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Description of a new species of freshwater sponge *Corvospongilla* Annandale (Spongillidae) from Diyala River, Iraq

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Abstract

The first finding of the genus *Corvospongilla* is reported from Southwestern Asia.*Corvospongilla mesopotamica* nov.sp. is described from the river Diyala, Iraq .A diagnostic characters to the present species (*C.mesopotamica* Annandale) is provided with discussion on its morphology, geographic range and habitat.

Introduction

The geographic range of sponges families is quite well known, but our knowledge is very poor on some regions, as in the case of western and central Asia. A recent biodiversity survey within the eastern catchment basin of the Tigris in east Mesopotamia (Saadalla, 1998) resulted in the discovery of a new species of the genus *Corvoponsgilla* Annandale, 1911 from the river Diyala, the easternmost of the main tributaries of the river Tigris. The taxonomic status and the geographic range of the new species are discussed.

Materials and Methods

The species under investigation lives in eutrophic waters and colonized the dam and rocks of the Himreen reservoir ,Iraq (34º 7’ N ,44º 8’ E) , in the littoral area subjected to periodic dry up ,sponges are aestivant and able to survive long term exposure to strong solar radiation and hot air (ca. 40 º C in august) . Sponges were dry at the time of collection. Sponge bodies were dissected and investigated both by Light Microscopy (LM) and Scanning Electron Microscopy (SEM). Slides of spicules from the sponge surface, choanosomal skeleton, basal area and gemmules were prepared by boiling sponge fragments in nitric acid according to Edmondson (1959), Manconi & Pronzato (2000, 2002) and Pronzato & Manconi (2001). Cross sections of several gemmules were made by hand under stereomicroscope .Fragments of the sponge surface and skeleton, cleaned spicules, entire gemmules and their sections mounted on stubs, sputter coated with gold and investigated under scanning electron microscope (SEM) Zeiss DMS 962. Measurements were made on 50 of each spicular type using light microscopy (LM). Specimens registered in natural history museums (Holotype Museo Civico di Storia Natural (G.Doris) Genova MSNG51766.

Results and Discussion

Taxonomic Account

Order: Haploscleridae Topsent, 1928.
Suborder: Spongillina Manconi & Prozanto, 2002.
Family: Spongillidae Gray, 1867.
Genus: *Corvospongilla* Annandale, 1911.
Species: *mesopotamica* nov.sp.

This species is named after the ancient civilization and region of Mesopotamia in Southwestern Asia.

Description

Body Shape: The sponges are characterized by a massive cushion like growth form with rounded lobes. Body of the holotype ca 20×15× 6 cm (Fig. 1). Colour dark grey in dry condition. Consistency in dry condition is rigid, hard and fragile due to the very low amount of spongin in the skeleton. Surface covered by a dermal membrane, is irregular due to the presence of lobes and conules (Fig.1). Conules 0.7 -3mm in height give the sponge a hispid surface is due to the compact arrangement of ectosomal spicules around tips of ascending fibres (Figs.2, 3) .Oscules conspicuous, single or rarely in groups (2-4) with variable size (2-6mm in diameter) irregularly scattered or at the apices of lobes, some oscules show 1-2 superficial radiating canal (Fig.1). The basal spongin plate is notably thick and reinforced by an irregular arrangement of spicules (Fig.5).

Skeleton: Ectosomal skeleton made up smooth strongyles with slightly inflated tips tangentially arranged to form an alveolar network with more or less regular rounded or polygonal meshes 150-200µm in diameter (Fig.2). Choanosomal skeleton is a reticulate alveolate network of thick multispicular (7-15) primary fibres125-350µm in diameter ascending from the basal area to the free sponge surface, where they emerge to form conules (Fig.3, 6). The paucispicular (2-5) secondary fibres are irregularly arranged to form the alveolar meshes (Figs. 2, 3, 4, 5, 6) fibres have extremely scanty spongin covering the spicular surface in a thin layer (Fig.6).

Spicules: Megascleres (Fig. 9, 10) are extremely abundant smooth strongyles (210-291×17-25 µm) with inflated tips (Fig.9), frequent smooth oxeas (176-303 6-23µm) with pointed tips (Fig. 9,10).Less frequent spicules are strongyles granulated mainly at the tips (Fig. 10) and oxeas with granulated surfaces except at the tips (Fig, 10). Strongyles display a very evident axial canal with a peculiar branched shape towards the tips.

Microscleres: Quite abundant, free and scattered in the choanosomal skeleton are of two types. The micropseudobirotules (Fig.7,8), typical of the genus, are characterized

by a smooth shaft (23-46×2-3µm) with pseudorotules (9-18µm in diameter) bearing 3-6 hooks (Fig. 12) . Short strongyles (70-100 × 6-7µm) with large spines at the tips represent a peculiar trait to the species (Fig. 11).

Larvae: Several larvae were scattered in the middle and basal sponge choanosome . The dry status of specimens made it impossible to characterize larval morphology. Larvae were supported by very thin, slender, bent, smooth oxeas (70-110×2-5µm) (Fig. 11).

Gemmules: Very abundant gemmules are distributed throughout the entire body thickness, but mainly in the choanosome and at the sponge basis. LM and SEM observations on gemmules revealed two gemmular morphs. Sessile and free. Sessile hemispherical gemmules are strictly adhering, singly or in groups, exclusively at the sponge basis, partly or totally embedded in the well developed basal spongin plate (Fig. 13). Gemmules are enveloped singly or in groups by gemmular cages (882-1172µm in diameter) made up of dense assemblages of spicules and scanty spongin (Fig. 14). Spicules of the cage are mainly large smooth strongyles with inflated tips resembling the skeletal megascleres , associated with short ,slightly bent strongyles with tubercles at the tips (Fig. 9) , and a dense layer of acanthosrongyles to form a mosaic like wall (Fig . 14) . The cage is easily separable from the surface of the gemmular theca (Fig. 15). The foramen is lateral. The sub oval gemmular theca (636-1000µm in diameter, 36-45µm in thickness) is made up of compact spongin supported by a dense layer of gemmuloscleres tangentially embedded in its deeper part (Fig. 16, 17). Free sub spherical gemmules (Figs. 18-22) occur singly within the skeletal meshes, or they are grouped in cavemous areas scattered through the entire choanosomal skeleton. A spicular cage is absent. The foramen is apical (Fig.19-20).The gemmular theca (360 -580) µm in diameter bears an almost smooth surface with rare spiny oxeas(Fig. 18,22).Cross sections show a trilayered gemmular theca (44 -53µm. thickness) with an outer layer bearing rare acanthostrongyles tangentially arranged (Fig. 22) .The intermediate well developed pneumatic layer with spongin arranged in small chambers is supported by gemmuloscleres more or less tangentially embedded in its deep portion in contact with the inner layer made up of sub layered compact spongin (Fig. 21) . Gemmuloscleres are acanthostrongyles and acanthoxeas (38 -55×4 -10µm.) (Fig. 23).

Diagnosis: *Corvospongilla mesopotamica* nov. sp. is characterized at the level of megascleres by the coexistence of extremely strongyles frequently with inflated tips and less abundant stout smooth oxeas. Less frequent strongyles with tubercles at the tips and oxeas with tubercles except at the tips are also present. Megascleres support the main skeletal network both in alveolate meshes with scanty spongin and in multispicular parallel ascending fibres.Microscleres belong to two types, the micropseudobirotules typical of the genus and short strongyles with large spines at the tips, a triat exclusive to this species. Gemmules belong to two morphs free and sessile. A gemmular cage of short strongyles with tubercled tips protects sessile gemmules. Gemmuloscleres are short spiny strongyles and oxeas.

The new species of *Corvospongilla*, here described from eastern catchment basin of the river Tigris, represents the first report in western palaearctic region and reduces the disjunction in the geographic range of the genus (Penny and Racek, 1968).

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وصف لنوع جديد من اسفنج المياه العذبة *Corvospongilla* Annandale (Spongillidae) في نهر ديالى / العراق

حسن علي أكبر سعدالله

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المستخلص

يمثل البحث الحالي أول اكتشاف أو تسجيل لنوع من الاسفنج يعود الى الجنس *Corvospongilla* في جنوب غرب اسيا. عثر على النوع الجديد الذي أعطي الاسم العلمي *Corvospongilla mesopotamica* nov.sp. في نهر ديالى/ العراق. تم االتطرق الى الصفات التشخيصية ووصف المظهر الخارجي والتوزيع الجغرافي علاوة على الموطن (التواجد) لهذا النوع في متن البحث.

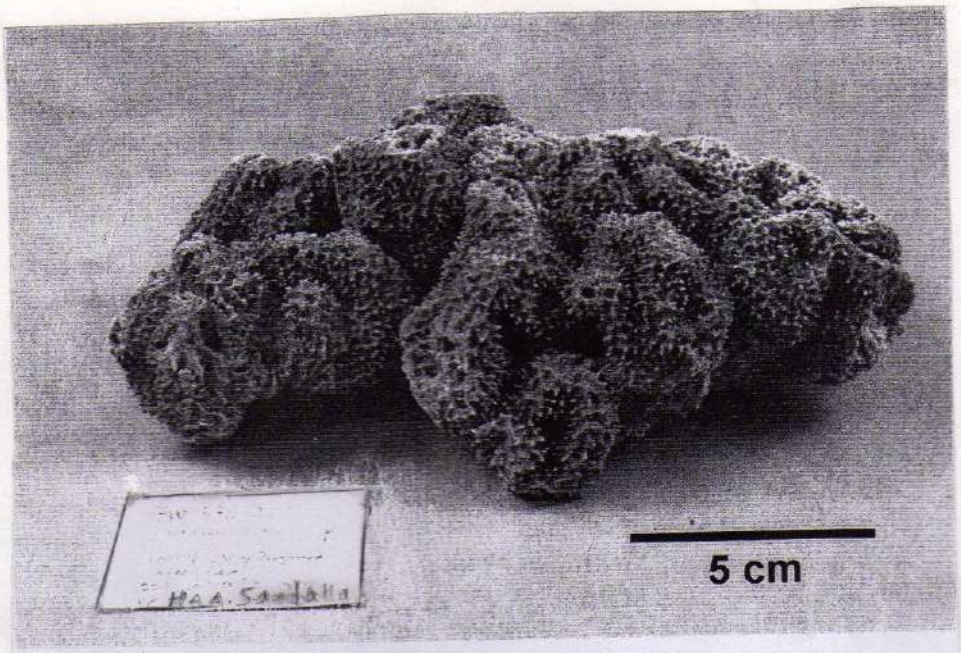
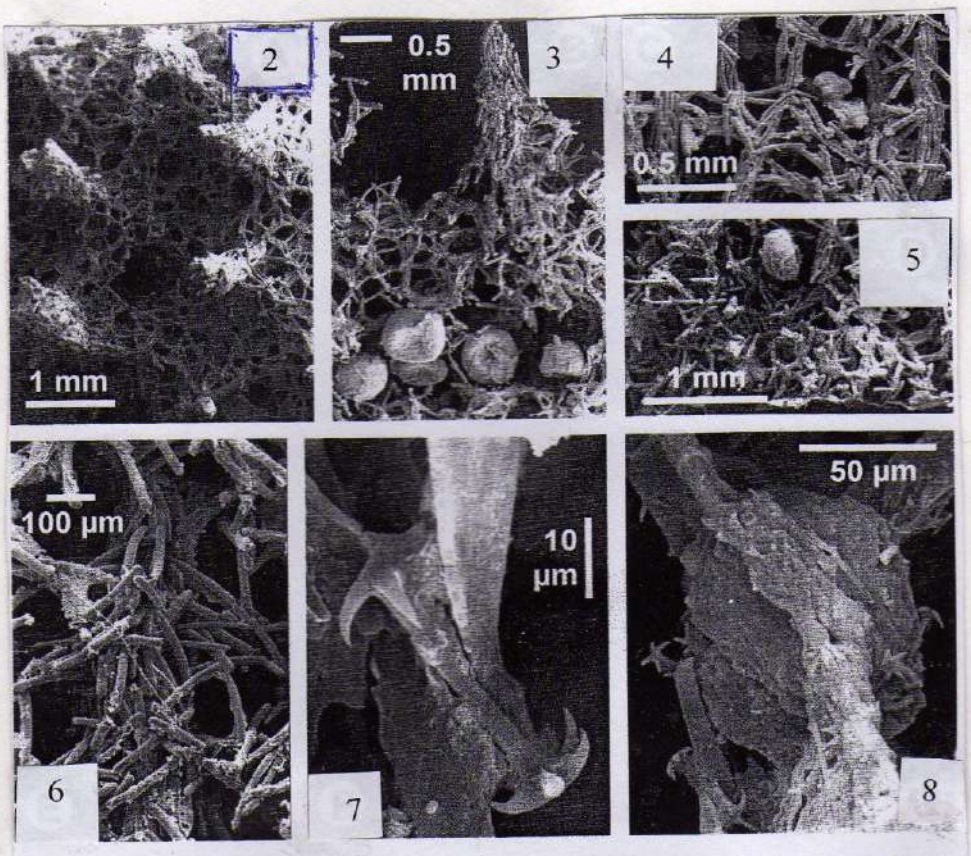


Fig. 1. *Corvospongilla mesopotamica* nov. sp. Holotype MSNG51766.



Corvospongilla mesopotamica nov. sp. (figs.2-8) Micrographs of skeletal trait

Fig.2. Conules surface with tangential ectosomal skeleton (top view).
Fig.3. Lateral view of superficial skeleton (cross section) with conule and a group of gemmules in the choanosome.
Fig.4. Alveolate reticulate skeletal network with main parallel ascending fibreswith connecting tracts.
Fig.5. Irregular skeletalnetwork(cross section)with ascending fibresarising at the level of the basal spongin plate(bottom).
Fig.6. Details of a plurispicular ascending fibre with connecting tracts.
Figs.7, 8. Micropseudobirotulate microscleres scattered singly or in groups in the choanosomal

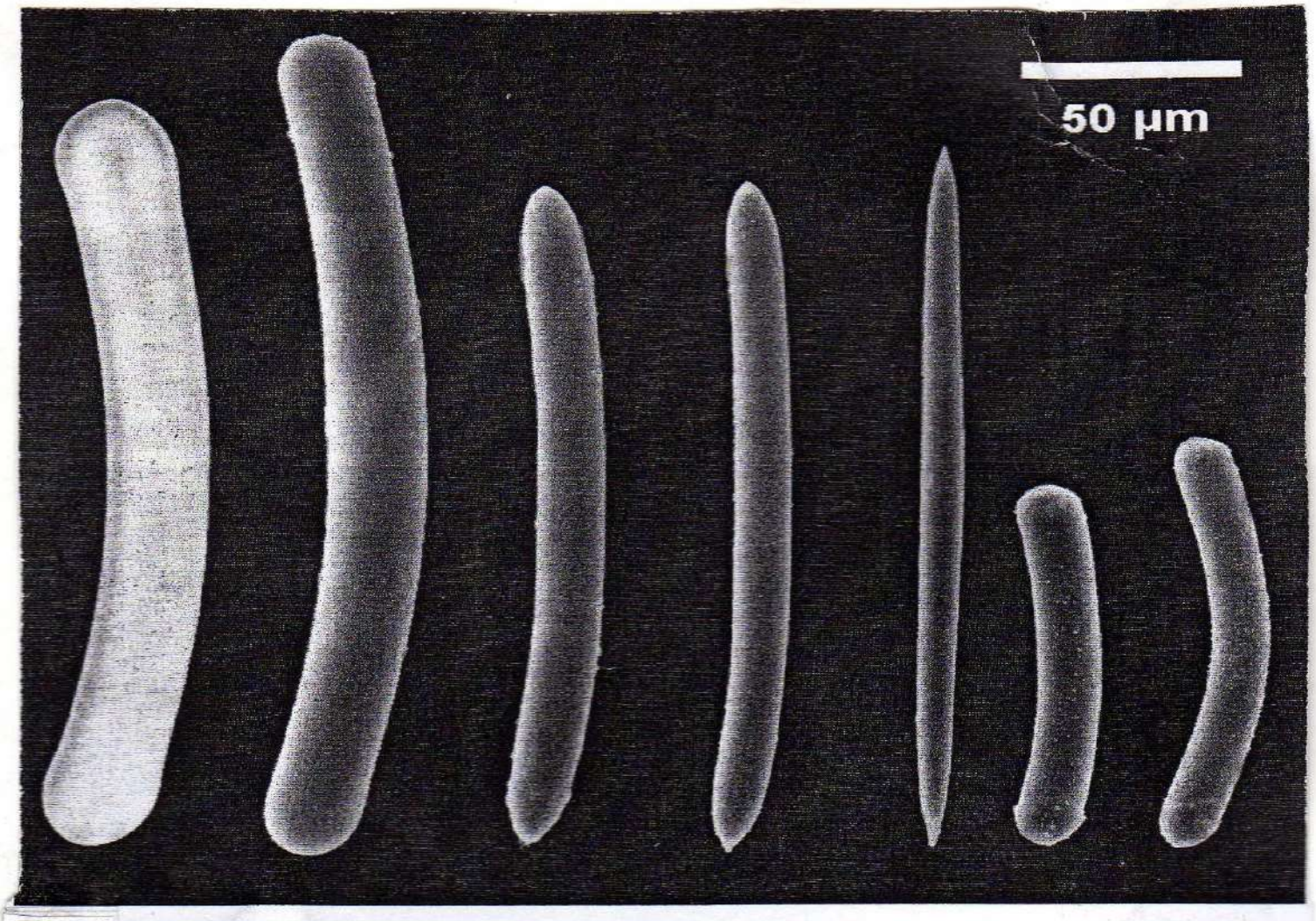
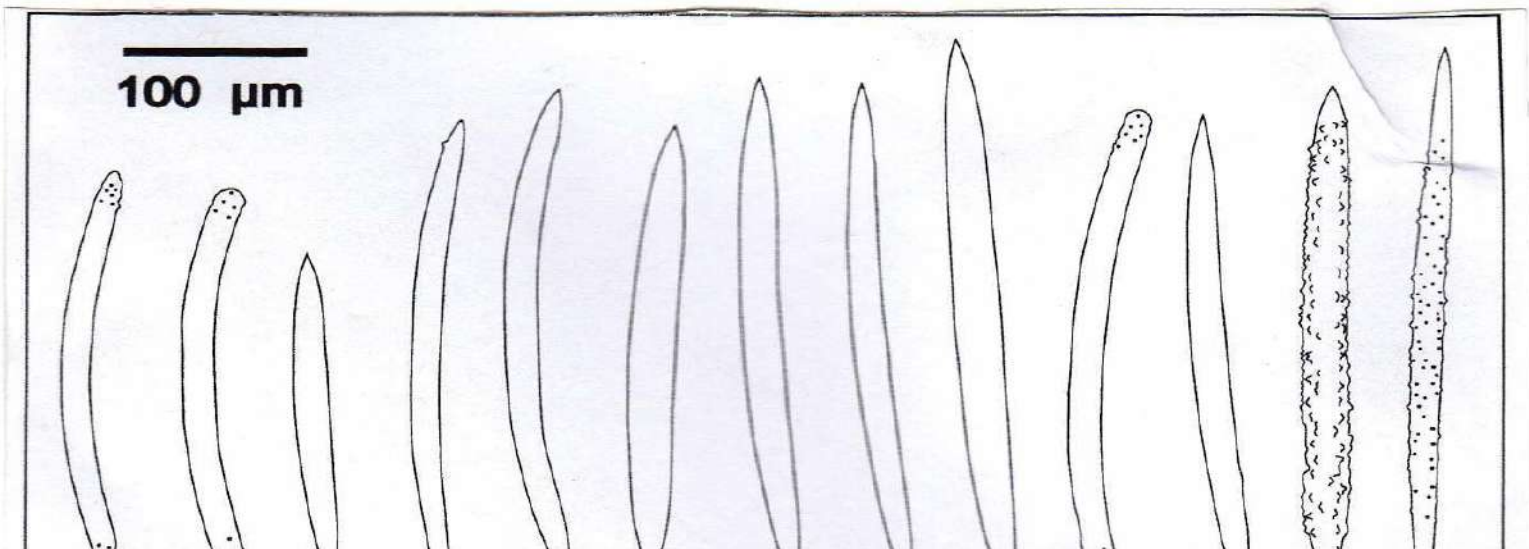


Fig.9 *Corvospongilla mesopotamica* nov. sp. Micrographs (SEM) of skeletal megascleres. strongyles and oxeas; on the right are spicules of the gemmular cage short strongyles with granulated tips.



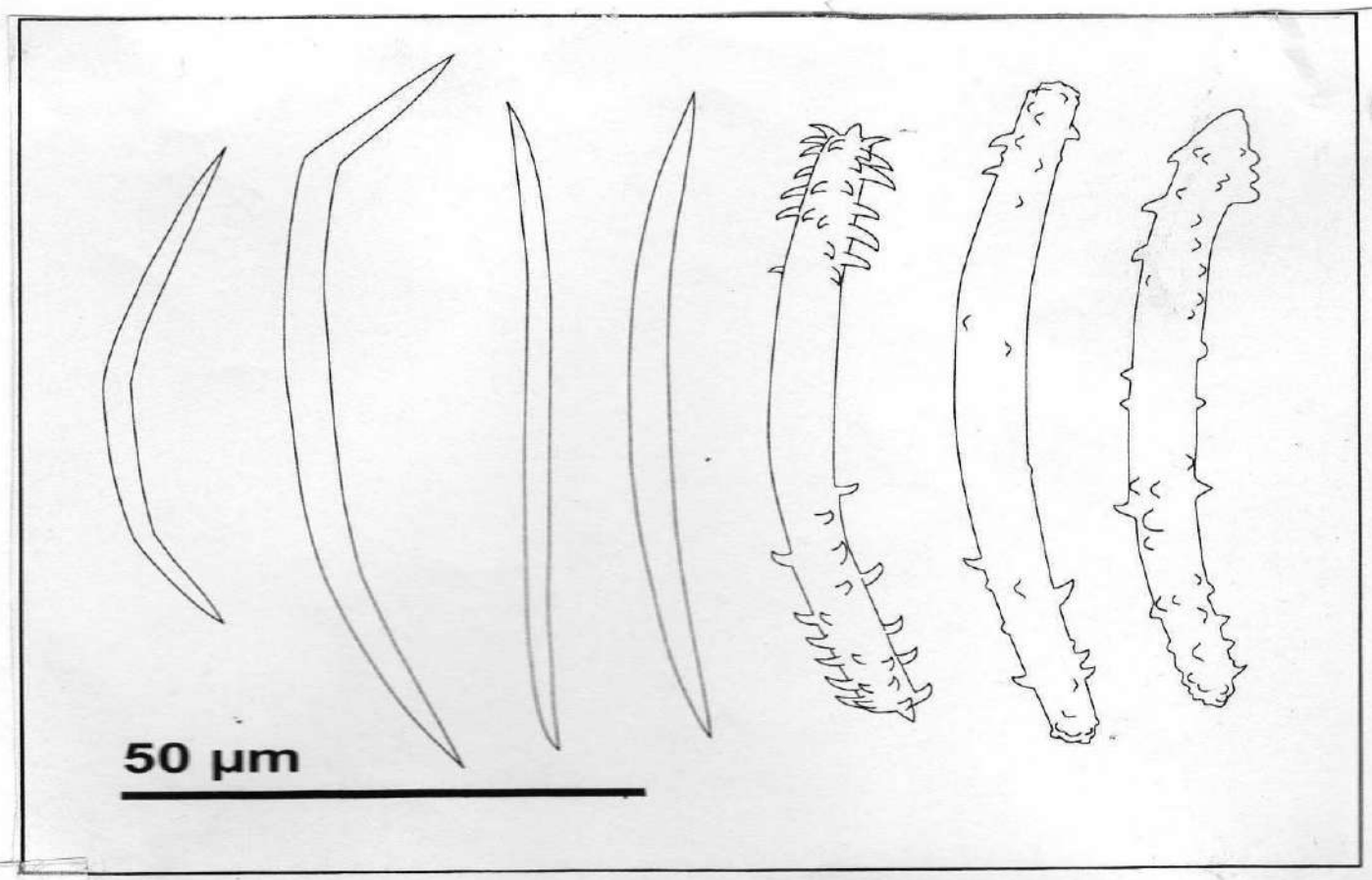


Fig.11. . *Corvospongilla mesopotamica* nov. sp. Drawings from SEM images. Microstrongyles with spiny tips as microscleres (right). Slim smooth microxeas as larval spicules (left).

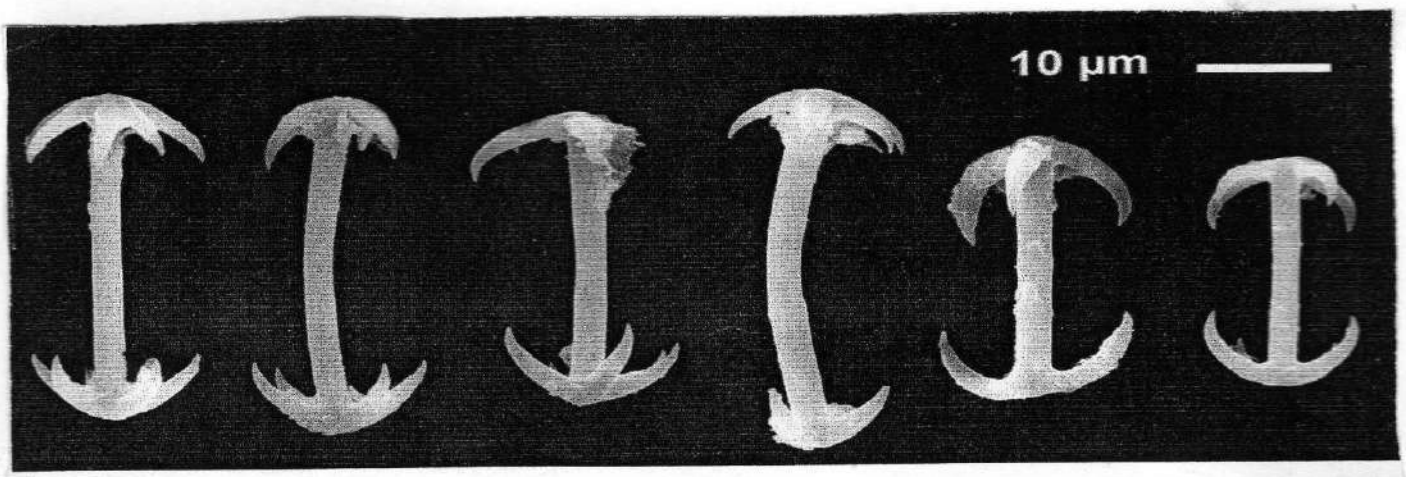
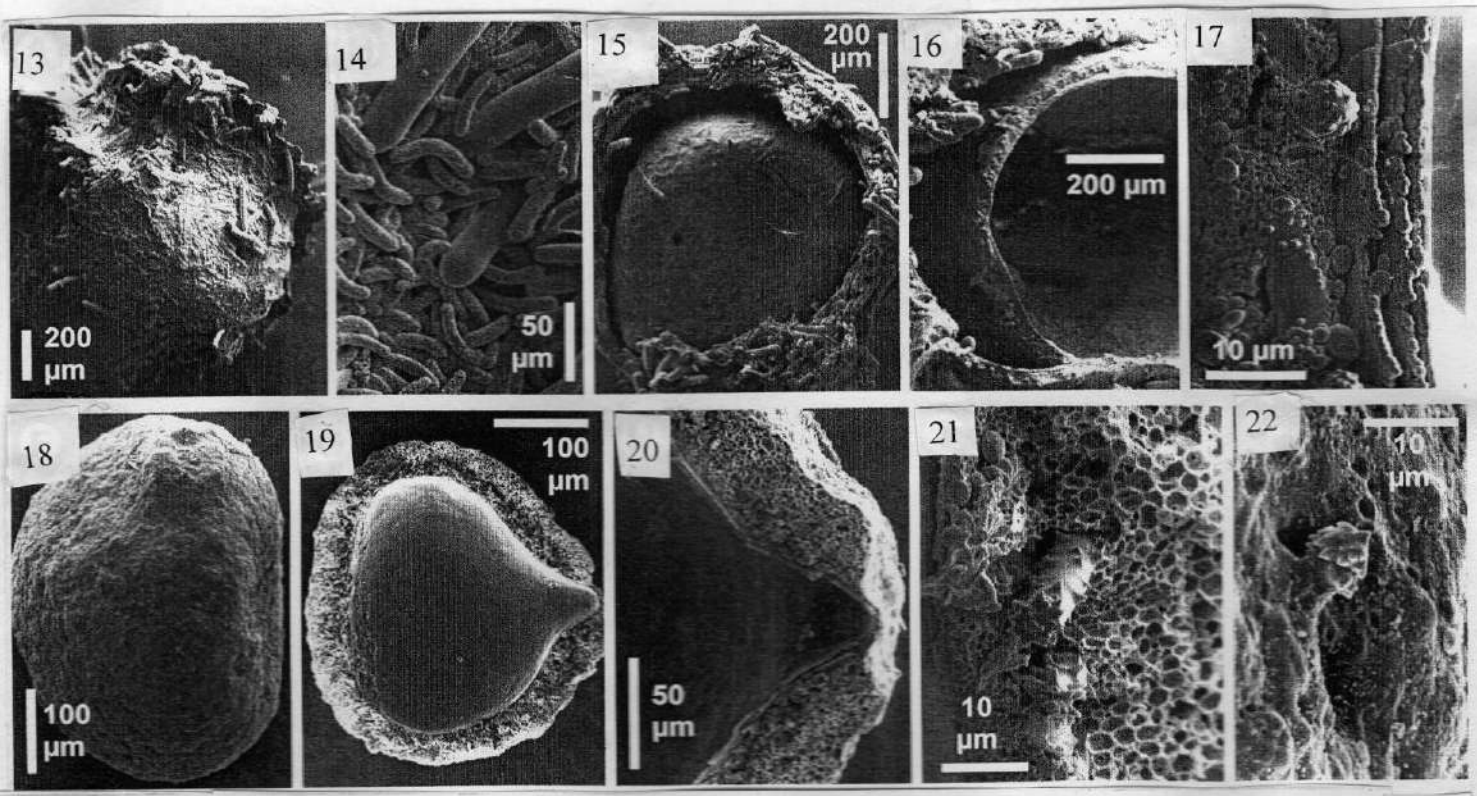


Fig. 12 *Corvospongilla mesopotamica* nov. sp. Micrographs (SEM) of micropseudobirotules armored with recurved hooks at the shaft tips.



Corvospongilla mesopotamica nov.sp. Gemmmules;
Sessile Gemmmules(Figs 13-17):
Fig.13. Gemmular cage around thegemmule.
Fig.14. Surface of the cage with large smooth strongyles , short strongyles with tubercles at the tips, and a dense mosaic –like layer of spiny strongyles.
Fig.15. Gemmular theca within the cage (cross section).
Fig.16. Section of cage and thecaothe gemmule.
Fig.17. Section of gemmular thecawith embeddedspiny strongyles in the moderately compact middle layer and the sublayeredinner layer.
Free Gemmules(Figs. 18-22):
Fig.18 Gemmuler theca.
Fig.19. Section of gemmular theca .
Fig.20. Detail of the foramen.
Fig.21.Pneumatic layerwith embedded spiny strongyles-oxeas towards the inner layer.
Fig.22. Gemmular outer layer with rare spiny oxeas piercing the surface.

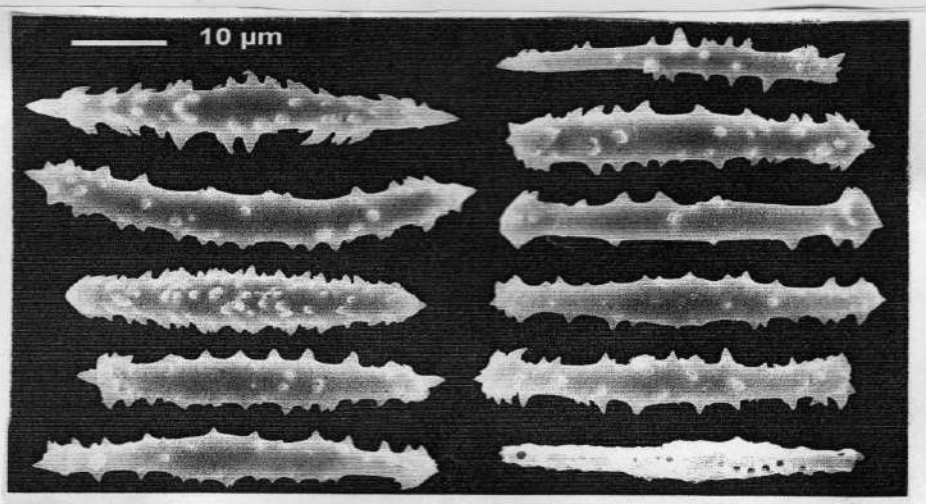


Fig 23*Corvospongilla mesopotamica* nov. sp. Micrographs (SEM) of gemmular strongyles and