

# New data on the distribution and biology of squids from the Southern Pacific

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The material for this study was collected in three cruises of the research vessel *Vozrozhdeniye* in central and eastern parts of Southern Pacific, mainly in the Subtropical Frontal Zone (or the Subtropical Convergence Zone), the northern part of the Notalian Zone and off economic zones of Chile, Peru and Ecuador from 41°38'S up to the equator during November, 1986 — December, 1989. All samples were taken by a commercial pelagic trawl mainly from the surface to depths of 400 m, sometimes deeper. Essential differences were found between faunas of the Central Southern Pacific and the Peruvian Current.

31 species of squids from families Lycoteuthidae, Enoploteuthidae, Onychoteuthidae, Histioteuthidae, Brachioteuthidae, Ommastrephidae, Pholidoteuthidae, Architeuthidae, Neoteuthidae, Chiroteuthidae, and Cranchiidae were identified in the oceanic region of Southern Pacific (the total number of oceanic squids known in this area is now 34). The most numerous species were *Eucleoteuthis luminosa* (Sasaki, 1915), *Abraliopsis gilchristi* (Robson, 1924), *Pholidoteuthis boschmai* Adam, 1950, *Todarodes filippovae* Adam, 1975 and *Galiteuthis suhmi* (Hoyle, 1885). Only two tropical epipelagic species — *Onychoteuthis banksii* (Leach, 1817) and *Pyroteuthis margaritifera* (Rüppell, 1844) — and subtropical *Ommastrephes bartramii* (LeSueur, 1821) were caught regularly in mixed waters of Subtropical Frontal Zone and subantarctic waters. Spawning of some oceanic species (*Abraliopsis gilchristi*, *Pyroteuthis margaritifera*, *Eucleoteuthis luminosa*) was noted during September-December.

28 species of squids were identified in waters of the Peruvian Current. The composition of fauna changed from purely notalian in southern samples (the most abundant species were *Abraliopsis gilchristi*, *Todarodes filippovae*, *Lycoteuthis diadema* (Chun, 1900), *Moroteuthis robsoni* Adam, 1962, *Galiteuthis suhmi*) to tropical [the most abundant species were *Dosidicus gigas* (d'Orbigny, 1838) and *Abraliopsis affinis* (Pfeffer, 1912)] in northern samples. The most northern record of notalian species was represented by two juveniles of *Todarodes filippovae* caught at 16°46'S near the economic zone of Peru. Spawning of *Abraliopsis affinis* and *Lycoteuthis diadema* was noted in the Peruvian Current during October-December. The peculiarity of waters of the Peruvian Current was the absence of such oceanic species as *E. luminosa* and *Architeuthis* sp. On the other hand some uncommon in Central Southern Pacific species [*Moroteuthis robsoni*, *Lycoteuthis diadema*, *Leachia rynchophorus* (Rochebrune, 1884)] were common in the southern part of Southeastern Pacific.

## Новые данные о распространении и биологии кальмаров южной Пацифики

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Материал для настоящей работы был собран в трех рейсах НПС "Воз-

рождение" в южную и восточную Пацифику в ноябре 1986 — декабре 1989 г.

В открытой части южной Пацифики был отмечен 31 вид кальмаров из семейств Lycoteuthidae, Euploteuthidae, Onychoteuthidae, Histioteuthidae, Brachioteuthidae, Ommastrephidae, Pholidoteuthidae, Architeuthidae, Neoteuthidae, Chiroteuthidae и Cranchiidae. Общий список океанических кальмаров центрально-южной Пацифики составляет теперь 34 вида. Наиболее многочисленными видами являются *Eucleoteuthis luminosa* (Sasaki, 1915), *Abraliopsis gilchristi* (Robson, 1924), *Pyroteuthis margaritifera* (Rüppell, 1844), *Pholidoteuthis boschmai* Adam, 1950, *Chiroteuthis veranyi veranyi* (Férussac, 1835) и *Galiteuthis suhmi* (Hoyle, 1885). Только два тропических эпипелагических вида — *Onychoteuthis banksii* (Leach, 1817) и *Pyroteuthis margaritifera* и субтропический *Ommastrephes bartramii* (LeSueur, 1821) отмечались регулярно в смешанных водах субтропической фронтальной зоны и субантарктических водах. В сентябре-декабре был отмечен нерест нескольких видов океанических кальмаров.

28 видов кальмаров было отмечено в уловах в юго-восточной Пацифике. Наблюдалась смена фаун кальмаров от чисто нотальной в южных пробах до тропической в северных. В водах Перуанского течения некоторые океанические виды (*E. luminosa*, *O. bartramii*, *Architeuthis* sp.) замещались нересто-океаническими [*M. robsoni* Adam, 1962, *Lycoteuthis diadema* (Chun, 1900), *Todarodes filippovae* Adam, 1975]. Самым северным нахождением представителей нотальной фауны в Перуанском течении была поимка двух ювенильных особей *T. filippovae* на широте 16°46' ю.ш. вблизи экономической зоны Перу. В Перуанском течении в октябре-декабре был отмечен нерест *Abraliopsis affinis* (Pfeffer, 1912) и *L. diadema*.

## INTRODUCTION

Despite considerable number of publications devoted to cephalopods of the offshore waters of New Zealand and South America [Alexandronets, Parfenyuk, 1986; Arkhipkin, Parfenyuk, 1986, 1987; Dell, 1952; Nesis, 1970, 1972, 1973, 1979; Nesis, Nikitina, 1986; Rancurel, 1970; Shchetinnikov, 1986; etc.], the fauna of oceanic squids of the central part of Southern Pacific is still insufficiently studied. Besides few general reviews discussing the mentioned region among others [Fischer, Hureau, 1985; Nesis, 1982 a,b, 1985; Roper et al., 1984], only three publications can be noted. They [Alexeyev, 1989; Polezhaev, 1986 a,b] deal with the fauna of oceanic squids of the central part of Southern Pacific and based on the material collected in cruises of Soviet research vessels in notalial and subtropical waters of Southern Pacific in 1982-1989.

The present study is based on the materials collected in three cruises of the R/V *Vozrozhdeniye*, and partially described earlier [Alexeyev, 1989].

## MATERIAL AND METHODS

The material was collected by the author in XI (April-July 1987) and XVI (August-December 1989) cruises of the R/V *Vozrozhdeniye*. Several samples of squids, collected in X cruise of the same vessel (November 1986 — January 1987) were kindly provided by V.M.Zhuravlev. The routes of all cruises

covered vast area of Southern and Southeastern Pacific from economic zone of New Zealand to economic zone of Chile and along the coast of South America to equator in the north (Fig. 1).

Usually the Southern Pacific is subdivided into Southeastern and Southwestern parts with the arbitrarily chosen boundary along 105°W. In the present study the division of Southern Pacific into Central-southern (CSP) and Southeastern parts (SEP) with the boundary along 90°W is used.

CSP is characterized by hydrological conditions determined by mainly latitudinal transfer water mass and, correspondingly, latitudinal orientation of hydrological borders respectively. Hydrology of SEP is determined by large meridional Peruvian Current and penetration of antarctic and notalial waters far to the north [Burkov, 1968; Radzikhovskaya, Leontyeva, 1968; Gershanovich, Sapozhnikov, 1986].

All squid samples were collected from the catches of commercial pelagic trawls. These trawls are poorly suitable for collecting small planktonic squids, e.g., Euploteuthidae, which easily pass through large mesh of the net. Therefore small squids are practically not found in the rear part of the trawl. Nevertheless they are often trapped by the net of the trawl wings and the wires, sometimes in great amount. Sometimes it was difficult to collect all trapped squids and their number was estimated to tens, hundreds or thousands.

The depth of trawling was determined by upper edge of the trawl. The vertical size of the trawl opening was about 10 m. The