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LATRUNCULIA OPARINAE N. SP. (DEMOSPONGIAE, POECILOSCLERIDA, LATRUNCULIIDAE) FROM THE KURILE ISLANDS, SEA OF OKHOTSK, RUSSIA

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ABSTRACT

A new species of *Latrunculia* with unusual properties is described from Kurile Island, Sea of Okhotsk, Russia. Although this species is structurally very similar in choanosomal architecture to all known species of *Latrunculia*, it differs from other *Latrunculia* in both the structure of the anisodiscorhabd microscleres and by possessing terminally spined styles. It is the first *Latrunculia* to be described with terminally spined anisostyles. Furthermore, the characteristic anisodiscorhabds of this new species closely resemble microfossils found in Oligocene deposits from New Zealand. The similarity between the new species and the fossil New Zealand species, along with the strong differences in spiculation from other *Latrunculia* species, suggest a Tethyan affinity for this new species.

Key words: *Latrunculia*, new species, Latrunculiidae, Porifera, Demospongiae, Russia

INTRODUCTION

Species of the genus *Latrunculia* Du Bocage, 1869, have always been difficult to differentiate clearly (Kelly-Borges & Vacelet, 1995) and the identity of the genus *Latrunculia* has been called into question at different times since 1879 (Carter, 1879, 1881; Ridley & Dendy, 1887; Kirkpatrick, 1900, 1903, 1908; Stephens, 1914; Hentschel, 1914; Dendy, 1921; Topsent, 1922; De Laubenfels, 1936; Bergquist, 1961; Lévi & Lévi, 1973). The dispute on what constitutes the genus *Latrunculia* inevitably resulted in a confused history of the family Latrunculiidae Topsent, 1922, in not only what constitutes this family complex but also its position within the classification system of the Demospongiae.

Recent revisions of both the family Latrunculiidae (Samaai & Kelly, 2002) and of the genus *Latrunculia* (Samaai, 2002) have clearly defined the boundaries of this problematic taxon by providing new insight into the taxonomy of these

assemblages. As it is currently perceived the family (and genus) is monophyletic and is considered to be one of the most cohesive of the Demospongiae families (and genera), consisting of *Latrunculia*, *Strongylodesma*, *Sceptrella* and a new South African genus (Samaai & Kelly, 2002; Samaai, 2002). Genera previously considered latrunculids (*Negombata*, *Sigmosceptrella*, *Diacarnus*, *Podospongia*) were all transferred to the family Podospongiidae (Samaai & Kelly, 2002; Kelly & Samaai, 2002).

The genus *Latrunculia* Du Bocage comprises of 36 nominal species, 11 of which are presently considered valid (Samaai, 2002). Latrunculiidae Topsent is characterised primarily by the possession of a dense accumulation of acanthose discorhabds or 'chessman' spicules, disposed in a perpendicular palisade in the outer ectosome, areolate pore fields, and short fistular oscules on the sponge surface. *Latrunculia*, the type genus, on the other hand is easily recognised on account of its unique synapomorphy of anisodiscorhabd microscleres (Kelly-Borges & Vacelet, 1995; Samaai & Kelly, 2002) and generally massive sponges with special pore areas and oscules encircled by elevated collars (Kelly-Borges & Vacelet, 1995; Miller et al., 2001; Samaai & Kelly, 2002; Samaai, 2002; Alvarez et al., 2002).

The discovery of this new species contributed to our understanding of the diversity and disparity of the genus and also shed some light on the family's position within the class Demospongiae. The location of this new species, 49°N, also extends the distribution of the genus further north and west within the North Pacific Ocean. In this paper we describe this new species and compare it with other recent species of the Northern Hemisphere and with fossil species from the Oligocene.

MATERIALS AND METHODS

The holotype studied and listed below is housed in the collection of the Zoological Museum Amsterdam (ZMA Por. 10780) and was collected in 1988 by one of the authors on board the USSR Research vessel 'Akademic Oparin' in the Sea of Okhotsk, northwestern Pacific Ocean (Russia) at a depth of 202 m. Paratypes are housed in the sponge collection of Pacific Institute of Bioorganic Chemistry (PIBOC), Vladivostok, Russia. Histological techniques for light and scanning electron microscopy (SEM) follow Hooper (1996). Spicule morphometric analysis was conducted using a light microscope and camera lucida, with reference to a template drawn from a stage micrometer. Spicule measurements are based on 20 spicules of each spicule category and pertain to maximum dimensions, denoted as range (and mean) of length and width. Spicule measurements are in micrometers.

SYSTEMATIC DESCRIPTION

Order Poecilosclerida Topsent
Suborder Latrunculina (Kelly & Samaai, 2002)
Family Latrunculiidae Topsent

Genus *Latrunculia* Du Bocage

Latrunculia Du Bocage, 1869

TYPE SPECIES. - *Latrunculia cratera* Du Bocage 1869: 161, Pl. XI, fig. 2, by monotypy (lost).

REPRESENTATIVE SPECIES. - *Latrunculia bocagei* Ridley & Dendy, 1887: 238, Pl. XLIV fig. 1, Pl. XLV, figs 8, 8a.

DIAGNOSIS (taken from Samaai & Kelly, 2002).- Encrusting to massive oval-shaped sponge with raised trumpet-like or mammiform oscular fistules and areolate pore fields; surface velvety to the touch; texture is very cakey, dense but compressible. Colour in life deep brownish black or dark green, sometimes tinged with deep blue; in preserved condition specimens always retain their dark pigmentation. The choanosomal architecture consists of monactinal or rarely diactinal spicules arranged in an irregular polygonal large-meshed reticulation formed by wispy tracts of spicules, which lack spongin reinforcement. There is no distinction between primary and secondary tracts. The ectosomal skeleton is a tangential layer of choanosomal megascleres, being somewhat plumose at the base of the ectosome. Megascleres are typically smooth and sinuous, occasionally polytylote anisostyles to which terminally spined styles or diactinal spicules may be added. Microscleres are anisodiscorhabds or aci-

culodiscorhabds to which large amphiaster-like spicules and acanthomicroxeas may be added in some species. Microscleres are disposed in a palisade in the outer ectosome. Sponges reproduce by vivipary, where known. *Latrunculia* spp. contain the pyrroloquilonine alkaloids discorhabdins and their derivatives.

Latrunculia oparinae n. sp.
Figs. 1A-G

MATERIAL. - Holotype: ZMA Por. 10780 (cross ref. Ts 439), Kurile Islands, Is. Onekotan, Russia, 49°22.1'N 154° 09.5'E, 202 m depth, 29-VII-1988, coll. V.B. Krasokhin (7 Cruise USSR RV 'Akademic Oparin', st. 66, dredge).
Paratypes: PIBOC O2-28-1, Kurile Islands, Is. Urup, Russia, 45°42.5'N 149°56.0'E, 127 m depth, 28-VII-1986, coll. V.B. Krasokhin (2 Cruise USSR RV 'Akademic Oparin', st. 28, dredge). PIBOC O17-126-2, Kurile Islands, Is. Traps rocks, Russia, 48°27.8'N 153°50.8'E, 176 m depth, 9-VII-1993, coll. V.B. Krasokhin, (17 Cruise Russian RV 'Akademic Oparin', st. 21, dredge).

DESCRIPTION. - Gross morphology: small, globular sponge, 3 x 3 x 1.5 cm diameter (Fig. 1A). Surface is smooth with two raised cylindrical-shaped oscules at the apex, 6 mm high, 4 mm wide and numerous small volcano-shaped oscules (towards the base and center of sponge), with no visible opening at the apex, 1 x 2 x 1 mm in diameter. Numerous large thin mammiform areolate pore fields, inverted at apex, 6 mm high, possess a distinct fleshy porel membrane. Ectosome thin, pergameneous, easily separable from the underlying choanosome. Texture firm and resilient. Colour in life dirty dark green; in preservative, choanosome dark brown and ectosome light brown.

Skeleton: the choanosomal skeleton is a firm, dense, well developed but irregular polygonal reticulation formed by wispy tracts of terminally spined anisostyles, with no distinction between the primary and secondary tracts (Fig. 1B). These tracts range in width from 273-455 μm in thickness, but form meshes that are 550 μm wide. Towards the surface these spicules tend to be vertically arranged. Scattered throughout the choanosome, between the tracts, are numerous anisodiscorhabds and abundant interstitial megascleres. The surface of the ectosome is lined with an erect layer of single non-interlocking anisodiscorhabds (Fig. 1C.1 and C.2). Beneath the discorhabds, in the ectosome, is a thick paratangential-tangential layer of densely interlocking megascleres, approximately 320 μm wide (Figs. 1C.1 and C.2).

Spicules: megascleres (Fig. 1D, E): anisostyles are terminally spined, centrally thickened, fusiform and sinuous, 435 (400-464) x 16 (16) μm. Microscleres (Fig. 1F, G): anisodiscorhabds, the manubrium is a short capitate vertically arranged spinose base followed immediately by the median whorl. The median whorl is circular, flat and horizontally arranged, 28 μm in diameter, similar in diameter to the subsidiary whorl, which is more or less perpendicular to the shaft. The whorls are deeply notched along the rim and divided into four segments, each possessing denticulate margins of 2-4 spines that are themselves microspined. The spines of the apical whorl are slanted upwards ending in a crown-like tuft of spined projections, 40 (35-44) x 7 (7) μm.

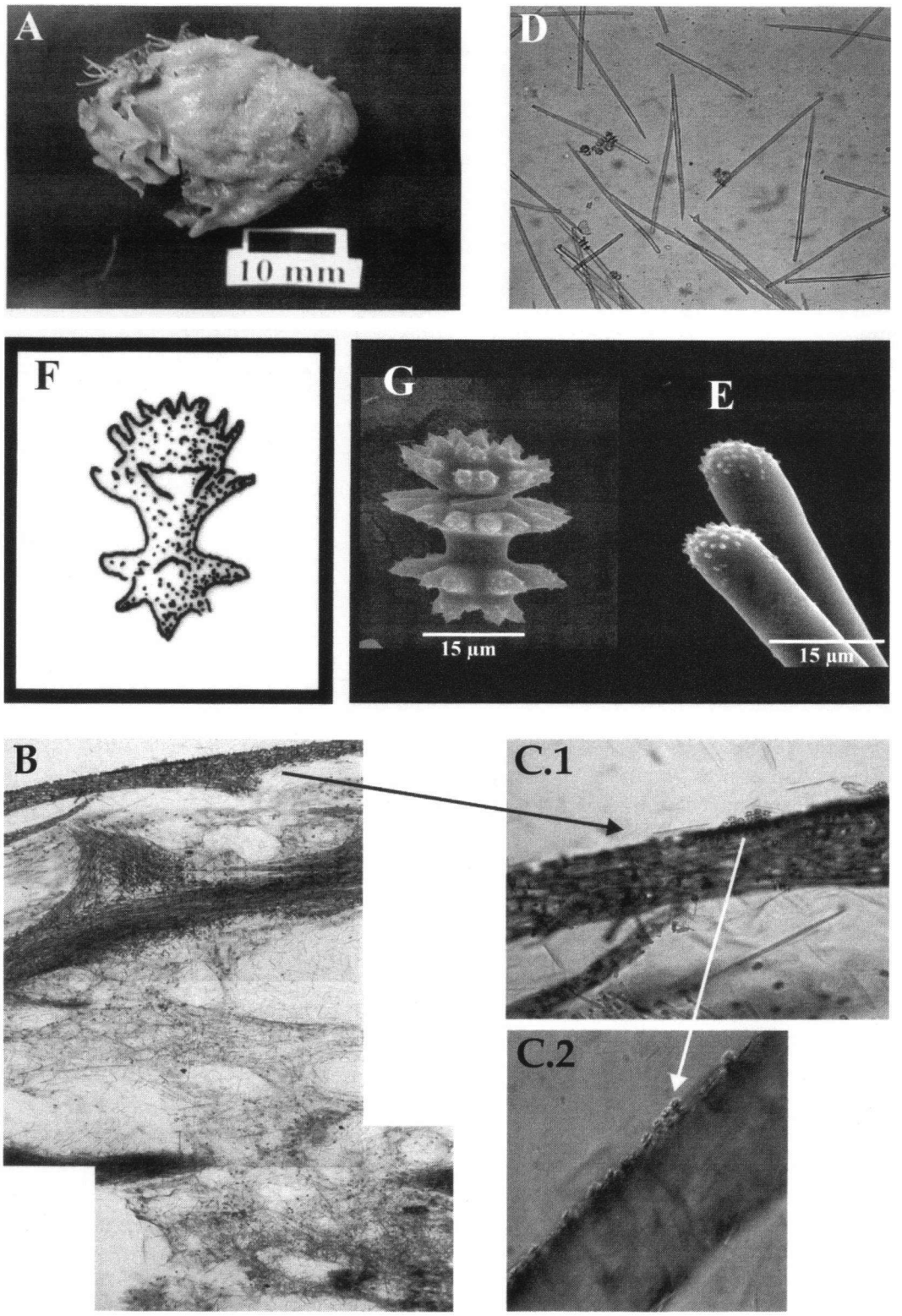
SUBSTRATUM AND DEPTH RANGE. - Gravel with sand, 127-202 m depth.

GEOGRAPHIC DISTRIBUTION (Fig. 2). - Only known from middle part of the Kurile Islands, Sea of Okhotsk, Russia.

CHEMISTRY. - The sponge contains biologically active pyrroloquinoline alkaloids, discorhabdins A that may have pharmacological potential (Popov et al., 1991)

ETYMOLOGY. - Named after the research vessel, 'Akademic Oparin', from which the material was collected off Kurile Islands.

REMARKS. - *Latrunculia* has an antiboreal distribution with predominant centres of distribution in the Southern Hemisphere and cold temperate waters but extends into the subtropical and western boreal Pacific region (Fig. 2) (Samaai, 2002). *Latrunculia oparinae* n. sp. extends the furthest north for any member of the genus, 49°N, although other members such as *L. cratera* Du Bocage, 1869 (Cape Verde Islands), *L. citharistae* Vacelet, 1969 (Mediterranean Sea), *L. ikematsui* Tanita, 1968 (Japan), and *L. multirotalis* Topsent, 1905 (Azores) are also found in the Northern



Figs. 1A-G. *Latrunculia oparinae*. A, holotype. B, C.1 and C.2, photomicrographs of skeletal architecture made from a slide of holotype (magnification: B = 4x, C.1 = 10x, C.2 = 20x). D, photomicrograph of megascleres (magnification: 10x). E, SEM photo of megasclere showing spinations. F, drawing of microsclere made from a slide of holotype (magnification: 40x). G, SEM photo of microsclere spicule made from holotype.

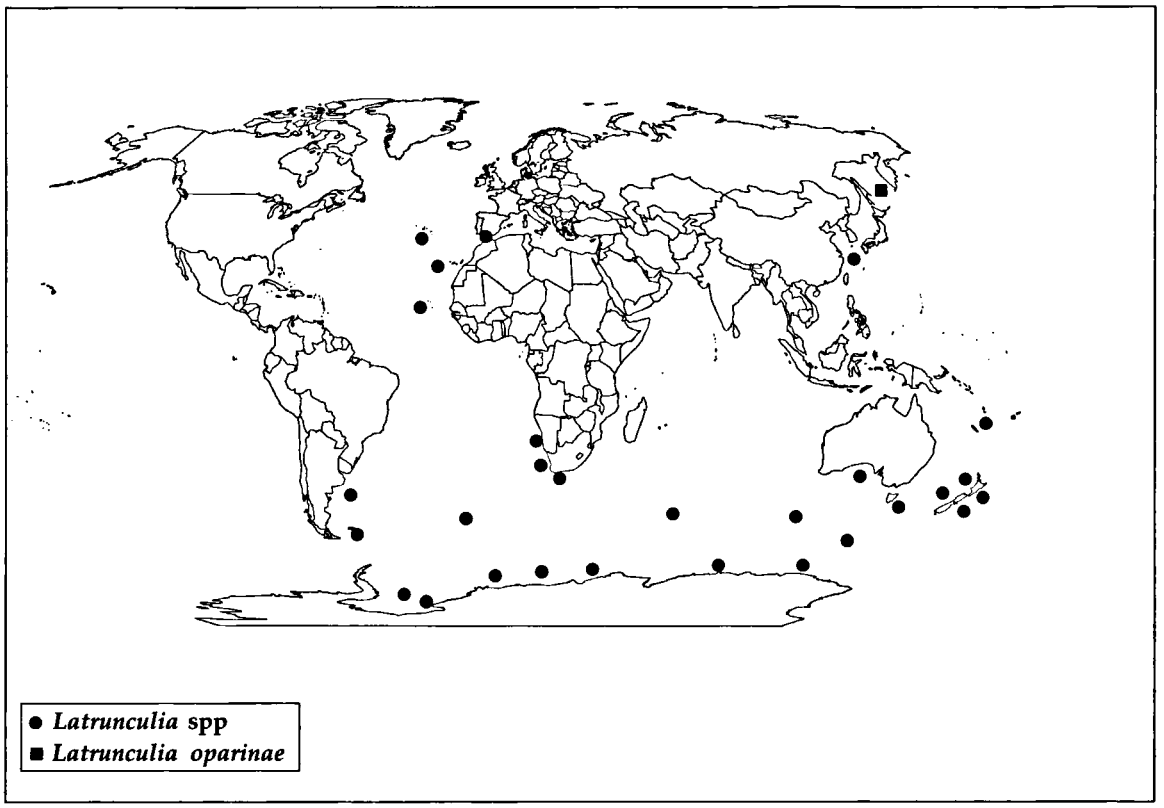


Fig. 2. Worldwide distribution of *Latrunculia* species and *Latrunculia oparinae* n. sp. Division of regional faunas based on the arbitrary biogeographical areas summarised in van Soest (1994).

Hemisphere. Other previously known Northern Hemisphere species such as *Latrunculia insignis* Topsent 1895, *L. triloba* Thiele, 1903, *L. tricincta* Hentschel 1929, and *L. insignis* var. *regularis* Topsent, 1895 were all transferred to the genus *Sceptrella* (family Latrunculiidae), whereas *L. biannulata* Topsent 1897, *L. carlinae* Boury-Esnault & Van Beveren, 1982, and *L. clavigera* Kirkpatrick, 1900 were all transferred to the genus *Sigmosceptrella*, and *L. normani* Stephens, 1915 to the genus *Podospongia* in the family Podospongiidae (Samaai & Kelly, 2002; Kelly & Samaai, 2002; Samaai, 2002).

Latrunculia oparinae n. sp. is the only species in this genus that possesses terminally spined anisostyles (Samaai, 2002), making it unique among the species previously described within *Latrunculia*. Structurally the anisodiscorhabds differ considerably in form and structure from any other known species of *Latrunculia*, especially those found to occur in the Northern Hemisphere. For example, the anisodiscorhabds of *L. citharistae* are slender, and possess two discs of subequal whorls, equally spaced on the shaft, with an apical whorl that ends in a crown-like tuft of dichotomous acute spined projections. *L. multirotalis* has a long, thick anisodiscorhabd, with multiple discs on the shaft, and an apical whorl resembling a small coup that is edged with teeth and blunt terminally spined spines. Conversely, *L. ikematsui* has an anisodiscorhabd typical to the *'brevis'* complex found within *Latrunculia* (see Samaai, 2002). The species described here is not conspecific with any of the Northern Hemisphere *Latrunculia* known to date, and are considered a unique entity within the genus *Latrunculia*.

Wiedenmayer (1994) noted that the genus *Latrunculia* was represented in the early Cretaceous and late Eocene - early Oligocene deposits. Spicule microfossils similar to those found in *Latrunculia oparinae* n. sp. were also

recorded from the Oligocene deposits of Oamaru (east coast of South Island of New Zealand (Hinde & Holmes, 1892; Wiedenmayer, 1994). The similarity between the fossil Pacific species (Oligocene period) and the Recent northwestern Pacific one, along with the dissimilarities in spicular structures, to that of other *Latrunculia* spp., suggests that this new species may be a possible remnant of a Tethyan fauna.

Several points of interest are raised when one considers the occurrence of terminally spined styles of this sponge. All members of the genus *Latrunculia* have primary spicules without spinations on the apex and the occurrence of this character could be a rare event in the evolution of this genus or it could be postulated as a retention of an ancestral character state. However, the significance of the presence of the terminally spined styles within this species must be appreciated in the context of the genus and family's higher order relationships; for certainly the presence or absence of a rare character within such a stable genus may have great taxonomic significance. Terminally spined spicules are however, not restricted to the genus *Latrunculia* (family Latrunculiidae), because faint and hard spinations were also observed in species of the genus *Strongylodesma* (family Latrunculiidae) (Samaai, 2002). Terminally spined styles are a common and widespread character in several poecilosclerid families (Hajdu et al, 1994; Wiedenmayer, 1994; Cristobo & Urgorri, 2001), and we believe that the occurrence/presence of terminally spined styles in a species of *Latrunculia* suggest further poecilosclerid affinities for this genus (and family) (see also Samaai, 2002; Samaai & Kelly, 2002).

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