

Arcobacter marinus sp. nov.

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A slightly curved, rod-shaped marine bacterium, designated strain CL-S1^T, was isolated from near Dokdo, an island in the East Sea, Korea. Cells were Gram-negative and grew well under either aerobic or microaerobic conditions. Analyses of the 16S rRNA and *gyrA* gene sequences of strain CL-S1^T revealed an affiliation with the genus *Arcobacter* within the class *Epsilonproteobacteria*. Phylogenetic analyses based on 16S rRNA and *gyrA* gene sequences showed that strain CL-S1^T formed a robust clade with *Arcobacter halophilus* LA31B^T, with sequence similarities of 96.1 and 88.2%, respectively. DNA–DNA relatedness between strain CL-S1^T and *A. halophilus* DSM 18005^T was 44%, indicating that they represent genomically distinct species. Strain CL-S1^T grew optimally at 30–37 °C, at pH 7 and in the presence of 3–5% NaCl. The dominant cellular fatty acids were iso-C_{15:0} 2-OH and/or C_{16:1}ω7c (28.4%), C_{16:0} (26.2%) and C_{18:1}ω7c (22.3%). The DNA G+C content of strain CL-S1^T was 28 mol%. Strain CL-S1^T differed phenotypically from *A. halophilus* LA31B^T based on its ability to grow aerobically at 10 °C and inability to grow under anaerobic conditions. Based on the data presented, strain CL-S1^T is considered to represent a novel species of the genus *Arcobacter*, for which the name *Arcobacter marinus* sp. nov. is proposed. The type strain is CL-S1^T (=KCCM 90072^T =JCM 15502^T).

The genus *Arcobacter* belongs to the family *Campylobacteraceae*, which also contains the genera *Campylobacter* and *Sulfurospirillum* (Vandamme *et al.*, 2005a). The genus *Arcobacter* was proposed by Vandamme *et al.* (1991); two *Campylobacter* species, [*Campylobacter*] *nitrofigilis* (McClung *et al.*, 1983) and [*Campylobacter*] *cryaerophilus* (Neill *et al.*, 1985), were reclassified as *Arcobacter nitrofigilis* and *Arcobacter cryaerophilus*, respectively (Vandamme *et al.*, 1991). [*Campylobacter*] *butzleri* (Kiehlbauch *et al.*, 1991) was later reclassified as *Arcobacter butzleri* (Vandamme *et al.*, 1992). Three other species of the genus (*Arcobacter skirrowii*, *Arcobacter cibarius* and *Arcobacter halophilus*) have been newly described (Vandamme *et al.*, 1992; Houf *et al.*, 2005; Donachie *et al.*, 2005). At the time of writing, the genus thus comprises six recognized species (Donachie *et al.*, 2005; Houf *et al.*, 2005; Vandamme *et al.*, 2005b). Members of the genus *Arcobacter* have been isolated from various environments. *A. cryaerophilus*, *A. butzleri* and *A. skirrowii* have been recovered from livestock and humans (Neill *et al.*, 1985; Kiehlbauch *et al.*, 1991; Vandamme *et al.*, 1992) and are recognized as potential emerging human pathogens

(Mansfield & Forsythe, 2000). *A. nitrofigilis* was isolated from *Spartina alterniflora* roots in a salt marsh (McClung *et al.*, 1983). *A. halophilus* and *A. cibarius* were isolated from a hypersaline lagoon (Donachie *et al.*, 2005) and the skin of a broiler carcass (Houf *et al.*, 2005), respectively. In the present study, a novel strain affiliated with the genus *Arcobacter* was isolated and subjected to a polyphasic taxonomic analysis.

Seaweeds and a starfish were collected and added to a surface seawater sample (50 ml) taken from the vicinity of Dokdo, an island in the East Sea, Korea. The mixture was maintained at 4 °C for 15 days. The mixture was then homogenized by using a blender and an aliquot (50 µl) was spread onto MY medium (Bouchotroch *et al.*, 2001). The culture was incubated aerobically at 30 °C for 2 weeks. Strain CL-S1^T was isolated and subsequently purified on fresh marine agar 2216 (MA; Difco). Strain CL-S1^T grew well on MA or on saline blood agar [SBA; per litre distilled water: 40 g blood agar base (BBL), 50 ml sheep blood, 30 g NaCl] at 37 °C under either aerobic or microaerobic conditions. The novel strain was preserved in marine broth 2216 (MB; Difco) supplemented with 30% (v/v) glycerol at –80 °C.

For 16S rRNA gene amplification by PCR, DNA was extracted from a single colony by a boiling method (Englen & Kelley, 2000). The crude extracts served as the DNA template for PCRs, which included *Taq* DNA polymerase (Bioneer) and primers 27F and 1492R (Lane, 1991). The PCR product was purified by using the AccuPrep PCR

The GenBank/EMBL/DDBJ accession numbers for the 16S rRNA and *gyrA* gene sequences of strain CL-S1^T are EU512920 and FJ754218, respectively.

Neighbour-joining trees based on *gyrA* gene sequences and inferred amino acid sequences of the *gyrA* gene and transmission electron micrographs of negatively stained cells of strain CL-S1^T are available as supplementary material with the online version of this paper.



ORIGINAL ARTICLE

***Prochaetosoma dokdoense* sp. nov. (Nematoda: Draconematidae) from Dokdo, Korea: First record of the genus *Prochaetosoma* from a shallow subtidal zone in the northwest Pacific Ocean**

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Abstract

A draconematid nematode *Prochaetosoma dokdoense* sp. nov., first discovered in December 2006 at a subtidal zone of Dokdo, Korea, the northwest Pacific Ocean, is described. This new species was obtained from coarse detritus and shell gravels. *Prochaetosoma dokdoense* sp. nov. differs from all the species hitherto described by the following combination of characteristics: longer slender body (910–1175 µm), elongate loop-shaped amphidial fovea in male (distal end of ventral arm slightly curved anteriorly), eight cephalic adhesion tubes in both sexes positioned just anterior to swollen pharyngeal region, number of posterior sublateral adhesion tubes (6 in male and 6–10 in female) and posterior subventral adhesion tubes (7–8 in male and 8–9 in female), longer spicule length (78–86 µm), long cylindro-conoid tail (114–131 µm in male and 116–131 µm in female) and higher ratio c' (6.5–7.5 in male and 7.4–9 in female). A table comparing the major differential diagnostic characteristics of the species of the genus *Prochaetosoma* Micoletzky, 1922 is presented. For a reliable understanding of the geographic distribution and species identification of the genus *Prochaetosoma*, a pictorial key showing the relative length of non-annulated tail terminus to total tail length in both sexes is included, together with a dichotomous species identification key based on adults and fourth-stage juvenile as far as known. This is the first record of the genus *Prochaetosoma* in the northwest Pacific Ocean.

Key words: DIC photomicrographs, key, morphology, morphometrics, taxonomy

Introduction

The genus *Prochaetosoma* was created by Micoletzky (1922) based on *Chaetosoma primitivum* Steiner, 1916 and classified within the family Draconematidae Filipjev, 1918 based on the following combination of characteristics: moderately developed buccal cavity armed with conspicuous dorsal tooth, tiny ventrosublateral teeth and endbulb of pharynx with a well cuticularized lumen wall.

The genus *Prochaetosoma* has been reported from the intertidal and shallow subtidal environments in oceans all over the world except for the northern part of the Pacific Ocean (overview in Table I

based on Steiner 1916; Allgén 1932; Gerlach 1957; Kreis 1963; Allen & Noffsinger 1978; Jensen 1986; Decraemer 1989). Ten species within the genus *Prochaetosoma* have been described previously (Allen & Noffsinger 1978; Decraemer et al. 1997). Of these, three species have been described from the southwest Pacific Ocean, i.e. *P. campbelli* (Allgén, 1932) and *P. longicapitatum* (Allgén, 1932) from New Zealand and *P. martensi* Decraemer, 1989 from Papua New Guinea. However, no biodiversity studies from the northwest Pacific Ocean with respect to the genus *Prochaetosoma* have been carried out so far.

During a continuous ecological investigation on an annual fluctuation of the free-living marine

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A new species of the genus *Goniopsyllus* Brady (Copepoda, Harpacticoida, Clytemnestridae) from Korean waters

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Abstract.—A new species, *Goniopsyllus dokdoensis*, is described from the adjacent waters of Dokdo Island in the East Sea of Korea. The new species is closely related to *G. clausi* in the triangular shape of the rostrum, the length of the thoracopod 5 exopod, and the constricted genital double somite. However *G. dokdoensis* is distinguished from *G. clausi* by its smaller body size, genital field with additional pores adjacent to the copulatory pore, urosomites without dorsal ornamentation, and differences in the length of caudal setae. Also, the sixth pair of legs in the male has two setae at the outer distal corner of each lobe. This study is the first to report the presence of the genus *Goniopsyllus* in Korean waters.

Members of the family Clytemnestridae are typically found in the epipelagic zone of all oceans. The family was established by Scott (1909) to accommodate the distinct copepod species found during the pioneering oceanographic expeditions, such as the U.S. Exploring Expedition (Dana 1854) and the Voyage of the H.M.S. *Challenger* (Brady 1883). Clytemnestrids were placed in the order Poecilostomatoida until Claus (1891) demonstrated that they actually belong to the order Harpacticoida. There were only two known species, *Clytemnestra scutellata* Dana, 1847, and *C. rostrata* (Brady 1883) before the recent revision of the family (Huys & Conroy-Dalton 2000). Huys & Conroy-Dalton (2000) declared Clytemnestridae as a nomen protectum and recognized at least ten valid species in two genera of the family. They revived

Goniopsyllus, which Brady (1883) originally erected for *G. rostratus*, and also placed *G. clausi*, *G. brasiliensis*, and *G. tenuis* in the genus. Two genera, *Clytemnestra* and *Goniopsyllus*, can be distinguished by their antennule segmentation and by morphological differences in the genital field and the armature of the antenna, maxillule, maxilla, and thoracopods 1 and 2.

Two cosmopolitan species in the family, *Clytemnestra scutellata* and *Goniopsyllus rostratus*, are known from various localities. For instance, *C. scutellata* was reported from near the Gilbert Islands, east of Tuamotu in the Pacific Ocean, and in the South China Sea (Dana 1847). Farran (1936) also recorded *C. scutellata* from the Great Barrier Reef. Most of the records for *C. rostrata* are presently assigned to *Goniopsyllus clausi* rather than *G. rostratus* (Huys & Conroy-Dalton 2000). The distribution of *G. rostratus* is

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동해 울릉분지 북동부지역의 지구물리학적 특성 및 지구조 연구

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A Study on the Geophysical Characteristics and Geological Structure of the Northeastern Part of the Ulleung Basin in the East Sea

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The geophysical characteristics and geological structure of the northeastern part of the Ulleung Basin were investigated from interpretation of geophysical data including gravity, magnetic, bathymetry data, and seismic data. Relative correction was applied to reduce errors between sets of gravity and magnetic data, obtained at different times and by different equipments. The northeastern margin of the Ulleung Basin is characterized by complicated morphology consisting of volcanic islands (Ulleungdo and Dokdo), the Dokdo seamounts, and a deep pathway (Korea Gap) with the maximum depth of -2500 m. Free-air anomalies generally reflect the topography effect. There are high anomalies over the volcanic islands and the Dokdo seamounts. Except local anomalous zones of volcanic edifices, the gradual increasing of the Bouguer anomalies from the Oki Bank toward the Ulleung Basin and the Korea Gap is related to higher mantle level and denser crust in the central of the Ulleung Basin. Complicated magnetic anomalies in the study area occur over volcanic islands and seamounts. The power spectrum analysis of the Bouguer anomalies indicates that the depth to the averaged Moho discontinuity is -16.1 km. The inversion of the Bouguer anomaly shows that the Moho depth under the Korea Gap is about -16~-17 km and the Moho depths towards the Oki Bank and the northwestern part of Ulleung Island are gradually deeper. The inversion result suggests that the crust of the Ulleung Basin is thicker than normal oceanic crusts. The result of 2D gravity modeling is in good agreement with the results of the power spectrum analysis and the inversion of the Bouguer anomaly. Except the volcanic edifices, the main pattern of magnetization distribution shows lineation in NE-SW. The inversion results, the 2D gravity modeling, and the magnetization distribution support possible NE-SW spreading of the Ulleung Basin proposed by other papers.

Key words : Ulleung Basin, gravity, magnetic, Moho depth, 2D gravity modeling, magnetization distribution, spreading center

본 연구에서는 울릉분지 북동부지역에서 획득한 중력, 자력, 수심자료 등 지구물리자료를 이용하여 이 지역의 지구물리학적 특성 및 지구조를 고찰하고자 하였다. 각각의 자료는 조사기간 및 사용 장비의 차이로 인하여 자료간의 오차가 나타나는데 상대적인 보정을 실시한 후 통합하였다. 울릉분지 북동부에 위치한 연구지역은 울릉도와 독도해산들, 그리고 한국해저간곡으로 이루어져 있으며 최대수심은 약 -2500 m를 보인다. 후리에어이상은 지형의 영향을 잘 반영하며 전체적으로는 울릉도와 독도 및 해산들에서 높은 값을 보인다. 부계이상은 해산들에 의한 국지적인 이상치를 보이지만 한국해저간곡 및 울릉분지를 중심으로 고이상을 보이는데 이는 맨틀상승에 의한 영향이라 판단된다. 자기이상도를 살펴보면 화산체(섬과 해산들)들을 중심으로 복잡한 자기이상대를 나타낸다. 연구지역 부계중력이상의 파워스펙트럼 분석으로부터 계산된 연구지역 모호면의 평균 깊이는 -16.1 km로 나타났다. 이 파워스펙트럼 분석을 이용하여 모호면 심도 역산을 수행하였다. 이 역산법으로 계산된 모호면의 심도는 한국해저간곡지역에서 -16~-17 km 정도이

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독도 주변해역에 대한 표층퇴적물 분포특성과 해저지형

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요 약

독도 주변해역 일대의 표층퇴적물 분포특성과 해저지형, 그리고 표층퇴적물과 지형특성의 관련성을 파악하기 위해 독도 주변해역에서 표층퇴적물을 채취했으며 다중빔 음향측심기를 이용하여 해저지형을 조사하였다. 독도 주변 표층퇴적물에 대한 퇴적학적 조사결과 퇴적물 특성은 수심과 관련되어 다양한 특성을 보인다. 퇴적물을 구성하는 성분상으로는 독도 주변해역 수심 200 m 이내에서는 쇄설성 퇴적물과 역질크기의 탄산염 퇴적물을 다량으로 함유하는 특징을 보인다. 유기탄소 함량은 수심증가에 따라 증가하는 경향을, 탄산염 함량은 수심증가에 따라 감소하는 경향을 보이고 있다. 유기탄소 함량은 대체적으로 2% 이내의 범위에 있으며 탄산염 함량은 최대 약 50% 에서 최소 3% 까지 다양하게 나타난다. 유기물의 기원과 특성을 지시하는 C/N 비는 대체적으로 현장에서 생물활동에 의해 생성된 유기물임을 지시하고 있으며 수심증가에 따라 감소하는 탄산염 함량은 탄산염 생산과 용해(dissolution), 그리고 육성기원 물질의 유입에 의한 희석(dilution)효과로 해석된다. 입도분석에 의한 퇴적상은 수심에 따라 다양한 퇴적상을 보이나 전체적으로는 세 개의 퇴적상(sedimentary facies)으로 분류될 수 있었다. 퇴적물 입도는 수심증가에 따라 세립해지는 경향을 보이고 있으며 유기탄소의 함량간에는 양의 상관관계를 보이고 있다. 그러나 일부 몇몇 정점에서는 수심과는 무관한 퇴적상을 보이고 있어 독도 주변 해저지형 특성이나 이와 관련된 층층수의 이동 등과도 관련있는 것으로 판단된다. 다중빔 음향측심기에 의해 획득된 해저지형을 살펴보면, 독도 주변 해저지형은 계단형태의 해안단구(marine terrace)형태를 반복하면서 독도쪽으로 수심이 감소하는 것으로 나타났다. 이러한 해안단구의 출현은 과거 해수면이 상승하면서 자연스럽게 형성된 것으로 해석되었으며 수심에 따라 달라진 해안단구형 해저지형은 주변의 퇴적환경에도 영향을 미친 것으로 판단된다. 표층퇴적물에 대한 퇴적학적 연구결과 독도 주변해역의 표층퇴적물 특성과 분포는 수심 및 지형특성과 밀접한 관계를 보이고 있는 것으로 나타났다.

주요어: 독도, 표층퇴적물, 퇴적상, 해저지형

Sangmin Hyun, Chang Hwan Kim, Hyeong-Tae Jou, Jin Kyung Kim and Chan Hong Park, 2010, Characteristics of surface sediments distribution and submarine topography around Dokdo Island, Korea. *Journal of the Geological Society of Korea*. v. 46, no. 6, p. 647-660

ABSTRACT: To understand the characteristics of surface sediments distribution and submarine topography and their relationship around the Dokdo, surface sediments were collected and submarine topographic features were investigated using multibeam echo-sounder. Sedimentological study of surface sediments indicates that the composition of surface sediments are clearly associated with water depth and shows various characteristics. The sediments deposited shallower than 200 m in water depth contains pyroclastic components and gravel-sized carbonate constituents. Organic carbon contents tend to increase with water depth, whereas carbonate contents decrease. Organic carbon contents range within ~2%, and carbonate contents vary within 3~50%. C/N ratios of organic matters indicate that the organic matters were originated from *in situ* biological production. Decreasing carbonate contents with depth were interpreted as a result of carbonate dissolution and dilution by terrigenous supply. Sedimentary facies based on grain size can be divided into three facies even though they are variable with water depth. Sediment grain size becomes finer with water depth, and shows positive correlation with organic carbon content. However, some parts of sedimentary facies do not show any relationship with water depth, indicating that

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