

# Giant North Pacific octopus, *Octopus dofleini apollyon* (Berry), in deep water of the western Bering Sea

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The octopus *O. dofleini apollyon* was caught in nearly half of bottom trawlings taken in the western part of the Bering Sea, 165 to 180°E, at depths 100-750 m in October-November, 1993. It was recorded at the depths from 105 to 750 m, being most common at 200-400 m. Maximal size (mantle length, ML) of male was 28 cm, of female — 27 cm, maximal weight of both sexes was 5.3 kg (unusually small size for the world's largest octopus species). Sex ratio was almost equal to 1. Average ML in males was 21.0, in females — 19.1 cm. Juveniles were very rare. Mature males and females comprised up to 68.5 and 41.4% of all specimens of respective sex. Maturation began at ML 12-13 cm, first mature males and females had ML 16 and 18 cm, mass maturation occurred at 18-20 and 19-22 cm. The largest not fully mature males and females had ML 24 and 26-27 cm. Spermatophore length was 44 to 60 cm, the number of spermatophores was no more than 10. The length of non-ovulated eggs was 7-8 cm, of ovulated — 6 cm.

The lowest boundary of *O. dofleini* distribution was previously reported at 180-200 m, although there were some records from depths to 583 m. Probably this species is eurybathic and may live and reproduce in upper bathyal. The finding of large reproducing population (or a part of population) of *O. dofleini* in upper bathyal resolves the mystery of repeated records of very small, almost newly hatched paralarvae of *O. dofleini* in open waters of the northern North Pacific, Bering and Okhotsk seas up to 200-300 nautical miles from the coast. If they hatch in upper bathyal and rise to the surface, they appear in the areas of rather strong (0.2-1.0 knots) permanent currents and may be widely dispersed.

## Гигантский северо-тихоокеанский осьминог *Octopus dofleini apollyon* (Berry) на глубинах западной части Берингова моря

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Осьминог *O. dofleini apollyon* найден почти в половине донных тралений, выполненных в октябре-ноябре 1993 г. в западной части Берингова моря на 165-180° в.д., 100-750 м. Встречен на глубинах 105-750 м, наиболее обычен на 200-400 м. Максимальный размер (длина мантии, ДМ) самца 28 см, самки 27 см, максимальный вес самца и самки 5,3 кг, что необычно мало для *O. dofleini*. Соотношение полов равное, средняя ДМ самца 21,0, самки 19,1 см. Молоди почти нет. Зрелые самцы и самки составляли 68,5 и 41,4% особей соответствующего пола. Созревание начинается при ДМ 12-13 см, самые маленькие зрелые особи имели ДМ: самцы 16, самки 18 см. Массовое созревание при 18-20 и 19-22 см. Самые крупные не

вполне зрелые самцы и самки имели ДМ 24 и 26-27 см. Длина сперматофоров 44-60 см, их число до 10. Длина не овулировавших яиц 7-8 мм, овулировавших 6 мм.

Ранее считалось, что *O. dofleini* обитает не глубже 180-200 м, хотя известны и единичные находения до 583 м. По-видимому, этот вид эврибатен и способен жить и размножаться в верхней батии. Нахождение крупной размножающейся популяции (или части популяции) *O. dofleini* в верхней батии объясняет загадку неоднократных находок только что вылупившихся личинок (параларв) *O. dofleini* в открытых водах северной Пацифики, Берингова и Охотского морей на расстояниях до 200-300 морских миль от берега: вылупляясь на склоне и всплывая к поверхности, они попадают в зону достаточно быстрых (0,2-1,0 узла) постоянных течений, которые разносят их на обширные пространства.

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The bottom octopuses of the shelf and slope of the Bering Sea are badly studied. Only some fragmentary records were mentioned in reviews [Akimushkin, 1963; Berry, 1912; Kondakov, 1941; Nesis, 1973; Pickford, 1964]. There are scanty, sometimes old data indicating that bottom octopuses are rather common and diverse both in nearshore zone and on the outer shelf and slope of the Bering Sea and Commander-Aleuthan chain; and that aboriginal people are well familiar with octopuses inhabiting the coastal zone and sometimes use them as a food and bait [Bakkala et al., 1985; Gurjanova, 1935; Dall, 1873; Turner, 1886; Wilson, Gorham, 1982]. This primarily concerns the giant North Pacific octopus, *Octopus dofleini apollyon* (Berry, 1912) [Hartwick, 1983; High, 1976; Mottet, 1975; Pickford, 1964; Wilson, Gorham, 1982].

In October and November, 1993, during an expedition aboard Japanese commercial trawler "Kashima Maru No. 8", I had an opportunity to conduct some observations on the species composition, distribution, and biology of bottom octopuses in the western part of the Bering Sea: Olyutorsky Bay, northern part of Shirshov Ridge, and Olyutoro-Navarin region. In this cruise some new data about vertical distribution and biology of the giant North Pacific octopus have been obtained.

## MATERIAL AND METHODS

Investigations were carried out from October 9 to November 11, 1993, between 165 and 180° E at depths from 100 to 750 m (Fig. 1). 137 trawlings were made with a commercial bottom trawl. They were of very different duration, from 30 min to 7-8 hours, usually some hours, at usual speed of 3.5 to 4.5 knots. Distribution of trawlings by areas and depths is given in Table 1.

The largest amount of trawlings was made in Olyutoro-Navarin region between 175 and 177° E at the depth of 300-500 m.

Conditions of work aboard a commercial ship restrict greatly the possibilities of scientific study. Analysis of total catch with sorting out of all octopuses was possible only if the catch was small which occurred rarely. Therefore it was impossible to recalculate the catch upon the units of time and space, especially as the trawl catchability for bottom octopuses remained unknown. I give below only the number of specimens per one trawling irrespectively of its speed and duration in order to avoid illusion of precise octopus counting.

There were no laboratory facilities on the ship and this excluded the possibility for fixation of caught specimens and the use of optics for their identification. The work was

Table 1. Distribution of the number of trawlings by areas and depths.

Таблица 1. Распределение числа тралений по районам и глубинам.

Area	Olyutorsky Bay		Shirshov Ridge	Olyutoro-Navarin region						Total
	165-167 E	168-169 E	170-170.5 E	171-173 E	173-175 E	175-176 E	176-177 E	177-178 E	179-180 E	
Number of trawls	10	12	10	2	8	57	24	7	7	137
Depth, m	100-200	201-300	301-400	401-500	501-600	601-700	701-800			
Number of trawls	4	8	68	44	5	4	4	137		