assessments of most commonly fished species.

*4 OKUTANI T / TRAWL / MODEL / WORLDWIDE / ATLANTIC / PACIFIC / INDIAN / ETP
ASSESSMENT / JIGGING / T PACIFICUS / D BLEEKERI / O BARTRAMII /
O BOREALIJAPONICUS / O BANKSII / G BOREALIS / D GIGAS / B MAGISTER /
T RHOMBUS

OKUTANI, T. 1980. Useful and latent cuttlefish and squids of the world.
National Cooperative of Squid Processors for the 15th Anniversary of its
Foundation. 65 pp.

Comprehensive information of cephalopod resources, from worldwide
sources. Contains color plates useful for identification purposes and
104 species are illustrated. In Japanese.

*2 OKUTANI T / WORLDWIDE / IDENTIFICATION

OKUTANI, T. and J. A. McGowan. 1969. Systematics, distribution and abundance
of the epipelagic squid (Cephalopoda, Decapoda) larvae of the
California Current, April 1954- March 1957. Bull. Scripps Inst.
Oceanogr. 14:1-90.

Survey of squid larvae collected during CalCOFI cruises of 1954-1957,
captured using a one meter diameter net. Techniques used may not have
accurately estimated species abundance and diversity. Report gives the
systematics, description and distribution of 13 squid species.

*2 OKUTANI T / MCGOWAN J A / EASTPACIFIC / IDENTIFICATION / NET /
DISTRIBUTION / ASSESSMENT / MORPHOMETRICS / L OPALESCENS / A FELIS /
P GIARDI / O BANKSII / OCTOPODOTEUTHIS / G FABRICII / M HETEROPSIS /
C SICULUS / C VERANYI / P PACIFICA / T MEGALOPS / H PFEFFERI / LIGURIELLA

OKUTANI, T., and I. Tung. 1978. Reviews of biology of commercially important
squids in Japanese and adjacent waters. I. Syplectoteuthis oualaniensis
(Lesson). Veliger 21(1):87-94.

Description of larval forms, growth, reproduction, food habits, parasites
and commercial fishing of S. oualaniensis.

*6 OKUTANI T / TUNG I / PACIFIC / INDIAN / ETP / GROWTH / REPRODUCTION /
SQUID DIET / FEEDING HABITS / SEABIRDS / FISH / PARASITE / FISHING

OLIPHANT, M. S. 1971. Pacific bonito food habits. California Department of
Fish and Game Fish Bulletin 152:64-82.

A survey of Pacific bonito stomach contents, collected during 1968 and
1969 at San Pedro, California. In order of abundance, principal prey
were northern anchovy, other fish and Loligo opalescens.

*3 OLIPHANT M S / EASTPACIFIC / FISH / FEEDING HABITS / L OPALESCENS

OLSON, R. J. 1982. Feeding and energetics studies of yellowfin tuna, food
for ecological thought. ICCAT Collective Vol. of Scientific Papers
17(2): 444-457.

Two methods of estimating food consumption are presented, one which

utilizes an energy budget model and the other which estimates daily food intake based on instantaneous gastric evacuation rates. In 1972, a major food source of ETP yellowfin tuna was frigate tunas (*Auxis* sp.), and cephalopods ranked second, according to an index of relative importance using volumes, occurrences and numerical abundances. However, in terms of mean prey biomass based on daily food intake, cephalopods ranked fourth, after scombrids, nomeids and gonostomatids.

*3 OLSON R J / ETP / FISH / FEEDING HABITS / PURSE SEINE

OVERSTREET, R. M., and F. G. Hochberg. 1975. Digenetic trematodes in cephalopods. *J. Mar. Biol. Ass. U.K.* 55:893-910.

Examination of 15 cephalopod species showed infections of digenetic trematodes. Paper reviews literature and includes a list of cephalopods which have been reported to have infections.

*6 OVERSTREET R M / HOCHBERG F G / PARASITE / S OFFICINALIS / A FALCO / A FELIS / L CHIROCTES / P GEMMATA / P GIARDI / J HEATHI / D GIGAS / L BREVIS / ROSSIA / O BRIAREUS / O MAORUM

PACKARD, A. 1972. Cephalopods and fish: the limits of convergence. *Biol. Rev.* 47:241-307.

Comparisons of similarities between cephalopods and fish. Description and review of cephalopod biology (habitat, locomotion, feeding, growth, sensory organs, and paleontology).

*2 PACKARD A / FISH / DISTRIBUTION / VERTICAL / GROWTH / SQUID DIET / REPRODUCTION / WORLDWIDE / WATASENIA / OCTOPODIDAE / SEPIIDAE / LOLIGO / SEPIOTEUTHIS / OMMASTREPHES / ILLEX / TODARODES / DOSCIDICUS / GONATUS / ONYCHOTEUTHIS / WATASENIA / ABRALIOPSIS / PYROTEUTHIS / HISTIOTEUTHIS / CALLITEUTHIS / CRANCHIA / ARCHITEUTHIS / CTENOPTERYX

PEARCY, W. G. 1965. Species composition and distribution of pelagic cephalopods from the Pacific Ocean off Oregon. *Pacific Science* 19:261-266.

Report of pelagic cephalopods caught in nighttime trawl surveys, during 1961-1963 off the Oregon coast. *Gonatus* spp., *Abraliopsis* sp. and *Chiroteuthis* sp. were most abundant numerically. Cephalopod avoidance of trawl gear and comparisons of survey results with albacore food habits were discussed.

*7 PEARCY W G / EASTPACIFIC / DISTRIBUTION / VERTICAL / TRAWL / FISH / SEASONAL / L OPALESCENS / R PACIFICA / O BANKSII / M ROBUSTA / ABRALIOPSIS / O SICULA / M HOLYEI / G FABRICII / G MAGISTER / NET / G ANONYCHUS / G BOREALIS / C VERANYI / G ARMATA / ASSESSMENT / C SCABRA / V INFERNALIS / J HEATHI / FEEDING HABITS / T PAVO

PENROSE, J. D. and G. T. Kaye. 1979. Acoustic target strengths of marine organisms. *J. Acoust. Soc. Am.* 65(2):374-380.

Application of the regression equations of Love (1977) to predict acoustic target strengths from body lengths of marine organisms. Data

from four crustaceans and one squid fit the regressions closely.

*7 PENROSE J D / KAYE G T / SONAR

PEREIRO, J. A., and J. Bravo de Laguna. 1980. Dinamica de la poblacion y evaluacion de los recursos del pulpo del Atlantico Centro-Oriental. FAO, SERIE CPACO/PACO 80/18 (Es). 53 pp.

Population dynamics of octopus found off northwest Africa, from four cruises 1967-1978, and based on mantle length frequency distributions. In 1976, the contribution of octopus to the commercial catch of cephalopods from the Saharan Bank was 49%. Growth, length-weight relationships and production models are discussed. In Spanish with English summary.

*7 PEREIRO J A / BRAVO DE LAGUNA J / OCTOPUS / GROWTH / ASSESSMENT / MODEL / ATLANTIC / TRAWL / FISHING

PERRIN, W. F., R. R. Warner, C. H. Fiscus, and D. B. Holts. 1973. Stomach contents of the porpoise, Stenella spp., and yellowfin tuna, Thunnus albacares, in mixed species aggregations. Fishery Bulletin 71(4):1077-1092.

Survey of tuna and porpoise stomach contents from animals captured by tuna purse-seine, in six net hauls in the eastern tropical Pacific, during April 1968. Dosidicus gigas and Symplectoteuthis sp. were the most abundant squids found, and squid were most important in terms of co-occurrences between tuna and porpoise, and as food for porpoise. While porpoise fed on both mesopelagic squid and epipelagic squid, tuna did not eat mesopelagic squid.

*3 PERRIN W F / WARNER R R / FISCUS C H / HOLTS D B / ETP / FISH / ONYKIA / D GIGAS / SYMPLECTOTEUTHIS / A AFFINIS / HISTIOTEUTHIDAE / CHIOTEUTHIDAE / HISTIOTEUTHIS / OCTOPODA / PURSE SEINE / FEEDING HABITS

PIEPER, R. E. 1979. Euphausiid distribution and biomass determined acoustically at 102 kHz. Deep-Sea Research 26(6A):687-702.

Investigation of the scattering layer off Southern California to determine euphausiid biomass. Accuracy of acoustic estimation was a function of concentration and size or weight of the organisms, and depth of the layer.

*7 PIEPER R E / SONAR / ASSESSMENT / VERTICAL / EASTPACIFIC

PINKAS, L. 1971. Bluefin tuna food habits. California Department of Fish and Game Fish Bulletin 152:47-63.

A survey of bluefin stomach contents, from fish sampled at San Pedro canneries, 1968-1969. Fish composed over 90 percent of prey items, followed by crustaceans and squid.

*3 PINKAS L / EASTPACIFIC / FISH / FEEDING HABITS / L OPALESCENS / GONATUS / O BOREALIJAPONICUS / O SICULA / ONYCHOTEUTHIS / A FELIS / C SCABRA / D GIGAS / GONATOPSIS / ENOPLOTEUTHIDAE / LEACHIA / A NOURYI / OCTOPODA / O BIMACULATUS / O TUBERCULATA / PURSE SEINE

RATHJEN, W. F., and D. W. Stanley. 1982. A harvesting and handling demonstration, Cape Ann, Massachusetts. Proceedings of the International Squid Symposium, August 9-12, 1981, Boston, Massachusetts. Unipub. pp. 137-144.

Experimental jigging for Atlantic Ocean *Illex illecebrosus*, with one automatic and two hand operated jigging machines. Squid catches varied from 40 to 1,200 pounds per hour of 18-25 cm mantle length squid. Even in full moon conditions catches were 1,000+ pounds per hour.

*5 RATHJEN W F / STANLEY D W / LIGHTS / JIGGING / ATLANTIC

RAU, G. H., A. J. Mearns, D. R. Young, R. J. Olson, H. A. Schafer, and I. R. Kaplan. 1983. Animal 13C/12C correlates with trophic level in pelagic food webs. Ecology 64(5):1314-1318.

Analyses of carbon isotopes in two Pacific ocean ecosystems, one in the ETP and the other in the Southern California Bight. Results indicate that the ratio of carbon-13 to carbon-12 increases with increasing trophic level. ETP *Symplectoteuthis oualaniensis* ratios were above zooplankton, and below those of flying fish, frigate tunas and sharks.

*3 RAU G H / MEARNIS A J / YOUNG D R / OLSON R J / SCHAFFER H A / KAPLAN I R / SQUID DIET / FISH / FEEDING HABITS / ETP / EASTPACIFIC / S OUALANIENSIS / MARINE MAMMALS

REINTJES, J. W., and J. E. King. 1953. Food of yellowfin tuna in the central Pacific. U.S. Fishery Bulletin 54(81):91-110.

Examination of the stomach contents of 1097 yellowfin tuna caught by trolling, live bait pole-and-line fishing, and longline, in waters near the Line and Phoenix Islands. Food categories, by volume, were fish (47%), squid (26%) and crustaceans (25%). Unidentified squid, crab larvae and carangid fish were the three most important food items of yellowfin, by volume. Comparisons of stomach contents were made by size of predator and distance to land.

*3 REINTJES J W / KING J E / FISH / FEEDING HABITS / PACIFIC / LINE / LONGLINE / O BANKSII / S OUALANIENSIS / OCTOPODOTEUTHIDAE / OCTOPODA

RICE, D. W. 1963. Progress report on biological studies of the larger cetacea in the waters off California. Norsk Hvalfangst-Tidende (7):181-187.

Information of seven cetacean species included cephalopods eaten by 54 sperm whales and seven giant bottlenose whales. Squid occurred in 96% of sperm whale stomachs.

*3 RICE D W / EASTPACIFIC / MARINE MAMMALS / FEEDING HABITS / M ROBUSTA / G BOREALIS / ONYCHOTEUTHIS / OCTOPUS / G FABRICII

ROBSON, G. C. 1948. The Cephalopoda Decapoda of the Arcturus oceanographic expedition, 1925. *Zoologica* 33(3):115-132.

Report of a collection of 30 species of decapods, mainly from the eastern tropical Pacific Ocean, near the Galapagos Islands. The majority were juvenile forms.

*2 ROBSON G C / NET / LIGHTS / TRAWL / ETP / ATLANTIC / B ABYSSICOLA / BATHYTEUTHIS / A HOYLEI / ABRALIOPSIS / P GIARDI / O NIELSENI / ONYKIA / O BANKSII / H OCEANI / S PTEROPUS / STENOTEUTHIS / CHIROTEUTHIS / H PELAGICA / MASTIGOTEUTHIS / L REINHARDTI / GALITEUTHIS / T PACIFICUS / H BEEBEI

ROELEVELD, M. A. 1982. Interpretation of tentacular club structure in Stenoteuthis oualaniensis (Lesson, 1830) and Ommastrephes bartramii (Lesueur, 1821) (Cephalopoda, Ommastrephidae). *Annals of the South African Museum* 89(4):249-264.

Delineation of tentacular club areas (dactylus, manus and carpus) for seven ommastrephid squids.

*1 ROELEVELD M A / IDENTIFICATION / S OUALANIENSIS / O BARTRAMII / N GOULDI T PACIFICUS / S PTEROPUS / N SLOANI PHILIPPINENSIS

ROPER, C. F. E. 1977. Comparative captures of pelagic cephalopods by midwater trawls. *Symp. Zool. Soc. Lond.* (38):61-87.

Comparisons of captures between several types of trawls. Trawls used were Isaacs-Kidd midwater trawl (IKMT), rectangular midwater trawl (RMT), and Engel trawl (EMT). Because the IKMT and RMT were closing types, some depth comparisons were also made. Indices of similarity (Jaccard's Community Index and Index of Similarity) indicated dissimilarity in net sampling between types.

*7 ROPER C F E / TRAWL / ASSESSMENT / ATLANTIC

ROPER, C. F. E., R. E. Young, and G. L. Voss. 1969. An illustrated key to the families of the order Teuthoidea (Cephalopoda). *Smithsonian Contributions to Zoology* (13):22 pp.

A dichotomous key using external body characteristics, with illustrations of representative species in 25 families. Includes notes on each family.

*1 ROPER C F E / YOUNG R E / VOSS G L / IDENTIFICATION / LOLIGINIDAE / GONATIDAE / ENOPLOTEUTHIDAE / OCTOPOTEUTHIDAE / ONYCHOTEUTHIDAE / LEPIDOTEUTHIDAE / CTENOPTERYGIDAE / BRACHIOTEUTHIDAE / LYCOTEUTHIDAE / HISTIOTEUTHIDAE / BATHYTEUTHIDAE / NEOTEUTHIDAE / PSYCHROTEUTHIDAE / ARCHITEUTHIDAE / OMMASTREPHIDAE / THYSANOTEUTHIDAE / CHIROTEUTHIDAE / MASTIGOTEUTHIDAE / CRANCHIIDAE / JOUBINITEUTHIDAE / CYCLOTEUTHIDAE / GRIMALDITEUTHIDAE / PROMACHOTEUTHIDAE

ROPER, C. F. E. and R. E. Young. 1975. Vertical distribution of pelagic cephalopods. *Smithsonian Contributions to Zoology* (209):1-51.

A report on the vertical distribution and vertical migration of pelagic cephalopods, presented by records of representative species in each family and summarized in bar graphs. Scope is worldwide with data from California, Bermuda, Hawaii and other collections.

*2 WORLDWIDE / ETP / VERTICAL / MEDITERRANEAN / ATLANTIC / INDIAN / EASTPACIFIC / PACIFIC / OCTOPODA / YOUNG R E / ROPER C F E / D GIGAS / S OUALANIENSIS / H HETEROPSIS / B BACIDIFERA / B BERRYI / G ONYX / G CALIFORNIENSIS / G PYROS / G BERRYI / G BOREALIS / O DELETRON / C CALYX CHIROTEUTHIS / V OBLIGOBESSA / VALBYTEUTHIS / M PYRODES / MASTIGOTEUTHIS M FAMELICA / L DISLOCATA / G PHYLLURA / G PACIFICA / T PAVO / B LYROMMA H PFEFFERI / P FISHERI / L VALDIVIAE

ROPER, C. F. E., and M. J. Sweeney. (In Press). Techniques for fixation, preservation, and curation of cephalopods.

Paper which describes chemicals and techniques used to fix and preserve cephalopods. In addition to describing of the use of formalin and alcohol, the authors discuss methods of freezing, extraction of beaks, statoliths and radulae, rehydration, labelling and containing.

*6 ROPER C F E / SWEENEY M J / PRESERVATION

SASAKI, M. 1929. A monograph of the dibrachiate cephalopods of the Japanese and adjacent waters. Reprinted from the *Journal of the College of Agriculture, Hokkaido Imperial University*, Vol. XX, Supplementary Number. 357 pp. and 25 plates.

Descriptions of and keys to the identification of 125 octopod and decapod cephalopods. Drawings of key morphological features are included. Distributions given include areas outside Japanese waters.

*1 SASAKI M / IDENTIFICATION / PACIFIC / EASTPACIFIC / ATLANTIC / INDIAN / DISTRIBUTION / OCTOPODA / ARCHITEUTHIDAE / OMMASTREPHIDAE / THYSANOTEUTHIDAE / HISTIOTEUTHIDAE / CHIROTEUTHIDAE / ONYCHOTEUTHIDAE / ENOPLOTEUTHIDAE / GONATIDAE / CRANCHIDAE / LOLIGINIDAE / SEPIIDAE / SEPIOLIDAE / IDOSEPIIDAE / PROMACHTEUTHIDAE

SATO, T. 1975a. Results of exploratory fishing for Doscidicus gigas (d'Orbigny) off California and Mexico. *FAO Fisheries Reports* (170):61-67.

A report of jigging for D. gigas off the Baja California coast, near Manzanillo and in the Gulf of California, during October-December 1971, off the Japanese research vessel Ryoun-Mar No. 3. Most of the catch were squid over 300 mm mantle length, and estimated life span was one year. Catches were 23280 kg in October, 728 kg in November and 30 kg in December.

*7 SATO T / ETP / D GIGAS / JIGGING / DISTRIBUTION / SQUID DIET / FISH FEEDING HABITS / MARINE MAMMALS / GROWTH / REPRODUCTION

SATO, T. 1975b. Present state of the American large red squid Doscidicus gigas (Dorbigny) fisheries in the east Pacific waters off the California peninsula. Prog. Rep. Squid Fish. Survey World (5):147-154. Translated from Japanese in: Canadian Translation of Fisheries and Aquatic Sciences (4586). 22 pp. Available from: Languages Services Branch, National Marine Fisheries Service, Washington, D.C.

Similar to Sato (1975a). Investigation of the resource potential of Doscidicus gigas, conducted from August 1971 to January 1972, off Baja California, in the Gulf of California and off Manzanillo, from the vessel Gyoun Maru.

*7 SATO T / ETP / D GIGAS / D BLEEKERI / JIGGING / GROWTH / REPRODUCTION / DISTRIBUTION / FEEDING HABITS / SQUID DIET / FISH / MARINE MAMMALS

SCHREIBER, R. W., and D. A. Hensley. 1976. The diets of Sula dactylatra, Sula sula, and Fregata minor on Christmas Island, Pacific Ocean. Pacific Science 30(3):241-248.

Composition of prey (fish and squid) of the Blue-faced Booby, the Red-faced Booby and the Great Frigatebird. Results seem to indicate a partitioning of the food resource by prey size and type.

*3 SCHREIBER R W / HENSLEY D A / SEABIRDS / PACIFIC / FEEDING HABITS

SHEVTSOVA, S. P., A. P. Brestkin, K. N. Nesis, and Y. V. Rozengart. 1979. Differences in the properties of cholinesterases of the optical ganglion of the squid Ommastrephes bartrami from the South Atlantic and the Great Australian bight. Oceanology 17(6):729-731.

Study, of optical ganglion cholinesterases, which showed little differences between South Atlantic and western Pacific Ommastrephes bartrami. Report suggests that the squid populations are not genetically separated.

*6 SHEVTSOVA S P / BRESTKIN A P / NESIS K N / ROZENGART Y V / ATLANTIC / PACIFIC / STOCK / O BARTRAMII

SHEVTSOVA, S. P., A. P. Brestkin, K. N. Nesis, and Y. V. Rozengart. 1979. Differences in the properties of cholinesterases in the visual ganglions of Ommastrephes bartrami (Les.) squids as an indicator of the isolation of populations from various parts of a discontinuous range. Oceanology 19 (3):320-323.

A study which suggests that competitive interaction with Doscidicus gigas in the eastern Pacific has split the populations of Ommastrephes bartrami of the North and South Pacific Ocean. Using properties of cholinesterase activity, the investigation found evidence of genetic exchange between North and South Atlantic squids, but isolation in the North and South Pacific.

*6 SHEVTSOVA S P / BRESTKIN A P / NESIS K N / ROZENGART Y V / O BARTRAMII / STOCK / ATLANTIC / PACIFIC / INDIAN / D GIGAS

SHIBATA, K., and E. E. C. Flores. 1972. Echo-traces typical of squids in the water surrounding Japan. *FAO Fisheries Circular* (142):7-13.

Echo-sounder recordings of Ommastrephes sloani pacificus, using 28, 50 and 200 kHz sounders, from vessels both underway and stationary. In addition, an underwater camera transmitted videos of squid responses to jigging lures.

*7 SHIBATA K / FLORES E E C / JIGGING / SONAR / CAMERA / O SLOANI PACIFICUS

SHIBATA, K., and P. Masthawe. 1980. Experimental echo survey for squid fishing around the Phuket Waters. Southeast Asian Fisheries Development Center Training Department. Current Technical Paper Series (9). 30 pp.

Measurements and calculations for measuring squid targets using a 50 kHz sounder. Although echotraces from squids could not be clearly identified, the sounder could detect individual squid at a maximum depth of 20-30 meters.

*7 SHIBATA K / MASTHAWEE P / SONAR

SHOMURA, R. S., and T. S. Hida. 1965. Stomach contents of a dolphin caught in Hawaiian waters. *J. Mamm.* 46(3):500-501.

Note on the stomach contents of a male Stenella attenuata captured three miles off Oahu. Pelagic squid were the most abundant food (86% by volume), and second were myctophids (6%).

*3 SHOMURA R S / HIDA T S / MARINE MAMMALS / FEEDING HABITS / A ASTROSTICTA / O HAWAIIENSIS / PACIFIC

SISSEWINE, M. P., and A. M. Tibbetts. 1977. Simulating the effect of fishing on squid (Loligo and Illex) populations of the Northeastern United States. *Set. Pap. Int. Comm. N.W. Atlan. Fish.* (2):71-84.

Presentation of simulation of fishing Loligo pealei and Illex illecebrosus of the east coast of the US. The simulation model used modified (for growth and spawning) yield equations and a Beverton-Holt stock recruitment relationship.

*7 SISSEWINE M P / TIBBETTS A M / MODEL / L PEALEI / I ILLECEBROSUS / ASSESSMENT / GROWTH / ATLANTIC

SPRATT, J. D. 1978. Age and growth of the squid, Loligo opalescens Berry, in Monterey Bay. *Calif. Dept. of Fish and Game Fish Bull.* (169):35-44.

Similar to Spratt (1979). See annotation for content.

*6 SRATT J D / EASTPACIFIC / GROWTH / AGING / L OPALESCENS

SPRATT, J. D. 1979. Age and growth of the market squid, Loligo opalescens Berry, from statoliths. *CalCOFI Rep.* 20:58-64.

Growth rates of Loligo opalescens were determined from statoliths and compared with model length progressions. Both statolith growth rings and

length composition showed that the squid reach adult size in about 14 lunar months, and that slower growing squid can live through part of a second season.

*6 SPRATT J D / L OPALESCENS / EASTPACIFIC / GROWTH / AGING

SQUIRE, J. L. 1983. Abundance of pelagic resources off California, 1963-1978, as measured by an airborne fish monitoring program. NOAA Technical Report NMFS SSRF-762. 75 pp.

Assessment of coastal California fish stocks, from observations by commercial fish spotters, using night (bioluminescence) and day (color and light intensity) sightings. Most common species seen were northern anchovy, jack mackerel, Pacific bonito, Pacific mackerel, Pacific Sardine and bluefin tuna. Squid (*Loligo opalescens*) were among the less common observations, but distributions of sightings are presented.

*7 SQUIRE J L / L OPALESCENS / AIRPLANE / DISTRIBUTION / EASTPACIFIC / ASSESSMENT

SQUIRES, H. J., O. Mora L., O. Bacona M., and O. Arroyo Q. 1971. Results of cruises 6907- 6911 and 7001 of the chartered vessel "Cacique" on the Pacific coast of Columbia. Proyecto para Desarrolla de la Pesca Maritima en Columbia, Estudios e Investigaciones (5). 42 pp.

Report of surveys for shrimp, squid, and fish normally taken by shrimp trawls. An estimate of the total shrimp fleet catch of the squid *Lolliguncula panamensis* was 150,000 kg.

*7 SQUIRES H J / MORA O / BARONA O / ARROYO O / L PANAMENSIS / TRAWL / ETP

SQUIRES, H. J., and J. H. Barragan. 1979. *Lolliguncula panamensis* (Cephalopoda: Loliginidae) from the Pacific coast of Columbia. Veliger 22 (1):67-74.

Growth, reproduction, feeding habits, and estimation of stock potential of the squid *Lolliguncula panamensis*. Report was based on a survey of commercial shrimps and fishes along the Pacific coast of Columbia, mainly from depths of 5 to 30 m.

*7 SQUIRES H J / BARRAGAN J H / L PANAMENSIS / ETP / TRAWL / SQUID DIET / ASSESSMENT / IDENTIFICATION / GROWTH / REPRODUCTION

STROUD, R. K., C. H. Fiscus, and H. Kajimura. 1981. Food of the Pacific white-sided dolphin, *Lagenorhynchus obliquidens*, Dall's porpoise, *Phocoenoides dalli*, and northern fur seal, *Callorhinus ursinus*, off California and Washington. Fishery Bulletin 78(4):951-959.

Prey were epipelagic and mesopelagic fishes and cephalopods, but most likely mesopelagic prey were eaten near the surface, after vertical migration in response to reduced light at dusk.

*3 STROUD R K / FISCUS C H / KAJIMURA H / EASTPACIFIC / MARINE MAMMALS / FEEDING HABITS / L OPALESCENS / ABRALIOPSIS / OCTOPOTEUTHIS / GONATUS / G BOREALIS / O BOREALIJAPONICUS / CHIROTEUTHIS / CRANCHIIDAE / O TUBERCULATA

SUZUKI, T. 1963. Studies on the relationship between current boundary zones in waters to the southeast of Hokkaido and migration of the squid Ommastrephes sloani pacificus (Steenstrup). Memoirs of the Faculty of Fisheries, Hokkaido Univ. 2(2):75-153.

Report on the abundance of Ommastrephes sloani pacificus in the Hokkaido, Japan area. Optimum temperature and prey availability were considered to be the major controls of squid migration and population density. Indices of abundance were based on catch per unit effort; prey availability was correlated with the deep scattering layer; and, temperature was observed as a function of current zones.

*7 SUZUKI T / O SLOANI PACIFICUS / PACIFIC / ASSESSMENT / JIGGING / DISTRIBUTION / SQUID DIET

SUZUKI, T. 1975. Echosounding for squid Todarodes pacificus (Steenstrup) in the offshore waters of the sea of Japan and estimation of its abundance. FAO Fisheries Reports (170):89-92.

A brief summary of echosounding techniques used in locating T. pacificus and a technique for estimating school size by monitoring decreasing CPUE. Squid were located more effectively using 200 kHz than with lower frequencies, and were found between the upper and lower deep scattering layers, formed by thermoclines. The relation of CPUE and cumulative catch allowed estimation of squid numbers, which can then be related to echosounding patterns.

*7 SUZUKI T / SONAR / ASSESSMENT / T PACIFICUS / PACIFIC

SUZUKI, T., M. Tashiro, and Y. Yamaguchi. 1974. Studies on the swimming layer of squid Todarodes pacificus Steenstrup as observed by a fish finder in the offshore region of the northern part of the Sea of Japan. Bulletin of the Faculty of Fisheries Hokkaido University 25(3):238-246. Translated from Japanese. Available from: Language Services Branch, National Marine Fisheries Service, Washington, D.C.

Echo-traces of pelagic Todarodes pacificus showed that squid images and the deep scattering layer are more clearly recorded using a 200 kHz sounder than with a 75 kHz one. Squid school images appeared spindle shaped, at a ship's speed of 9 knots, and were generally distributed between the upper and lower scattering layers.

*7 SUZUKI T / TASHIRO M / YAMAGISHI Y / SONAR / ASSESSMENT / VERTICAL / JIGGING / T PACIFICUS

TOLL, R. B. 1982. The comparative morphology of the gladius in the order Teuthoidea (Mollusca: Cephalopoda) in relation to systematics and phylogeny. PhD. Dissertation, University of Miami. 390 pp.

A useful review of squid pens, for identification purposes.

*6 TOLL R B / IDENTIFICATION

TUNG, I. 1976. On the food habit of common squid, Symplectoteuthis oualaniensis (Lesson). Report of the Institute of Fishery Biology, Ministry of Economic Affairs and National Taiwan University 3(2):49-46.

A food habits study in which fish was the primary prey item. Squid and crustaceans were also food items. In Chinese with English abstract.

*6 TUNG I / PACIFIC / S OUALANIENSIS / SQUID DIET / PARASITE

TUNG, I. 1981. On the fishery and biology of the squid, Ommastrephes bartrami (Lesueur) in the northwest Pacific Ocean. Report of the Institute of Fishery Biology, Ministry of Economic Affairs and National Taiwan University 3(4):12-37.

A report of fishing grounds locations and CPUEs by month and area for years 1977, 1978 and 1979, and as far east as 173°E. Presents stomach contents, regressions of mantle length on body weight, and morphometrics of reproductive organs. In Chinese with English abstract.

*6 TUNG I / PACIFIC / O BARTRAMII / SQUID DIET / MORPHOMETRICS / FISHING

VAUGHAN, D. L. 1978. The target strength of individual market squid, Loligo opalescens. Calif. Dept. of Fish and Game Fish Bull. (169):149-159.

Target strengths, from eleven individual squid and using a 200 kHz sounder, showed little relation to the size of squid. Values can be used in integrator systems applicable to population assessment.

*7 VAUGHAN D L / L OPALESCENS / ASSESSMENT / SONAR

VAUGHAN, D. L., and C. W. Recksiek. 1978. An acoustic investigation of market squid, Loligo opalescens. Calif. Dept. of Fish and Game Fish Bull. (169): 135-147.

Similar to Vaughan and Recksiek (1979). See annotation for content.

*7 VAUGHAN D L / RECKSIEK C W / L OPALESCENS / SONAR / ASSESSMENT / EASTPACIFIC

VAUGHAN, D. L., and C. W. Recksiek. 1979. Detection of market squid, Loligo opalescens, with echo sounders. CalCOFI Rep. 20:40-50.

Echo-traces of squid, recorded by sounders operating at 38, 50 and 200 kHz, were verified by midwater trawls, jigging and visual observation. Two behavioral patterns were observed, one from continuous bottom associated traces, and the other from more difficult to assess midwater plume traces.

*7 VAUGHAN D L / RECKSIEK C W / L OPALESCENS / SONAR / ASSESSMENT / EASTPACIFIC

VOLKOV, A. F., and I. F. Moroz. 1977. Oceanological conditions of the distribution of cetacea in the eastern tropical Pacific Ocean. Report of the International Whaling Commission 27:186-188.

Notes on the distribution of baleen and sperm whales in the ETP. Baleen whales were found in areas of richer food bases, connected with zones of vergence, and such distribution was atypical of migrating whales. Report says surface observations of squid, and convergence zones cannot always be associated with sperm whale distributions, since these whales feed on deep water prey.

*3 VOLKOV A F / MOROZ I F / MARINE MAMMALS / FEEDING HABITS / ETP

VOSS, G. L. 1967. The biology and bathymetric distribution of deep-sea cephalopods. Stud. Trop. Oceanogr. 5:511-535.

Depth distribution of major taxa, including specific examples. Zones described are the epipelagic, mesopelagic, bathypelagic, bethopelagic and benthic.

*2 VOSS G L / VERTICAL / TRAWL / SQUID DIET

VOSS, G. L. 1971. Cephalopods collected by the R/V John Elliot Pillsbury in the Gulf of Panama. Bulletin of Marine Science 21(1):1-34.

Report of the collection of 18 cephalopod species in the Gulf of Panama, of which eight were squids and four were new octopus species. Records of collection sites and methods (lights, trawls, nets, and dipnets) are included.

*2 VOSS G L / ETP / DIPNET / LIGHTS / NET / VERTICAL / FISHING / DISTRIBUTION / L DIOMEDEA / O BANKSII / P GIARDI / A AFFINIS / L PANAMENSIS / B BACIDIFERA / D GIGAS / MASTIGOTEUTHIS / D DANAE / V DANAE / B ABYSSICOLA / S OUALANIENSIS / HISTIOTEUTHIS / M DENTATA / OCTOPODA / TRAWL

VOSS, G. L. 1973. Cephalopod resources of the world. FAO Fisheries Circular (149). 75 pp.

A survey of worldwide cephalopod resources, fisheries, and potential. Report is compiled by specific countries or areas.

*2 VOSS G L / WORLDWIDE / ETP / EASTPACIFIC / PACIFIC / FISHING / ATLANTIC / INDIAN / MEDITERRANEAN / DISTRIBUTION / L OPALESCENS / L DIOMEDEA / L PANAMENSIS / L BREVIS / S OUALANIENSIS / D GIGAS

WALKER, W. A. 1981. Geographical variation in morphology and biology of bottlenose dolphins (Tursiops) in the eastern North Pacific. NOAA Administrative Report. (LJ-81-03C). 17 pp., references, figures, tables.

Contains a food habits section with stomach contents of nine coastal and 17 offshore ETP Tursiops. ETP dolphin prey were, by volume, epipelagic fish (86.7%), and cephalopods (13.3%). Report suggests that mesopelagic fish remains in dolphin stomachs occurred secondarily, because stomach

contents of an intact Doscidicus gigas included otoliths from mesopelagic fishes.

- *3 WALKER W A / ETP / EASTPACIFIC / MARINE MAMMALS / FEEDING HABITS / SQUID DIET / L OPALESCENS / D GIGAS / O BIMACULATUS / A AFFINIS / S OUALANIENSIS / T RHOMBUS / HISTIOTEUTHIS / OCTOPOTEUTHIS / CHIROTEUTHIS CRANCHIIDAE / O TUBERCULATA

WALDRON, K. D., and J. E. King. 1963. Food of skipjack in the central Pacific. *FAO Fish. Rep.* 6(3):1431-1557.

Examination of 707 skipjack stomach contents, from tuna obtained by live bait fishing, longline, trolling and purse seine, from 1950 to 1956. Food categories, by volume, were fish (74.6%), squid (19.5%), and crustaceans (3.7%).

- *3 WALDRON K D / KING J E / PACIFIC / FISH / FEEDING HABITS / LINE / OCTOPODA / LOLIGINIDAE / SEPIOTEUTHIS / OMMASTREPHIDAE / LONGLINE / O HAWAIIENSIS / SYMPLECTOTEUTHIS / PURSE SEINE

WAWROWSKI, R. 1981. The evaluation of echosounding and towing methods for squid fishing. Working Paper for Workshop on the Biology and Resource Potential Of Cephalopods, Melbourne, Australia, March 1981. National Museum of Victoria. Victoria Institute of Marine Sciences. 27 pp.

Review of hydroacoustic estimation and its application to the assessment of squid abundance. Transmission, noise, computerization, and applications are discussed. Commercial trawling techniques are also presented.

- *7 WAWROWSKI R / SONAR / ASSESSMENT / TRAWL

WHITAKER, J. D. 1980. Squid catches resulting from trawl surveys off the southeastern United States. *Marine Fisheries Review* 42(7-8):39-43.

Sampling Loligo sp. and Illex illecebrosus, with groundfish and other bottom trawls, indicated that squid abundance south of Cape Hatteras is small relative to more northern waters. Length frequency and seasonal data are presented.

- *7 WHITAKER J D / ASSESSMENT / TRAWL / SEASONAL / ATLANTIC / GROWTH / L PEALEI / L PLEI / I ILLECEBROSUS

WOLFF, G. A. 1982a. A beak key for eight eastern tropical Pacific cephalopod species with relationships between their beak dimensions and size. *Fishery Bulletin* 80(2):357-370.

Methods for identifying eight common squids of the ETP, by the use of upper and lower beak dimensions. Author presents linear regressions of mantle length and body weight on beak dimensions.

- *1 WOLFF G A / ETP / IDENTIFICATION / D GIGAS / O BARTRAMII / O BANKSII / A AFFINIS / P GIARDI / L REINHARDTI / L OPALESCENS / S OUALANIENSIS / MORPHOMETRICS

WOLFF, G. A. 1982b. A study of feeding relationships in tuna and porpoise through the application of cephalopod beak analysis. Final Technical Report for DAR-7924779. Texas A&M University. 231 pp.

Study of beak characteristics of 18 squid species, and application of resulting beak identification guide to stomach content analysis of Stenella attenuata and Thunnus albacares (same collection as Perrin et al. 1973). Reviews papers on tuna and cetacean feeding habits. Cephalopod beak key was based on ANOVA using 31 ratios of upper and lower beak dimensions. Presents linear regressions of squid body weight on mantle length and upper and lower rostral lengths. Grouping of tuna and dolphin stomach contents was based on discriminant analysis and clustering, and theories of feeding strategies are presented.

*1 WOLFF G A / FISH / MARINE MAMMALS / FEEDING HABITS / PACIFIC / ETP / S OUALANIENSIS / D GIGAS / O BARTRAMII / L DANAE / S LUMINOSA / N HAWAIIENSIS PACIFICUS / H PELAGICA / O VOLATILIS / L REINHARDTI / A AFFINIS / A FELIS / P GIARDI / H HETEROPSIS / H DOFLEINI / G ONYX / L OPALESCENS / O BANKSII / IDENTIFICATION / MORPHOMETRICS

WOLFF, G. A., and J. H. Wormuth. 1979. Biometric separation of the beaks of two morphologically similar species of the squid family Ommastrephidae. Bulletin of Marine Science 29(4):587-592.

Use of discriminant analysis and multiple linear regression to separate two Atlantic squids, Ommastrephes pteropus and O. bartrami, on the basis of ratios of upper and lower beak dimensions. Discriminant analysis classified 42 of 46 samples correctly; multiple linear regression used two and three variables. Regressions of weight and mantle length on rostral length were presented.

*1 WOLFF G A / WORMUTH J H / IDENTIFICATION / MORPHOMETRICS / ATLANTIC / O PTEROPUS / O BARTRAMII

WORMUTH, J. H. 1971. The biogeography, systematics and interspecific relationships of the oegopsid squid family Ommastrephidae in the Pacific Ocean. Univ. of Calif., San Diego, PhD. dissertation. 189 pp.

Dissertation in which morphological characters and clustering, recurrent group analysis and factor analysis were used to distinguish 12 ommastrephid squids. The resulting taxonomic structure placed Symplectoteuthis oualaniensis and Ommastrephes pteropus into the genus Symplectoteuthis, whereas S. luminosa and Hyaloteuthis pelagica were put in the genus Hyaloteuthis. Author includes species descriptions and notes on ecology, distribution and feeding habits.

*6 WORMUTH J H / DISTRIBUTION / PACIFIC / EASTPACIFIC / ATLANTIC / ETP / IDENTIFICATION / NET / TRAWL / SQUID DIET / DIPNET / D GIGAS / S OUALANIENSIS / S LUMINOSA / O BARTRAMII / O VOLATILIS / N HAWAIIENSIS / H PELAGICA / O PTEROPUS / T PACIFICUS / N GOULDI / I ILLECEBROSUS / N SLOANI / MORPHOMETRICS

WORMUTH, J. H. 1975. The biogeography and numerical taxonomy of the oegopsid squid family Ommastrephidae in the Pacific Ocean. Bulletin of the Scripps Institution of Oceanography 23. 90 pp.

Publication of the same information presented in author's PhD. dissertation (Wormuth 1971). In addition, ommastrephid biogeography is discussed in more depth.

*6 WORMUTH J H / DISTRIBUTION / PACIFIC / EASTPACIFIC / ATLANTIC / ETP / NET TRAWL / IDENTIFICATION / SQUID DIET / DIPNET / D GIGAS / S OUALANIENSIS / S LUMINOSA / O BARTRAMII / O VOLATILIS / N HAWAIIENSIS / H PELAGICA / O PTEROPUS / T PACIFICUS / N GOULDI / I ILLECEBROSUS / N SLOANI / MORPHOMETRICS

YAJIMA, S., and S. Mitsugi. 1975. Japanese squid jigging gear. FAO Fisheries Reports (170):85-88.

A short history and description of jigging gear used to catch Todarodes pacificus.

*5 YAJIMA S / MITSUGI S / JIGGING / PACIFIC / LIGHTS / T PACIFICUS

YANAMOTO, K., and T. Okutani. 1975. Studies on early life history of decapodan Mollusca- V. Systematics and distribution of epipelagic larvae of decapod cephalopods in the southwestern waters of Japan during the summer in 1970. Bull. Tokai Reg. Fish. Lab. (83):45-96.

A survey of juvenile cephalopods, from depth-discrete tows made to collect Japanese eel larvae, with a 2.5 m diameter net. Horizontal and vertical distributions are presented for 23 larval squid species.

*7 YANAMOTO K / OKUTANI T / IDENTIFICATION / PACIFIC / NET / DISTRIBUTION / VERTICAL / ROSSIA / ENOPLOTEUTHIS / A ANDAMANICA / ABRALIA / T ALESSANDRINII / P GIARDI / OCTOPOTEUTHIS / O BOREALIJAPONICUS / O CARRIBAEA / C SICULUS / L PACIFICA / L REINHARDTI / L VALDIVIAE / GALITEUTHIS / S MELANCHOLICUS / TEUTHOWENIA

YOUNG, R. E. 1972. The systematics and areal distribution of pelagic cephalopods from the seas off Southern California. Smithsonian Contributions to Zoology (97):1-159.

Description of 33 cephalopod species, collected from 28°N to 34°N by an Isaacs-Kidd mid-water trawl. Includes a key to these species, and discusses characters, systematics and distribution. Contains 38 plates of illustrations.

*2 YOUNG R E / MORPHOMETRICS / IDENTIFICATION / TRAWL / DISTRIBUTION / EASTPACIFIC / A FALCO / A FELIS / P ADDOLUX / P GEMMATA / O BARTRAMII / S LUMINOSA / NEOTEUTHIS / H HETEROPSIS / G ONYX / H DOFLEINI / O DELETRON / G BERRYI / G CALIFORNIENSIS / G PYROS / G BOREALIS / O BOREALIJAPONICUS / M PYRODES / V OBLIGOBESSA / C CALYX / V DANAE / G BOMPLANDII / B BERRYI / L DISLOCATA / C SCABRA / G PHYLLURA / G PACIFICA / H PFEFFERI / J HEATHI / JAPETELLA / O TUBERCULATA / A MOLLIS / OCTOPUS / V INFERNALIS

YOUNG, R. E. 1975a. Leachia pacifica (Cephalopoda, Teuthoidea): spawning habitat and function of the brachial photophores. Pacific Science 29(1): 19-25.

Trawl survey of the squid Leachia pacifica, off Oahu, Hawaii. Larvae to young adults were found in near surface waters; but, mature animals occurred at depths greater than 1000 m. Branchial photophores probably serve as sexual attractants.

*6 YOUNG R E / L PACIFICA / TRAWL / VERTICAL / PACIFIC / REPRODUCTION

YOUNG, R. E. 1975b. A brief review of the biology of the oceanic squid, Symplectoteuthis oualaniensis (Lesson). Comp. Biochem. Physiol. 52B:141-143.

A short summary of the biology of Symplectoteuthis oualaniensis, which occurs in the tropical Pacific and Indian Oceans. Report states although little is known about this squid's biology and vertical distribution, seabirds feed upon it, and its abundance indicates it may be an untapped ocean resource.

*6 YOUNG R E / S OUALANIENSIS / DISTRIBUTION / SEABIRDS / FISH / INDIAN / FEEDING HABITS / VERTICAL / SQUID DIET / TRAWL / PACIFIC

YOUNG, R. E. 1977. Ventral bioluminescent countershading in midwater cephalopods. Symp. Zool. Soc. Lond. (38):161-190.

A study of six midwater squids, to investigate if counterillumination could serve as a concealment behavior at upper depths. Paper presents vertical distributions (from day and night trawls), countershading behavior, and data on bioluminescent organs. Bioluminescent countershading was believed to occur in four of the six species.

*6 YOUNG R E / VERTICAL / P MICROLAMPAS / S MELANCHOLICUS / H HAWAIIENSIS / ENOPLOTEUTHIS / H DOFLEINI / T ALESSANDRINII / TRAWL / PACIFIC

YOUNG, R. E. 1978. Vertical distribution and photosensitive vesicles of pelagic cephalopods from Hawaiian waters. Fishery Bulletin 76(3):583-615.

Survey of the vertical distribution of 47 cephalopod species, which revealed habitat separation among related species, and reported day-night migrations in 25 of the 47 species. Reproductive processes were linked to vertical zonation. Size and shape of photosensitive vesicles were associated with detection of downwelling light and regulation of vertical migration and counterillumination.

*2 YOUNG R E / VERTICAL / PACIFIC / REPRODUCTION / TRAWL / ABRALIOPSIS / P MICROLAMPAS / P ADDOLUX / P GIARDI / OCTOPODA / A TRIGONURA / H HAWAIIENSIS / E PYGMAEA / A PELAGICUS / V INFERNALIS / V RICHARDI / J DIAPHANA / G PACIFICA B LYROMMA / H BEEBEI / S MELANCHOLICUS / T PAVO / P FISHERI / L PACIFICA / L REINHARDTI / L VALDIVIAE / M INERMIS / G BOMPLANDII / M FAMELICA / P LIPPULA C PICTETI / CHIROTEUTHIS / BRACHIOTEUTHIS / O NIELSENI / C SIRVENTI / D LACNIOISA / C SICULUS / O COMPACTA / HISTIOTEUTHIS / H CELETARIA / H DOFLEINI / ENOPLOTEUTHIS / T ALESSANDRINII

YOUNG, R. E., E. M. Kampa, S. D. Maynard, F. M. Mencher, and C. F. E. Roper. 1980. Counterillumination and the upper depth limits of midwater animals. *Deep-Sea Research* 27A:671-691.

Investigation of counterillumination in three mesopelagic squids and one myctophid fish. Counterillumination responses occurred under an upper limit of light intensity. Intensity limits were correlated with moonlit night and day illumination, at depth, and with trawl survey data. Counterillumination was thought to be a concealment behavior at upper depth limits.

*6 YOUNG R E / KAMPA E M / MAYNARD S D / MENCHER F M / ROPER C F E / TRAWL / VERTICAL / PACIFIC / ABRALIOPSIS / P GIARDI

ZUEV, G. V., and K. N. Nesis. 1971. Squid biology and fishing. [Kal'mary (biologiya i promysel)]. *Pishchevaya Promyshlennost'*, Moscow. 360 pp. Translated from Russian. Available from: Language Services Branch, National Marine Fisheries Service, Washington, D.C.

Comprehensive work covering squid resources, based on a survey of worldwide literature and the authors' own data. Topics covered include form and structure, growth and reproduction, feeding, distribution, biological review by major genera and species, and fishing methods and production.

*2 ZUEV G V / NESIS K N / PACIFIC / INDIAN / ATLANTIC / ANTARCTIC / EASTPACIFIC / ETP / DISTRIBUTION / SEASONAL / VERTICAL / REPRODUCTION / GROWTH / NET / GILLNET / LIGHTS / JIGGING / TRAWL / FEEDING HABITS / FISH MARINE MAMMALS / SQUID DIET / WORLDWIDE / SEABIRDS / MIGRATION / PARASITE / FISHING

ZUEV, G. V., K. N. Nesis, and Ch. M. Nigamatullin. 1975. Systematics and evolution of the squid genera *Ommastrephes* and *Symplectoteuthis* (Cephalopoda, Ommastrephidae). *Zool. Zh.* 54(10):1468-1479.

Presentation of characteristics of some ommastrephid squids, and some suggestions related to their taxonomic positions. In Russian with English summary.

*2 ZUEV G V / NESIS K N / NIGAMATULLIN CH M / WORLDWIDE / E LUMINOSA / H PELAGICA / O BARTRAMII / S PTEROPUS / S OUALANIENSIS / D GIGAS / ORNITHOTEUTHIS / DISTRIBUTION

TAXA INDEX

References are listed by broad taxonomic groups. Literature may deal with either one of the species listed or a broader taxa (genus, family, or order).

TEUTHOIDEA

Architeuthidae:

Architeuthis

- | | |
|--------------------------|----------------------|
| Anonymous 1982a | Morejohn et al. 1978 |
| Belyayev 1962 | Packard 1972 |
| Clarke 1962, 1980 | Roper et al. 1969 |
| Gaskin and Cawthorn 1967 | Sasaki M. 1929 |
| Hess and Toll 1981 | |

Bathyteuthidae:

Bathyteuthis abyssicola, B. bacidifera, B. berryi, Benthoteuthis

- | | |
|------------------------|----------------------|
| Fields and Gauley 1972 | Robson 1948 |
| Herring 1977 | Roper et al. 1969 |
| Hoyle 1904 | Roper and Young 1975 |
| King and Iversen 1962 | Voss 1971 |
| Nesis 1973a | Young 1972 |
| Okutani 1974 | |

Brachyteuthidae:

Brachyteuthis riisei

- | | |
|-----------------------|-------------------|
| Iversen 1962 | Okutani 1974 |
| King and Iversen 1962 | Roper et al. 1969 |
| Nesis 1973a | Young 1978 |

Chiroteuthidae:

Chiroteuthis calyx, C. imperator, C. picteti, C. veranyi, Doratopsis, Planktoteuthis lippula, Valbyteuthis danae, V. obligobessa

- | | |
|----------------------------|--------------------------|
| Clarke 1962, 1980 | Okutani and McGowan 1969 |
| Clarke et al. 1976 | Pearcy 1965 |
| Clarke and Kristensen 1980 | Perrin et al. 1973 |
| Fiscus 1982 | Robson 1948 |
| Fiscus and Mercer 1982 | Roper et al. 1969 |
| Harris 1973 | Roper and Young 1975 |
| Kawakami 1980 | Sasaki 1929 |
| King and Iversen 1962 | Stroud et al. 1981 |
| McGowan 1967 | Voss 1971 |
| McHugh 1952 | Walker 1981 |
| Nesis 1972, 1973a | Young 1972, 1978 |
| Okutani 1974 | |

Cranchiidae:

Bathothauma lyromma, Corynomma, Cranchia scabra, Crystalloteuthis,
Desmoteuthis, Drechsetia danae, Galiteuthis armata, G. pacifica, G. phyllura,
HelioCranchia beebel, H. pfefferi, Leachia danae, L. dislocata, L.
eschschoeltzi, L. (Euzygaena, Pyrgopsis) pacifica, Liguriella, Liocranchia
globula, L. intermedia, L. reinhardti, L. valdiviae, Loligopsis schneehagenii,
Megalocranchia abyssicola, Mesonychoteuthis hamiltoni, Phasmatopsis fisheri,
Sandalops melancholicus, Teuthowenia, Taonidium chuni, Taonis megalops, T.
pavo

Alverson 1963	McGowan 1967
Anonymous 1982a	McHugh 1952
Belyayev 1962	Morejohn et al. 1978
Blackburn 1968	Nesis 1972, 1973a, 1978
Clarke 1962, 1966, 1980	Okutani 1974
Clarke and Stevens 1974	Okutani and McGowan 1969
Clarke et al. 1976	Packard 1972
Clarke and Kristensen 1980	Pearcy 1965
Fields and Gauley 1972	Pinkas 1971
Herring 1977	Robson 1948
Hess and Toll 1981	Roper et al. 1969
Hoyle 1904	Roper and Young 1975
Iversen 1962	Stroud et al. 1981
Iverson 1971	Voss 1971
Iverson and Pinkas 1971	Walker 1981
Kawakami 1980	Wolff 1982a, 1982b
King and Ikehara 1956	Yanamoto and Okutani 1975
King and Iversen 1962	Young 1972, 1975a, 1977, 1978

Ctenopterygidae:

Ctenopteryx siculus

Blackburn 1968	Okutani and McGowan 1969
Hess and Toll 1981	Packard 1972
King and Iversen 1962	Roper et al. 1969
Nesis 1972, 1973a	Yanamoto and Okutani 1975
Okutani 1974	Young 1978

Cycloteuthidae:

Cycloteuthis sirventi, Discoteuthis discus, D. lacniosa

Clarke 1980	Roper et al. 1969
Kawakami 1980	Young 1978
Nesis 1973a	

Enoploteuthidae:

Abralia andamanica, A. astrosticta, A. veranyi, Abraliopsis affinis, A. falco,
A. felis, A. hoylei, A. morrisii, Ancistrocheiros tesueuri, Pterygioteuthis
gemmata, P. giardi, P. microlampas, Pyroteuthis addolux, P. margaritifera,
Thelidoteuthis alessandrini, Watasenia

Alverson 1963	Ashmole and Ashmole 1968
Anonymous 1982a	Ashmole and Ashmole 1967

Enoploteuthidae (continued):

- | | |
|---------------------------|------------------------------|
| Blackburn 1968 | Morejohn et al. 1978 |
| Clarke 1966, 1980 | Nesis 1972, 1973a |
| Clarke et al. 1976 | Okutani 1974 |
| Fields and Gauley 1972 | Okutani and McGowan 1969 |
| Fiscus 1982 | Overstreet and Hochberg 1975 |
| Hanlon et al. 1979 | Packard 1972 |
| Harris 1973 | Pearcy 1965 |
| Herring 1977 | Perrin et al. 1973 |
| Hess and Toll 1981 | Pinkas 1971 |
| Hoyle 1904 | Robson 1948 |
| Iversen 1962 | Roper et al. 1969 |
| Iverson 1971 | Sasaki 1929 |
| Iverson and Pinkas 1971 | Shomura and Hida 1965 |
| Kawakami 1980 | Stroud et al. 1981 |
| King and Ikehara 1956 | Voss 1971 |
| King and Iversen 1962 | Walker 1981 |
| Kubodera and Okutani 1981 | Wolff 1982a, 1982b |
| McGowan 1967 | Yanamoto and Okutani 1975 |
| McGowan and Okutani 1968 | Young 1972, 1977, 1978 |
| McHugh 1952 | Young et al. 1980 |

Gonatidae:

Berryteuthis magister, Gonatopsis borealis, Gonatus anonychus, G. antarcticus,
G. berryi, G. californiensis, G. fabricii, G. madokai, G. magister, G. onyx,
G. pyros

- | | |
|----------------------------|--------------------------------|
| Anonymous 1982a | Kubodera and Okutani 1981 |
| Belyayev 1962 | Laevastu and Larkins 1981 |
| Bernard 1980 | Matsumoto 1982 |
| Berzin 1971 | McGowan 1967 |
| Clarke and Stevens 1974 | McHugh 1952 |
| Clarke et al. 1976 | Nesis 1971, 1972, 1973a, 1973b |
| Clarke and Kristensen 1980 | Okutani 1977 |
| Clarke and MacLeod 1980 | Okutani and McGowan 1969 |
| Dawe 1981 | Pearcy 1965 |
| Fiscus 1982 | Pinkas 1971 |
| Fiscus and Mercer 1982 | Rice 1963 |
| Iverson 1971 | Roper et al. 1969 |
| Iverson and Pinkas 1971 | Roper and Young 1975 |
| Jefferts and Pearcy 1979 | Sasaki 1929 |
| Kawakami 1976, 1980 | Stroud et al. 1981 |
| Kawamura 1980 | Wolff 1982b |
| Kristensen 1980 | Young 1972 |

Grimalditeuthidae:

Grimalditeuthis bomplandii

- | | |
|-------------------|------------------|
| Roper et al. 1969 | Young 1972, 1978 |
|-------------------|------------------|

Histioteuthidae:

Calliteuthis meleagroteuthis, C. reversa, Histioteuthis bonnellii, H. celetaria, H. cookiana, H. corona cerasina, H. dofleini, H. heteropsis, H. meleagroteuthis, H. reversa, Histioteutha oceani, Meleagroteuthis heteropsis, M. holyci

Anonymous 1982a	Morejohn et al. 1978
Belyayev 1962	Nesis 1972, 1973a
Blackburn 1968	Okutani 1974
Clarke 1962, 1980	Okutani and McGowan 1969
Clarke and Stevens 1974	Packard 1972
Clarke et al. 1976	Pearcy 1965
Clarke and Kristensen 1980	Perrin et al. 1973
Gaskin and Cawthorn 1967	Robson 1948
Harris 1973	Roper et al. 1969
Herring 1977	Roper and Young 1975
Hess and Toll 1981	Sasaki 1929
Hoyle 1904	Voss 1971
Iverson 1971	Walker 1981
Iverson and Pinkas 1971	Wolff 1982b
Kawakami 1976, 1981	Young 1972, 1977, 1978
King and Iversen 1962	

Lepidoteuthidae (Pholidoteuthidae):

Lepidoteuthis, Pholidoteuthis adami, Tetronychoteuthis massyae

Anonymous 1982a	Kawakami 1980
Clarke 1980	Matsumoto 1982
Harris 1973	Roper et al. 1969
Hess and Toll 1981	

Loliginidae:

Doryteuthis bleekeri, Loligo brasiliensis, L. gahi, L. opalescens, L. pealei, L. plei, L. vulgaris, Loliolopsis diomedea, L. chiroctes, Lolliguncula brevis, L. panamensis, Sepioteuthis australis, S. bilineata, S. sepoidea, S. tessoniana

Ally and Keck 1978	Deweese and Price 1983
Alverson 1963	Engel 1975
Amaral and Carr 1980	Evans 1975
Anonymous 1980, 1981, 1982a	FAO 1982
Ashmole and Ashmole 1967	Fields 1965
Bernard 1980	Filippova 1971
Berry 1912	Fiscus 1982
Blott 1980	Gaskin and Cawthorn 1967
Boletzky 1977	Grieb and Beeman 1978
Calliet et al. 1979	Hanlon et al. 1979
Christofferson et al. 1978	Herring 1977
Clark and Brown 1979	Hochberg and Fields 1980
Clarke 1962	Hoyle 1904
Court 1980	Huey 1930
Dawe 1981	Hurley 1978

Loliginidae (continued):

Iversen 1962	Okutani 1977
Iverson 1971	Okutani and McGowan 1969
Iverson and Pinkas 1971	Oliphant 1971
Juanico 1980, 1982	Overstreet and Hochberg 1975
Karpov and Calliet 1978, 1979	Packard 1972
Kashiwada and Recksiek 1978	Pearcy 1965
Kashiwada et al. 1979	Pinkas 1971
Kato and Hardwick 1975	Roper et al. 1969
King and Ikehara 1956	Sasaki 1929
Knipe and Beeman 1978	Sato 1975b
Koyama 1975	Sissenwine and Tibbetts 1977
Lange 1980	Spratt 1978, 1979
Lange and Sissenwine 1980	Squire 1983
Laughlin and Livingston 1982	Squires et al. 1971
Matsui et al. 1972	Squires and Barragan 1979
Matsumoto 1982	Stroud et al. 1981
McGowan 1954, 1967	Vaughan 1978
McHugh 1952	Vaughan and Recksiek 1978, 1979
McInnis and Broenkow 1978	Voss 1971, 1973
Mearns et al. 1981	Waldron and King 1963
Mesnil 1977	Walker 1981
Morejohn et al. 1978	Whitaker 1980
Nesis 1973a, 1978	Wolff 1982a, 1982b

Mastigoteuthidae:

Mastigoteuthis dentata, M. famelica, M. inermis, M. pyrodes

Anonymous 1982a	Nesis 1973a
Clarke 1980	Okutani 1974
Clarke and Trillmich 1980	Robson 1948
Hoyle 1904	Roper et al. 1969
Iverson 1971	Roper and Young 1975
Iverson and Pinkas 1971	Voss 1971
King and Iversen 1962	Young 1972, 1978

Neoteuthidae:

Neoteuthis

Okutani 1974	Young 1972
Roper et al. 1969	

Octopoteuthidae (Octopodoteuthidae):

Octopoteuthis (Octopodoteuthis) deletron, Taningia danae

Anonymous 1982a	Clarke and Kristensen 1980
Belyayev 1962	Fiscus 1982
Blackburn 1968	Harris 1973
Clarke 1962, 1980	Herring 1977
Clarke and Stevens 1974	Kawakami 1980
Clarke et al. 1976	King and Iversen 1962

Octopoteuthidae (continued):

McGowan 1967	Roper et al. 1969
McHugh 1952	Roper and Young 1975
Morejohn et al. 1978	Walker 1981
Okutani 1974	Yanamoto and Okutani 1975
Okutani and McGowan 1969	Young 1972
Reintjes and King 1953	

Ommastrephidae:

Doscidicus (Ommastrephes) gigas, Hyaloteuthis pelagica(us), Illex argentinus,
I. illecebrosus, Nototodarus gouldi, N. (Ommastrephes) hawaiiensis, N. sloani,
N. sloani gouldi, N. sloani philippinensis, Ommastrephes bartrami, O. caroli,
O. (Symplectoteuthis) pteropus, (O.) sloani pacificus, Ornithoteuthis
antillarum, O. volatilis, Symplectoteuthis (Eucleoteuthis) luminosa, S.
oualaniensis, Stenoteuthis, Todarodes angolensis, T. filippovae, T. pacificus,
T. sagittatus, Todaropsis eblanae

Alverson 1963	Harris 1973
Anonymous 1980, 1981	Herring 1977
1982a, 1982b	Hess and Toll 1981
Ashmole and Ashmole 1968	Hochberg and Fields 1980
Ashmole and Ashmole 1967	Hoyle 1904
Balch et al. 1978	Hurley and Waldron 1978
Bernard 1980	Hurley and Beck 1979
Bernard 1981	Iversen 1962
Berry 1912, 1914	Iverson 1971
Berzin 1971	Iverson and Pinkas 1971
Blackburn 1968	Japan Marine Fishery Resource
Blunt 1960	Research Center 1978
Boletzky 1977	Juanico 1980
Burukovski et al. 1977	Juhl 1955
Clark and Brown 1979	Kawakami 1976, 1980
Clarke 1962, 1965, 1966, 1980	Kawamura 1980
Clarke and Stevens 1974	King and Ikehara 1956
Clarke et al. 1976	King and Iversen 1962
Clarke and Kristensen 1980	Klett Traulsen 1981, 1982
Clarke and Trillmich 1980	Korzun et al. 1979
Court 1980	Kubodera and Yoshida 1981
Dawe 1981	Lange 1980
Deweese and Price 1983	Lange and Sissenwine 1980
Fields and Gauley 1972	Lee 1981
Filippova 1971	Lipinski and Wrzesinski 1982
Fiscus 1982	Long and Rathjen 1980
Fiscus and Mercer 1982	Lu and Dunning 1982
Flores et al. 1978	Matsumoto 1982
Gaevskaya 1976, 1977	McHugh 1952
Gaevskaya and Nigamatullin 1976	Mearns et al. 1981
Gaskin and Cawthorn 1967	Mercer 1975
Hamabe et al. 1975	Mesnil 1977
Hanlon et al. 1979	Morejohn et al. 1978

Ommastrephidae (continued):

- | | |
|------------------------------|------------------------------|
| Murakami et al. 1981 | Shevtsova et al. 1977, 1979 |
| Nesis 1970, 1972 | Shibata and Flores 1972 |
| 1973a, 1977a, 1978 | Shomura and Hida 1965 |
| Ogura 1976 | Sissenwine and Tibbetts 1977 |
| Ogura and Nasumi 1976 | Suzuki 1963 |
| Okutani 1977 | Suzuki 1975 |
| Overstreet and Hochberg 1975 | Suzuki et al. 1974 |
| Packard 1972 | Tung 1976, 1981 |
| Perrin et al. 1973 | Voss 1971, 1973 |
| Pinkas 1971 | Waldron and King 1963 |
| Rathjen and Stanley 1982 | Walker 1981 |
| Rau et al. 1983 | Whitaker 1980 |
| Reintjes and King 1953 | Wolff and Wormuth 1979 |
| Robson 1948 | Wolff 1982a, 1982b |
| Roeleveld 1982 | Wormuth 1971, 1975 |
| Roper et al. 1969 | Yajima and Mitsugi 1975 |
| Roper and Young 1975 | Young 1972, 1975b |
| Sasaki 1929 | Zuev et al. 1975 |
| Sato 1975a, 1975b | |

Onychoteuthidae:

Kondakovia, Moroteuthis robusta, Onychoteuthis banksii, O. borealijaponicus,
O. compacta, Onykia carribaea

- | | |
|---------------------------|---------------------------|
| Alverson 1963 | Kawamura 1980 |
| Anonymous 1982a | King and Ikehara 1956 |
| Bernard 1980 | King and Iversen 1962 |
| Berry 1914 | Matsumoto 1982 |
| Berzin 1971 | McGowan 1967 |
| Blackburn 1968 | McHugh 1952 |
| Clarke 1962, 1966, 1980 | Morejohn et al. 1978 |
| Clarke et al. 1976 | Nesis 1972, 1973a |
| Clarke and Trillmich 1980 | Okutani 1974, 1977 |
| Evans 1975 | Okutani and McGowan 1969 |
| Fiscus 1982 | Packard 1972 |
| Fiscus and Mercer 1982 | Pearcy 1965 |
| Gaskin and Cawthorn 1967 | Perrin et al. 1973 |
| Harris 1973 | Pinkas 1971 |
| Herring 1977 | Reintjes and King 1953 |
| Hess and Toll 1981 | Rice 1963 |
| Hochberg 1974 | Robson 1948 |
| Hochberg and Fields 1980 | Roper et al. 1969 |
| Hoyle 1904 | Sasaki 1929 |
| Iversen 1962 | Stroud et al. 1981 |
| Iverson 1971 | Voss 1971 |
| Iverson and Pinkas 1971 | Wolff 1982a, 1982b |
| Jefferts and Pearcy 1979 | Yanamoto and Okutani 1975 |
| Kawakami 1976, 1980 | Young 1972, 1978 |

Psychroteuthidae:
Psychroteuthis

Clarke et al. 1976
Kawakami 1980

Roper et al. 1969

Thysanoteuthidae:
Thysanoteuthis rhombus

Alverson 1963
Anonymous 1982a
Clarke 1962
Hess and Toll 1981

Morejohn et al. 1978
Okutani 1977
Roper et al. 1969
Sasaki 1929

OCTOPODA (Argonautidae, Octopodidae)

Allopsis mollis, Amphitretus pelagicus, Argonauta bottgeri, A. hians,
Benthoctopus, Eledone cirrhosa, Eledonella pygmaea, Japetella diaphana, J.
heathi, Octopus bimaculatus, O. briareus, O. maorum, O. vulgaris, Ocythoe
tuberculata, Tremoctopus gracilis, Vitreledonella richardi

Alvariño and Hunter 1981
Alverson 1963
Anonymous 1981, 1982a
Ashmole and Ashmole 1967
Belyayev 1962
Berry 1912, 1914
Berzin 1971
Boletzky 1977
Caddy 1981
Clarke 1962, 1980
Clarke and Stevens 1974
FAO 1982
Fields and Gauley 1972
Fiscus 1982
Fiscus and Mercer 1982
Gaskin and Cawthorn 1967
Hess and Toll 1981
Hochberg and Fields 1980
Hoyle 1904
Iversen 1962
Iverson 1971
Iverson and Pinkas 1971
Jefferts and Percy 1979

Kawakami 1980
King and Ikehara 1956
Koyama 1975
Kubodera and Okutani 1981
McGowan 1967
McHugh 1952
Morejohn et al. 1978
Nesis 1972, 1973a
Overstreet and Hochberg 1975
Packard 1972
Percy 1965
Pereiro and Bravo de Laguna 1980
Perrin et al. 1973
Pinkas 1971
Reintjes and King 1953
Rice 1963
Roper and Young 1975
Sasaki 1929
Stroud et al. 1981
Voss 1971
Waldron and King 1963
Walker 1981
Young 1972, 1978

VAMPYROMORPHA

Vampyroteuthis infernalis

Clarke 1980	Kawakami 1980
Clarke et al. 1976	Nesis 1973a
Clarke and Kristensen 1980	Pearcy 1965
Iverson 1971	Young 1972, 1978
Iverson and Pinkas 1971	

SEPIOIDEA (Idosepiidae, Sepiidae, Sepiolidae)

Heteroteuthis hawaiiensis, Rossia pacifica, Sepia officinalis

Anonymous 1981, 1982a	King and Ikehara 1956
Boletzky 1977	Koyama 1975
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Clarke 1962	Overstreet and Hochberg 1975
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Hurley and Waldron 1978	Pereiro and Bravo de Laguna 1980
Japan Marine Fisheries Resource Research Center 1978	Pieper 1979
	Roper 1977

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Clarke 1962, 1980	McGowan and Okutani 1968
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(March 1983)
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and D. D. STANLEY
(April 1983)
 - 31 Re-estimation of three parameters associated with anchovy egg and larval abundance: Temperature dependent incubation time, yolk-sac growth rate and egg and larval retention in mesh nets.
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R. N. UCHIDA
(July 1983)
 - 34 "Some data on dolphin mortality in the eastern tropical Pacific tuna purse seine fishery prior to 1970."
T. D. SMITH and N. C. H. LO
(July 1983)
 - 35 "Precision of age determination of northern offshore spotted dolphins."
S. B. REILLY, A. A. HOHN, and A. C. MYRICK, JR.
(August 1983)
 - 36 "Recovery of adult green turtles observed or originally tagged at French Frigate Shoals, Northwestern Hawaiian Islands."
G. BALAZS
(August 1983)
 - 37 "Report of the workshop on long-range planning for the North Pacific albacore fishery."
D. J. MACKETT, Editor
(November 1983)
 - 38 Distribution of four dolphins (*Stenella spp.* and *Delphinus delphis*) in the eastern tropical Pacific, with an annotated catalog of data sources.
W. F. PERRIN, M. D. SCOTT, G. J. WALKER, F. M. RALSTON
and D. W. K. AU
(December 1983)