

## Morphological Description of Subtidal Sponges (Porifera: Demospongiae) Inhabiting Preselected Sites in Talim Bay, Lian, Batangas, Philippines

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### ABSTRACT

The study presents findings on the survey of sponges inhabiting nine preselected sampling stations along the coastline of Talim Bay, Lian, Batangas, Philippines, and a comparison of data with those earlier reported in the same location in 1995. Collection sites were determined using a global positioning system (GPS) device. Specimens were examined based on shape, color of live and preserved specimens, consistency, feel of surface texture and presence of structures like microhispid projections, spines, conuli, presence of apertures/holes and distribution, and size of ostia and osculum. The 24 specimens collected all belong to Demospongiae, of which 21 sponges were classified as belonging to 10 families, namely, Microcionidae, Axinellidae, Halichondriidae, Callyspongiidae, Chalinidae, Niphathiidae, Petrosiidae, Irciniidae, Chondropsidae, Clionidae, and 14 genera. The sponge identified was dominated by Family Chalinidae comprising seven specimens of Genus *Haliclona* collected in five different sites representing 29.2% ( $n = 7$ ) of the collection. Only three species were identified and verified, namely, *Chalinula nematifera*, *Callyspongia (Cladochalina) samarensis*, and *Xestospongia testudinaria*. A close monitor of the underlying factors affecting species diversity, including loss, re-emergence, and/or emergence of new species at Talim Bay is highly recommended.

**Keywords:** Sponges; Spicule types; Family Chalinidae; Talim Bay, Lian, Batangas, Philippines

## INTRODUCTION

Sponges are ecologically essential components of coral reefs owing to their biomass and ecological importance (Van Soest et al., 2017; Bell, 2008; Grzimek, 1974). They also contain natural and medical properties (Corfield, 1938; Concepcion et al., 1994; Hooper, 1997). Many types of habitats (i.e., coral reefs, mangrove, muddy, sandy, and rubble) can support sponge species diversity in the country (Pangan et al., 2007; Villaroman, 1996). In the country, however, the dominance of Demospongiae sponges has been recorded in the Batangas area (Villaroman, 1996; Caberoy, 1981) and Cebu (Longakit, 2005). Several *Haliclona* spp. have been identified in Cebu (Longaki, 2005) and Tayabas Bay, Luzon (Caberoy, 1981) but not in Janao Bay, Batangas (Villaroman, 1996). Although many probate collections are known (Longakit et al., 2005; Levi, 1959; Villaroman, 1996), the database of sponges in the country is wanting, and to our knowledge, there is no documentation of similar works in Talim Bay, Lian, Batangas.

Spicule morphology is useful in phylogenetic reconstructions (Butler, 1961) and in the taxonomy of particular genera (Kelly, 2001; Ruppert & Barnes, 1994; George & George, 1979; Erpenbeck & Worheide, 2007). Only few Philippine sponge species have been analyzed with respect to variation in spicules (Caberoy, 1981; Hooper et al., 2000). With the rampant practice of dynamite fishing and unregulated harvesting of marine species by fisher folks and increasing rate of water pollution owing to the influx of garbage, Talim Bay in Lian, Batangas, Philippines, has obviously undergone marked degradation in marine life. In this paper, we present our findings of sponges in preselected sites in Talim Bay, Lian, Matuod, Batangas, and compared them to the undocumented earlier findings of Elmero et al. (1995) in similar sites in Talim Bay.

## MATERIALS AND METHODS

### Procedure I

Sponges were collected in the De La Salle Marine Biological Station, Lian, Batangas, situated about 20 m from the shoreline of Talim Bay, positioned between 13.58" and 14.01" north latitude and 120.36" and 120.38" east longitude of Batangas (Santos & Sarion, 2008) (Fig. 1). The study site comprised nine sampling stations along the coastline of Talim Bay, namely, Clubhouse 2A, Galvez 5A, Inner Talim 6A, Middle Duenas Reef, Layag-layag 3A, Outer Talim 7A, Toroso 4A, Roces Mangrove Waterway, and Roces. Actual sites were recorded using a global positioning system (GPS).

The sponges were collected via snorkeling or scuba diving. No transect line was employed. Spotted sponges at the collection site were photographed in situ and then removed carefully with the use of a fine knife using gloves. The sponges at depths that the proponents could not cover were collected by professional divers (please refer to annotations in figures). For encrusted sponges, the removal of the basal membrane was usually not done due to the difficulty in removing that portion. In such a case, the specimens that were removed constituted the representation of the sponge as a whole. To avoid mismatch, the sponges collected were designated their respective field numbers and were immediately placed in separate covered containers filled with 95% ethanol. Each specimen collected was photographed after fixation, and a close-up documentation of surface details followed thereafter.

### Procedure 2

Specimens that were collected were examined with emphasis on the following pertinent data and taxonomic characteristics (Hooper & Van

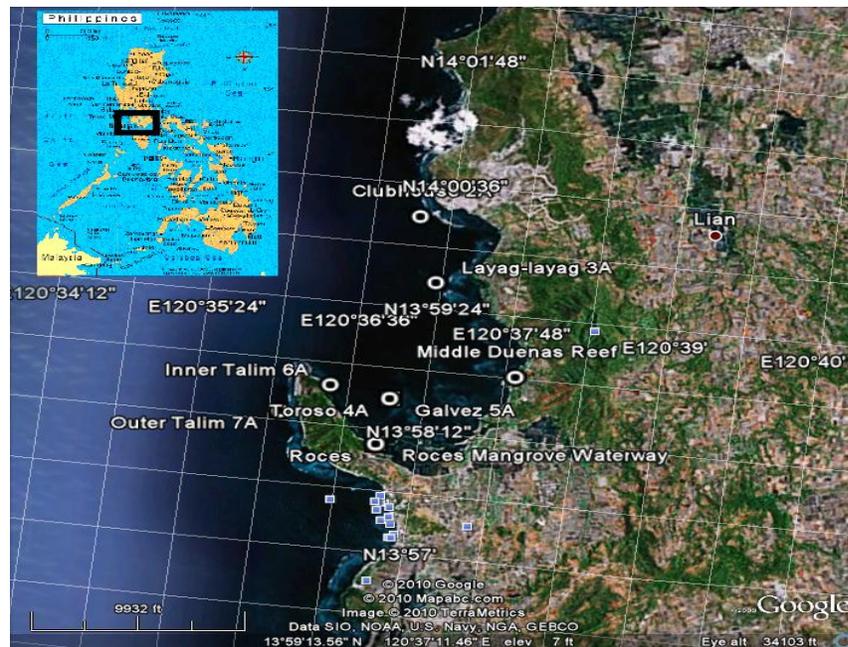


Figure 1. Map of Talim Bay, Lian, Batangas, showing the nine stations where sponges were collected. (Source: Google Earth and <http://www.chanrobles.com/comap.htm>)

Soest, 2002; Kelly, 2001; Longakit, 2005): external surface features, which included 1) shape (encrusted, circular, cylindrical, tube, vase, fan, chimney-like, others); 2) color of the live and preserved specimens; 3) consistency (hard, elastic, compressible, soft, others); 4) feel of surface texture and presence of structures like microhispid projections, spines, conuli, others; and 5) presence of apertures/holes (distribution and size of ostia and osculum).

A tissue section from the each of the sponges collected with intact ectosomal and choanosomal regions was cut using a clean scalpel, and the samples obtained were immediately placed in microcentrifuge tubes. An adequate amount of sodium hypochlorite or bleach was added to dissolve the organic components and to facilitate separation of skeletal materials that lasted 30 min to an hour (Hooper, 2000). Dissolved spicules were washed with distilled water several times, and ethanol was added to avoid the preparation from turning crystalline, as well as to hasten drying when placed on a

glass slide. Spicules were poured in small amounts onto a clean glass slide, allowing the aqueous solution to dry before applying a mounting medium, and then covered. Specimens were allowed to dry before microscopic examination. In cases when a mounting medium was not employed, after washing with ethanol, a small amount of distilled water was placed directly on a glass slide, covered, and examined.

The sponge tissue section was placed on a glass slide and teased carefully with forceps or probes. To maintain the integrity of the skeletal arrangement composed of intact spicules held together by organic materials like fibers and/or spongin, overteasing was avoided and specimens were examined microscopically in 95% ethyl alcohol.

Spicule length and width were measured using a calibrated ocular micrometer. The larger and smaller spicules were measured under a magnification of 20 $\times$  and 40 $\times$ , respectively. To ascertain the validity of a spicule form or type in a particular specimen,

20 spicules of a specific type or form were measured. Spicules were documented and photographed for purposes of comparison.

Identification was based on the gross morphology, texture and form, skeletal arrangement, and particularly the spicule type or form. The taxonomic keys used were those on Systema Porifera by Van Soest et al. (2017), Hooper and Van Soest (2002), Bergquist (2001), and Caberoy (1981).

## RESULTS AND DISCUSSION

The 24 specimens were all demospongiae. Twenty-one (21) specimens identified belong to 10 families and 14 genera (Tables 1 & 2;

Figs. 2–22). The collection largely comprised the Family Chalinidae of Genus *Haliclona* ( $n = 7$  specimens) collected in five different sites and one specimen of *Chalinula* (Table 2). Only tree species were identified and verified, namely, *Chalinula nematifera*, *Callyspongia (Cladochalina) samarensis*, and *Xestospongia testudinaria*.

### Taxonomic Description of the Sponges

#### *Class Demospongiae Sollas, 1885*

*Diagnosis:* Growth appearances tubular, massive, lobate, branching, flabellate, cup-shaped, excavating, and others; inorganic skeleton either absent or present; if present,

**Table 1. Summary of 21 Sponges Collected From Nine Sampling Stations in Talim Bay and Identified According to Families and Genera**

Family	Genera	Species
Microcionidae	<i>Clathria</i> ( $n = 1$ )	UI
Axinellidae	<i>Axinella</i> ( $n = 1$ )	UI
Halichondriidae	<i>Ciocalypta</i> ( $n = 2$ )	UI
Chalinidae	<i>Haliclona</i> ( $n = 5$ ) <i>Haliclona (Gellius)</i> ( $n = 1$ ) <i>Halichona (Sigmadocia)</i> ( $n = 1$ ) <i>Chalinula nematifera</i>	UI UI
Niphathiidae	<i>Niphates</i> ( $n = 1$ )	UI
Petrosiidae	<i>Xestospongia</i> ( $n = 2$ )	UI
<i>Xestospongia testudinaria</i>	<i>Petrosia (Strongylophora)</i> ( $n = 1$ )	
Irciniidae	<i>Sarcotragus</i> ( $n = 1$ )	UI
Chondropsidae	<i>Phoriospongia</i> ( $n = 1$ )	UI
Clionidae	<i>Spheciospongia</i> ( $n = 1$ )	UI

Note: UI = unidentified.

Table 2. Site Distribution of 24 Sponges Collected From Nine Stations in Talim Bay

Genus	Sampling sites									Total	
	1	2	3	4	5	6	7	8	9		
<i>Clathria</i>		1									1
<i>Axinella</i>							1				1
<i>Ciocalypta</i>								2			2
<i>Callyspongia</i>								1			1
<i>Callyspongia (Cladochalina)</i>			1								1
<i>Haliclona</i>	1					1	1	1	1	1	5
<i>Haliclona (Gellius)</i>								1			1
<i>Haliclona (Sigmantocia)</i>	1										1
<i>Chalinula</i>							1				1
<i>Niphates</i>					1						1
<i>Petrosia (Strongylophora)</i>	1										1
<i>Xestospongia</i>							2				2
<i>Sarcotragus</i>						1					1
<i>Phoriospongia</i>		1									1
<i>Sphaciospongia</i>	1										1
Unidentified species	1			1							3
	1										

Legend:

1 (Clubhouse 2A)

4 (Layaglayag)

7 (Torso 4A)

2 (Galvez 5A)

5 (Midle Duenas Reef)

8 (Roces Mangrove waterway)

made of sponging fibers alone or jointly with siliceous spicules generally separated into megacleres or microscleres.

#### **Family Microcionidae Carter, 1875**

*Diagnosis:* Sponges have encrusting, lamellate, fan-shaped, and branching growth forms; skeleton tangential, isodictyal, reticulate, or plumose, never radial; subectosomal region poorly developed; ectosomal skeleton usually

composed of styles or anisoxeas spicules in erect bundles.

#### **Genus *Clathria* Schmidt, 1862**

Sponges generally stand erect; skeleton composed of horny fiber cord by styles and echinated by smaller spined styles.

**Diagnosis:** roundish to tree-like growth form, rough texture, whole sponge easily compressible; whole sponge not attached to coral substrate, only a portion of it; in situ, color light orange, and when preserved, dark mocha; oscules few and irregularly arranged and measured around 1-mm dm; skeletal structure enclosed in sponging fibers forming sparse, paratangential tracts and composed of spinous (acanthose) average measurement 75  $\mu\text{m}$  long and 6.6  $\mu\text{m}$  across; smooth styles with average measurement 173  $\mu\text{m}$  long and 4.1  $\mu\text{m}$  wide; with protruding acanthostyles on the sides.

**Family Axinellidae Carter, 1875**

**Diagnosis:** Sponges encrusting, fan-shaped, and branching growth forms; red, orange, or yellow colored; texture velvety or microhispid; skeletal arrangement plumoreticulated.

**Genus Axinella Schmidt, 1862**

Sponges generally ramose, bushy, or lamellate pattern; megascleres are styles and oxea; skeletal arrangement usually plumoreticulated in the extra-axial region and indistinctly reticulated in axial region.

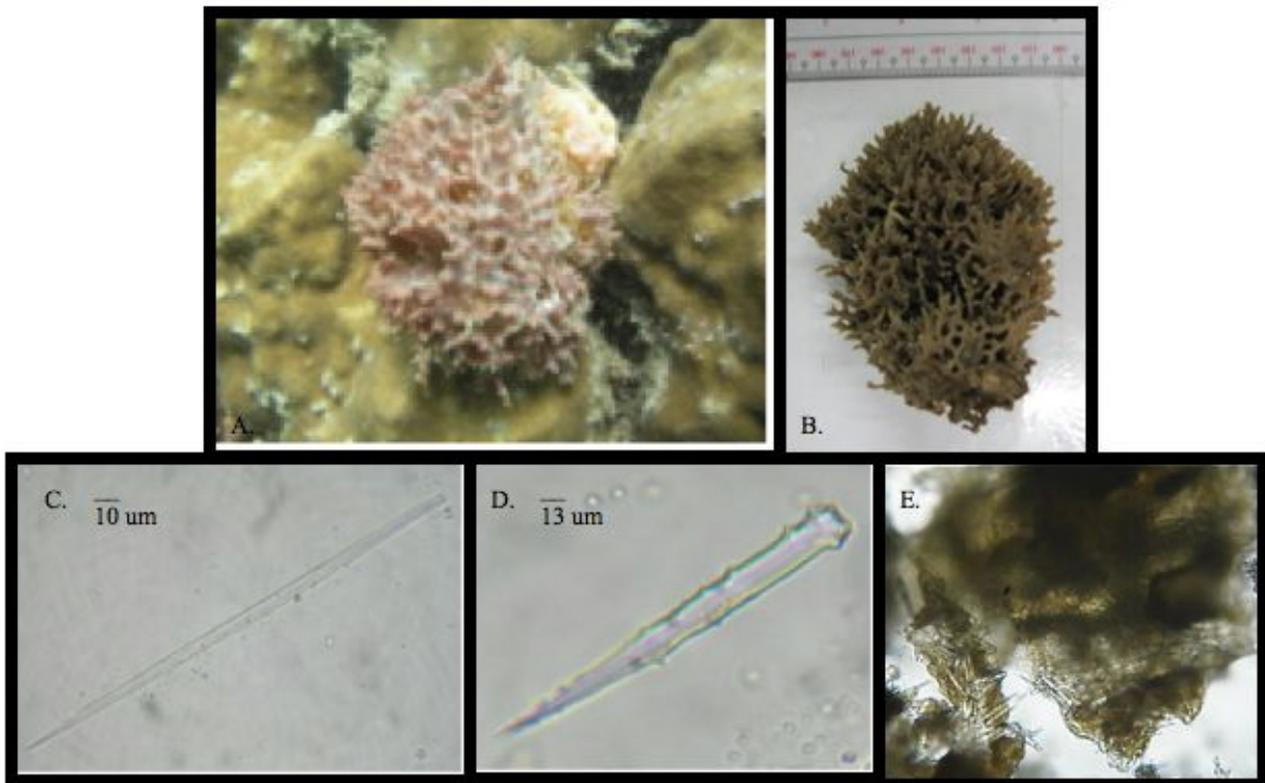


Figure 2. *Clathria* sp. in situ (A) and fixed (B) Spicules: acanthostyle (C) and smooth style (D) Skeletal arrangement (E) Annotations: Single specimen, TAL-GAA-002 (DLSU Z.C. 002), Galvez 5A, Talim Bay, Lian, Batangas, 14°22'16.8"North, 120°37'60.1"East, May 3, 2009, 4 m deep; collected by Dr. W. Licuanan.

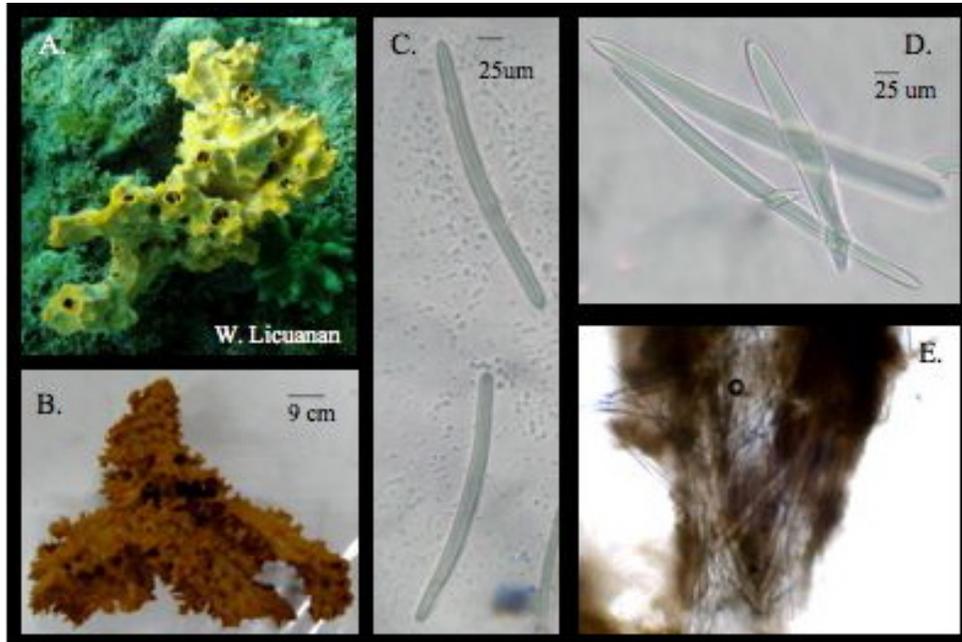


Figure 3. *Axinella* sp. in situ (A) and fixed (B) Spicules: blunt tip oxeas (C) and styles (D) Skeletal arrangement (E) Annotations: Single specimen, TAL-TOA-001 (DLSU Z.C.), Torso 4A, Talim Bay, Lian, Batangas, 13°58'30.7"North, 120°36'56.8"East, May 7, 2009, 6.3 m deep; collected by Dr. W. Licuanan.

*Diagnosis:* Irregular growth form but without separations in between; smooth texture in between the microhispid projections; attached to a coral substrate; color yellow in situ and orange when preserved; oscules irregularly arranged and dispersed throughout sponge undersides; skeletal structure compressed axially and plumoreticulated in extra-axial region; megascleres are styles and oxeas.

**Family Halichondriidae Gray, 1867**

*Diagnosis:* Sponges have spicules showing diverse shapes of oxeotes and stylotes; skeletal arrangement paratangential or palisade-like.

**Genus Ciocalypta Bowerbank, 1862**

Sponges typically with smooth texture, fairly transparent exterior, lacking visible oscules, and finger-shaped fistules; basal mass generally covered in soft sediment with the finger-shaped-fistules rising above sediment; spicules are styles and/or oxeas; skeletal arrangement tangential.

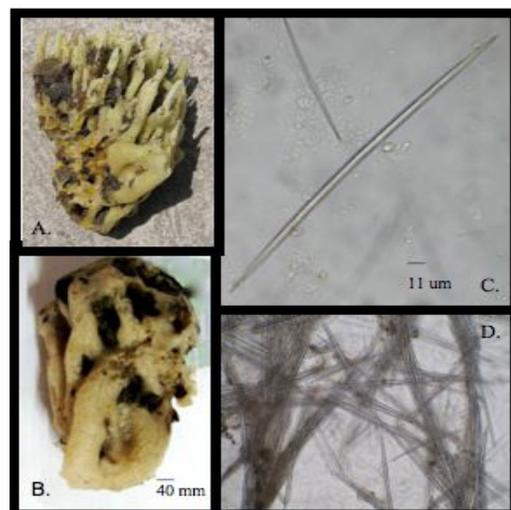


Figure 4. *Ciocalypta* sp.1 in situ (A) and fixed (B) Spicules: fusiform oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-ROW-003 (DLSU Z.C.), Roces Mangrove Waterway, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by Ms. C. Samson.

*Diagnosis:* Fistulose growth form, with different lengths, easily compressible, transparent, smooth, may be rough at some parts; lays on a soft substrate; light yellow green in situ and turned light brown when fixed; oscules invisible, but sponge evidently perforated and dispersed throughout the body; skeletal arrangement paratangential or palisade-like.

*Diagnosis:* Fistulose growth form but thicker in width, easily compressible and ripped, with few small microhispid-like projections on the surface, colored yellow green in situ and dark yellow when fixed, oscules invisible, skeletal arrangement paratangential or palisade-like.

**Family Callyspongiidae De Laubenfels, 1936**

*Diagnosis:* Growth forms encrusting, vase-shaped, tubular, or branching; texture smooth, firm, or resilient; surface smooth or naturally sculptured into conules, ridges, or spines to the exterior; skeletal arrangement in two-dimensional tangential reticulation of primary and secondary sponging fibers with spicules of oxeas and/or strongyles.

**Genus Callyspongia Duchassaing & Michelotti, 1864**

Sponges differ significantly in growth form from massive to ramose, foliaceous to infundibuliform, repent to erect and others;

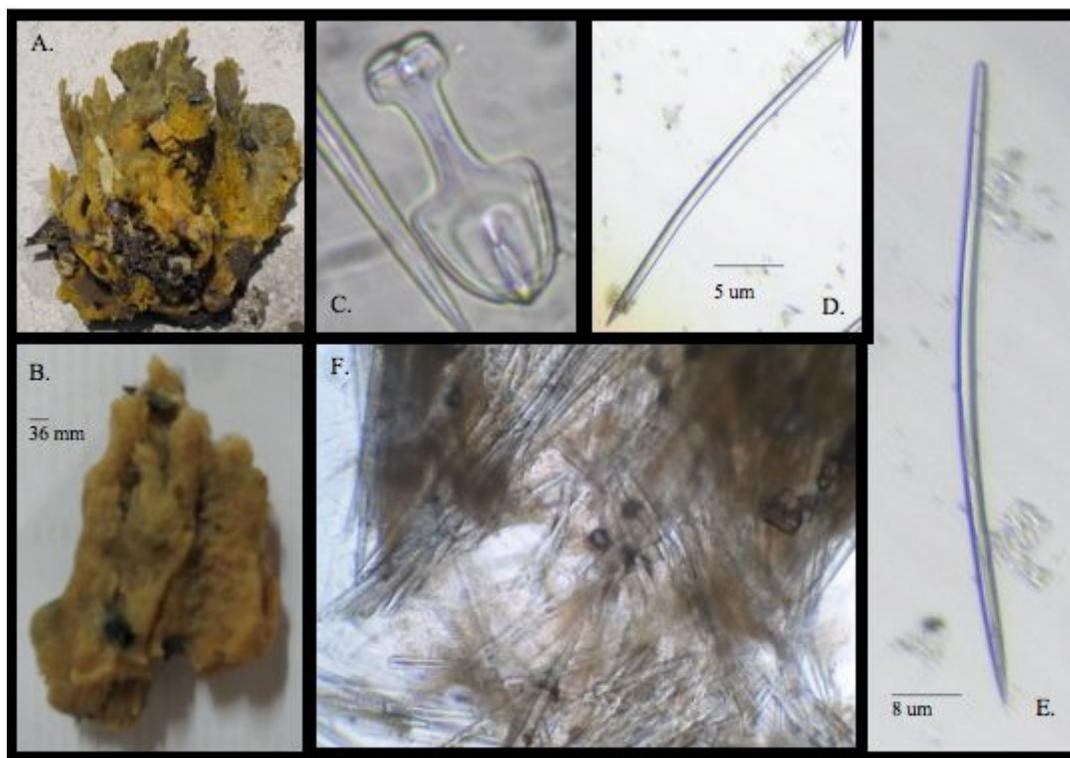


Figure 5. *Ciocalypta* sp.2 in situ (A) and fixed (B) Spicules: palmate isochela (C; note < 20 counts), oxea (D) and style (F) Skeletal arrangement (E)  
 Annotations: Single specimen, TAL-ROW-005 (DLSU Z.C.), Roces Mangrove Waterway, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by Ms. C. Samson.

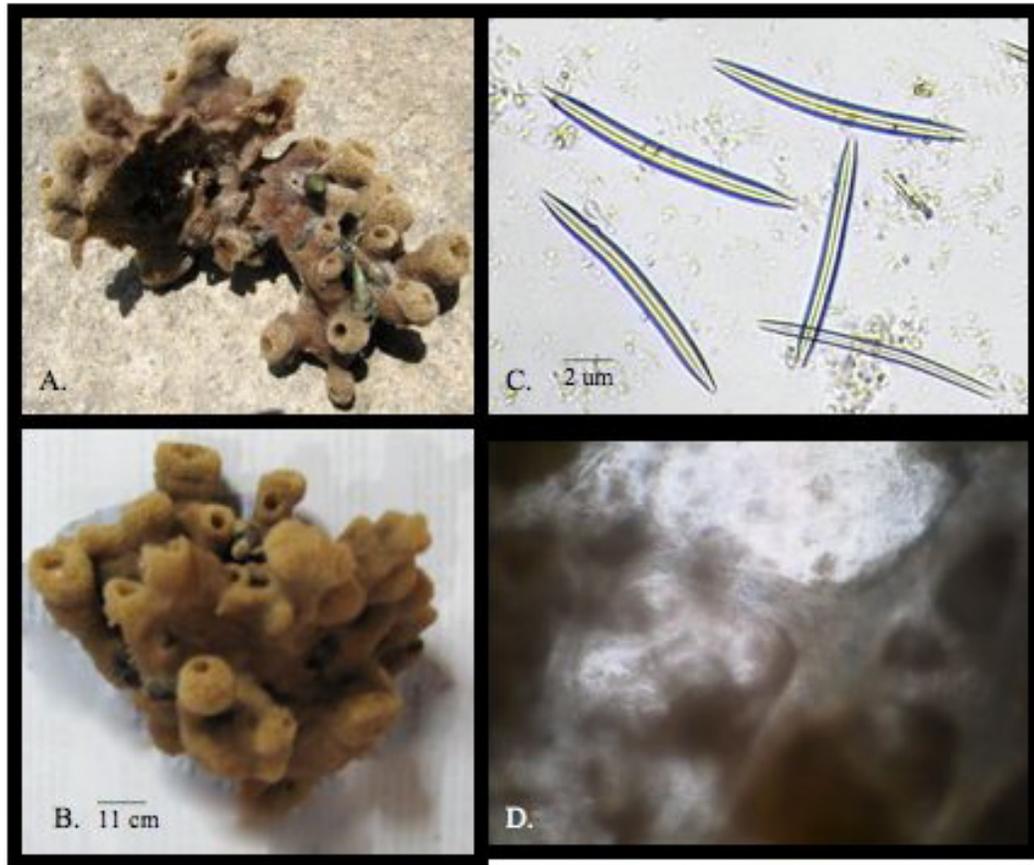


Figure 6. *Callyspongia* sp. in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-ROW-001 (DLSU Z.C.), Roces Mangrove Waterway, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by Ms. Cai Samson.

spongin frequently seen; skeletal arrangement is two-dimensional tangential reticulation of primary, secondary, and at times tertiary spiculo-fibers with spicules of oxeas and/or strongyles.

*Diagnosis:* Erect to tubular growth form, medium compressible, and may be tough to tear; attached to soft substrate and texture rubber-like; color brown in situ and cream yellow when fixed; oscules located on top of the stalks; skeletal arrangement has sponging sheath, with regularly arranged primary paucispicular and connecting unispicular fibers.

### ***Genus Callyspongia (Cladochalina) Schmidt, 1870***

Sponges usually branched, tubuliform, or vase-like growth form; masses of branches, with a general base and irregularly distributed oscula; surface may be conulose or spiny; texture elastic, fragile, and breakable when evaporated; possesses megascleres oxeas or strongyloxeas in varying forms; skeletal arrangement tangential, primary, secondary, and tertiary fibers in one plane with three sizes of irregular meshes.

*Diagnosis:* Masses of branches evident and with twig-like appearance; yellow in situ; fixed

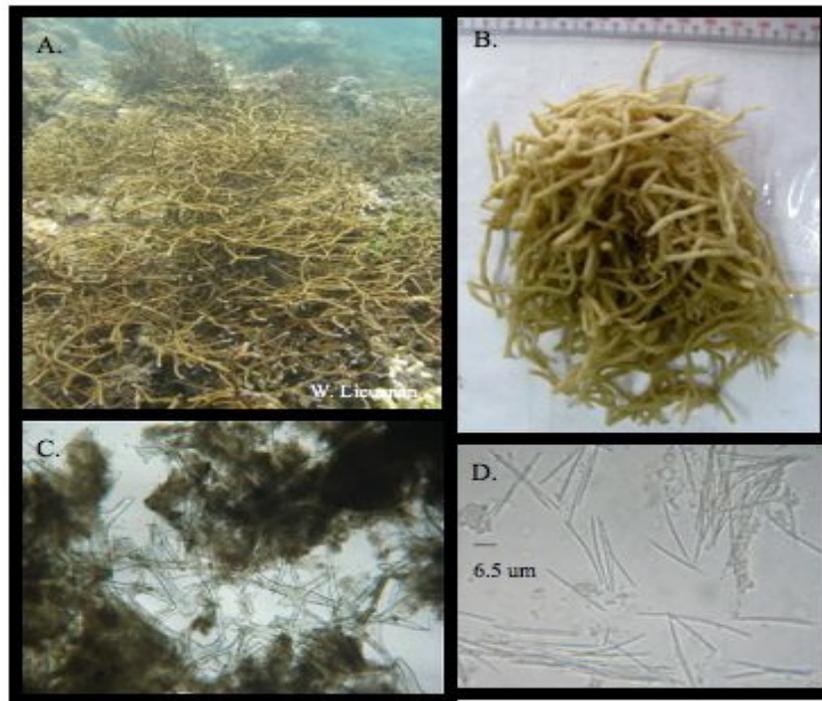


Figure 7. *Callyspongia (Cladochalina) samarensis* in situ (A) and fixed (B). Skeletal arrangement (C) Spicules: oxeas (D) Annotations: Single specimen, TAL-ITA-001 (DLSU Z.C.), Inner Talim 6A, Talim Bay, Lian, Batangas, 20°14'18.9"North, 130°40'17.9"East, May 3, 2009, 6 m deep; collected by Dr. Wilfredo Licuanan.

remains yellow but turned out noodle-like and somewhat transparent; very soft texture and compressible; with megascleres oxea; without microscleres; skeleton shows primary, secondary, and tertiary fibers in one plane forming irregular meshes.

#### **Family Chalinidae Gray, 1867**

**Diagnosis:** Sponges with encrusting, cushion-shaped, ramose, or tubular growth forms; consistency soft to rather firm or spongy; usually with oscular chimneys or mounds; color purple, pink, violet, brown, or green; with megascleres oxeas or strongyle; microscleres if present, microxeas or sigmas; skeletal arrangement reticulation of uni-, pauci-, or multispicular primary lines

frequently connected by unispicular secondary lines.

#### **Genus Haliclona Grant, 1836**

Generally have cushion-shaped, oscular mounds or chimneys, branching, tube-shaped, repent ramose, and rarely thinly encrusting; natural color purple, violet, yellowish, green, black, white, or orange; consistency differs from soft or fragile to firm, elastic, or brittle; surface varies from smooth or even to hispid; oscules located in oscular mounds or chimneys; skeletal arrangement regular, tangential, unispicular, or isotropic reticulation; with megascleres oxeas or strongyles; microscleres, if present, are sigmas or toxas; spongin typically present, restricted to nodes of spicules as skeletal support.

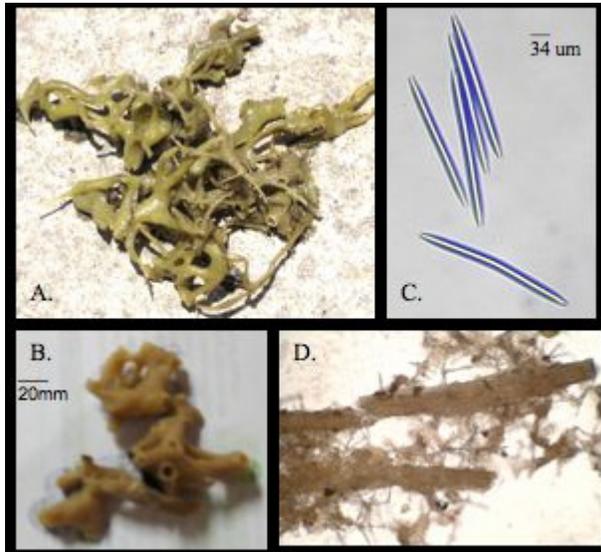


Figure 8. *Haliclona* sp.1 in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-ROW-004 (DLSU Z.C. 004), Roces Mangrove Waterway, Talim Bay, Lian, Batangas, 3°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by J. Tan.

*Diagnosis:* Appearance seaweed-like; with crater-like oscules scattered loosely in the body; compressible and ripable; in situ specimen olive green, when preserved, yellow-orange; spicules slightly bent oxeas with pointed tips; skeletal arrangement unispicular, with pointed tips of oxeas connected by spongin in triangular forms.

*Diagnosis:* Hair-like sponge attached to substrate; spongy texture, with visible small perforations/holes; oscules regularly distributed throughout the body with about 1-cm spacing; easily compressible and tear; grayish/dark brown in situ and mocha when fixed; skeletal arrangement in triangular form.

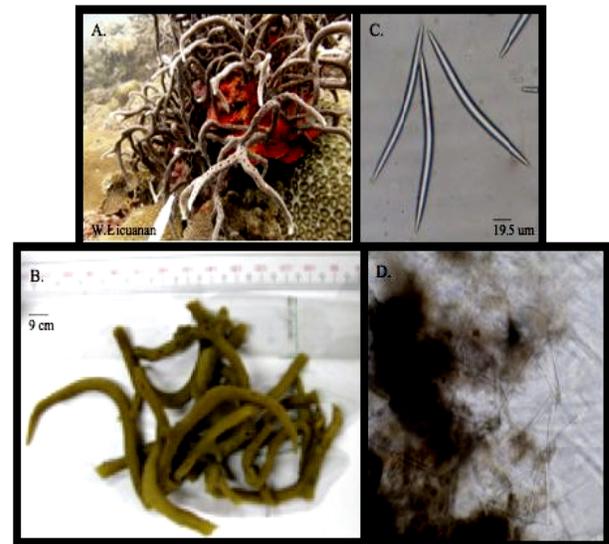


Figure 9. *Haliclona* sp. 2 in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-OTA-001 (DLSU Z.C.), Outer Talim 7A, Talim Bay, Lian, Batangas, 13°58'17.9"North, 120°36'06.0"East, May 6, 2009, 4–5 m deep; collected by Ms. Cai Samson. Photographed by Dr. W. Licuanan.

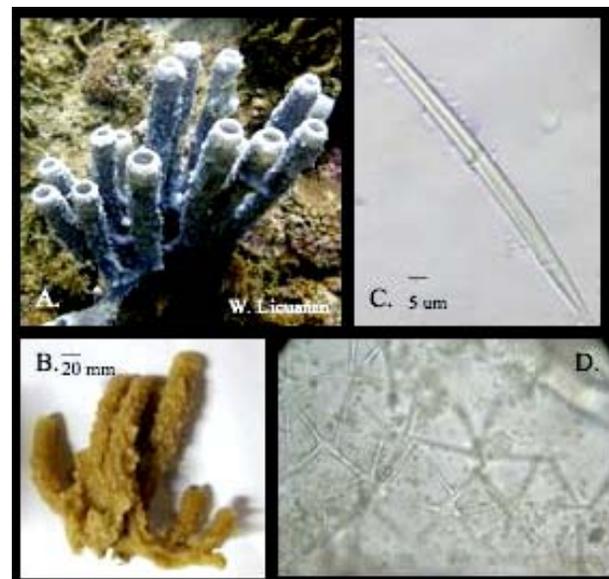


Figure 10. *Haliclona* sp.3 in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-CHA-003 (DLSU Z.C.), Clubhouse 2A, Talim Bay, Lian, Batangas, 14°00'17.8"North, 120°36'58.1"East, May 2, 2009, 4–5 m deep; collected by Dr. W. Licuanan.

*Diagnosis:* Tubular growth form, with spongy texture, easily compressible but not easily torn and with microhispid-like surface; oscules are distributed on top through stalk-like chimneys; in situ, purplish, and when fixed, brownish to light yellow; skeletal arrangement with linked-long spicules.

*Diagnosis:* Encrusting growth form, spongy texture, easily compressible and torn; oscules irregularly distributed on top of the sponge with different diameters; blue in situ and color

fades away when fixed; skeletal arrangement is one spicule long, isotropic and without a multispicular tract.

*Diagnosis:* Sponge with soft texture and slimy feel; live specimen colored dark violet and when fixed turned darker; evident protruding oscules with different diameters; spicules present are oxeas conical with pointed tips; skeletal arrangement long single/mono spicules.

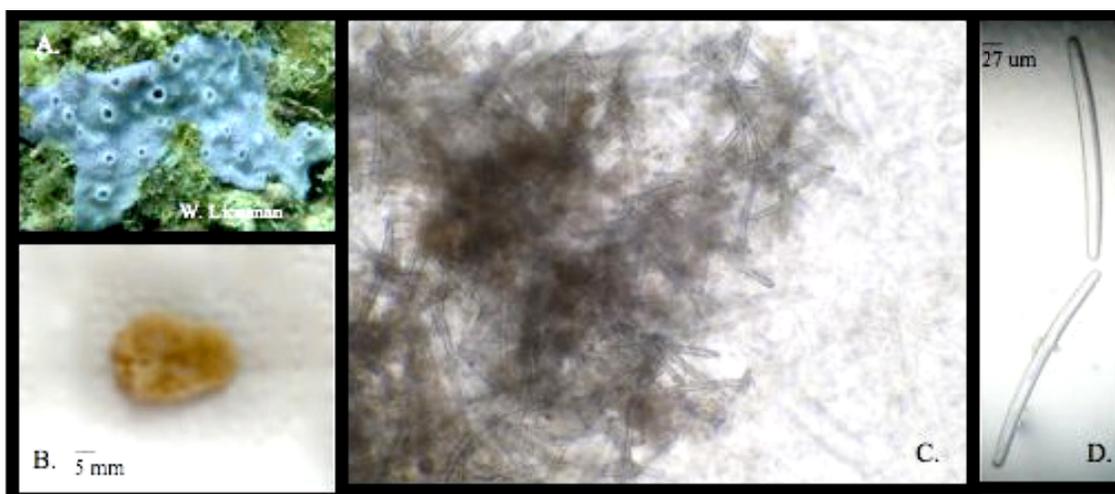


Figure 11. *Haliclona* sp. 4 in situ (A) and fixed (B) Skeletal arrangement (C) Spicules: oxeas (D) Annotations: Single specimen, TAL-TOA-002 (DLSU Z.C.), Torso 4A, Talim Bay, Lian, Batangas, 13°58'30.7"North, 120°36'56.8"East, May 7, 2009, 6.3 m deep; collected by Dr. Wilfredo Licuanan.

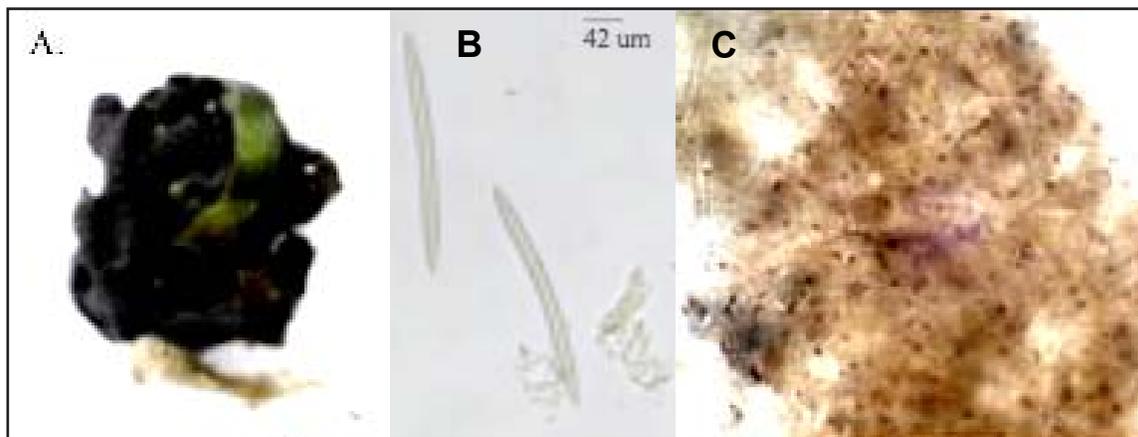


Figure 12. *Haliclona* sp. 5 in situ (A) Spicules: oxeas (B) Skeletal arrangement (C) Annotations: Single specimen, TAL-ROC-002 (DLSU Z.C.), Roces, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by J. Tan.

**Genus *Haliclona* (Gellius) Gray, 1867**

Sponges generally cushion-shaped or submassive sponges; consistency soft, fragile, and/or brittle; may form fistular outgrowths on the exterior; megascleres large oxeas; microscleres, when present, are sigmas; skeletal arrangement subhalichondrid reticulation.

*Diagnosis:* Texture somewhat coarse but still compressible; peach to cream live and soot black when fixed; oscules scattered/dispersed; spicules are oxeas with hastate pointed ends, some slightly bent, some straight; styles with hastate appearance, one end pointed the other blunt; skeletal arrangement takes different reticulations, with no spongin to connect the nodes of spicules.

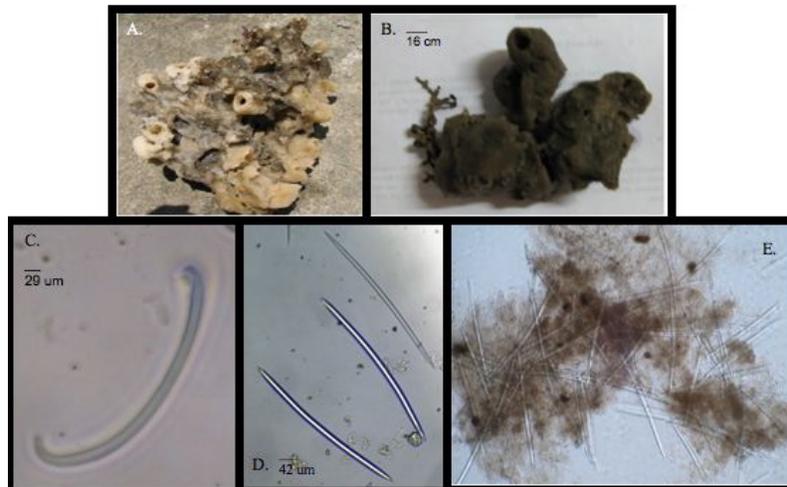


Figure 13. *Haliclona* (*Gellius*) sp. in situ (A) and fixed (B) Spicules: C-shaped sigma (C) and oxeas (D) Skeletal arrangement (E) Annotations: Single specimen, TAL-ROW-002 (DLSU Z.C.), Roces Mangrove Waterway, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992", May 8 2009, 1m deep; collected by J. Tan.

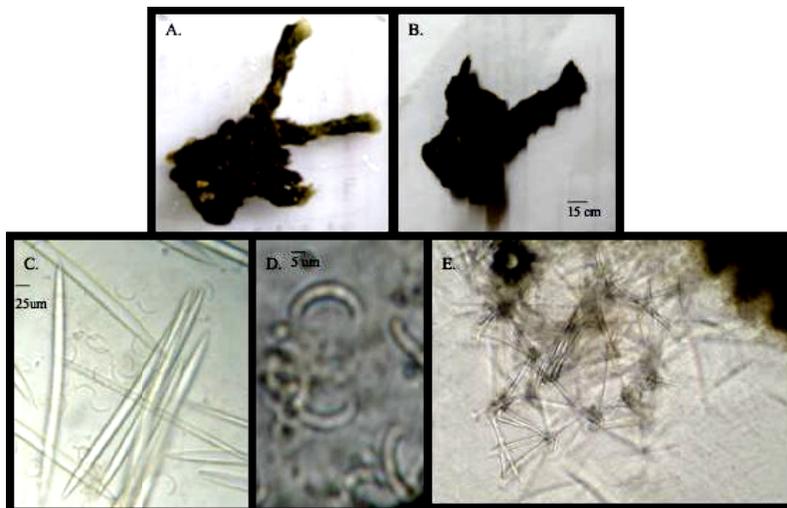


Figure 14. *Haliclona* (*Simadocia*) sp. in situ (A) and preserved (B) Spicules: oxeas (C) and C-shaped sigmas (C, D) Skeletal arrangement (E) Annotations: Single specimen, TAL-ROC-001 (DLSU Z.C.), Roces, Talim Bay, Lian, Batangas, 13°58'3.8274"North, 120°36'52.992"East, May 8, 2009, 1m deep; collected by J. Tan.

*Diagnosis:* Sponge soft texture and compressible; colored dark violet live, turned dirty brown when fixed; small oscules present but fairly spaced out; spicules present are oxeas with conical ends, some bent and others straight; skeletal arrangement has spongin on nodes of spicules forming corners or noose.

**Genus *Chalinula* Schmidt, 1868**

Sparingly encrusting, cushion-shaped, or unevenly digitate growth forms; texture comprehensible, smooth surface, somewhat hispid consistency to soft or spongy; oscules distributed in body; spicules, oxeas vary in form and size; skeleton rich in spongin.

*Diagnosis:* Sponge thin encrusting growth form; rough texture, slightly compressibility and tearable; consistency firm but elastic; in situ colored violet with white streaks and when fixed turned light green yellow; oscules irregularly distributed and few; spicules are

oxeas; skeletal arrangement with secondary lines in more than one spicule length.

**Family *Niphatidae* Van Soest, 1980**

*Diagnosis:* Encrusting, huge, fan-shaped, or branching growth forms; texture stiff, rigid, and brittle; usually has chimney-like oscules; surface smooth or rough, partly hispid, ridged, or spiny; megascleres are oxeas or strongyles of diverse sizes; microscleres, if present, are sigmas or microxeas; skeletal arrangement multispicular and tangential reticulation.

**Genus *Niphates* Duchassaing & Michelotti, 1864**

Growth forms massive, vase-shape to tubular or ramose growth form; surface conulose, spiny, and rigid; oscules irregularly distributed and a little raised; spongin dominant and cover spicules; megascleres are oxeas; microscleres, if present, sigmas; skeletal arrangement forms a tangential network and rounded to irregular meshes.

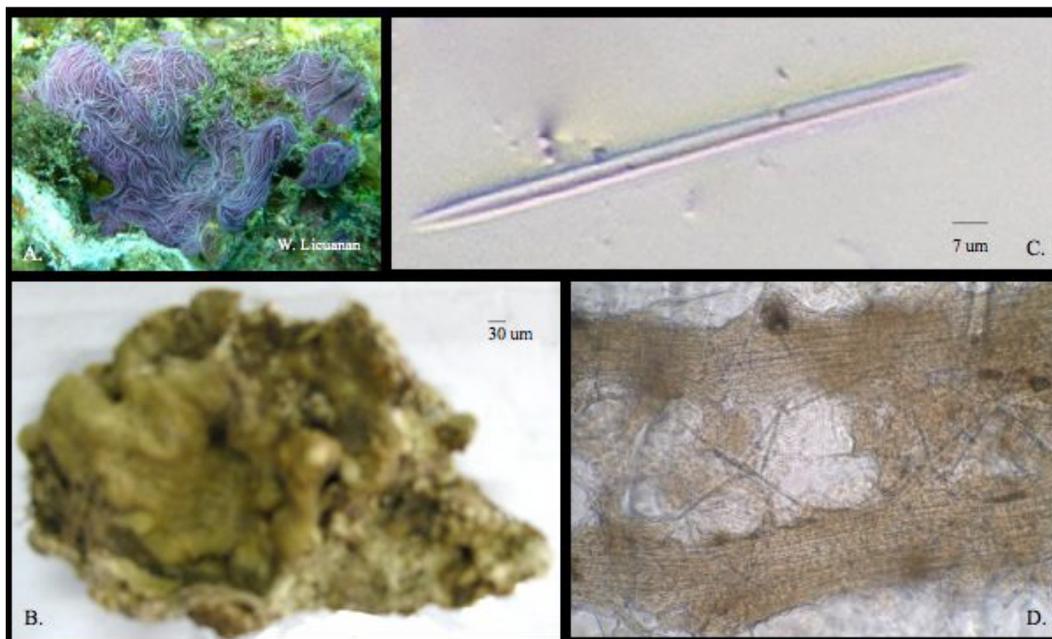


Figure 15. *Chalinulanematifera* in situ (A) and preserved (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-TOA-003 (DLSU Z.C.), Torso 4A, Talim Bay, Lian, Batangas, 13°58'30.7"North, 120°36'56.8"East, May 7, 2009, 6.3 m deep; collected by Dr. W. Licuanan.

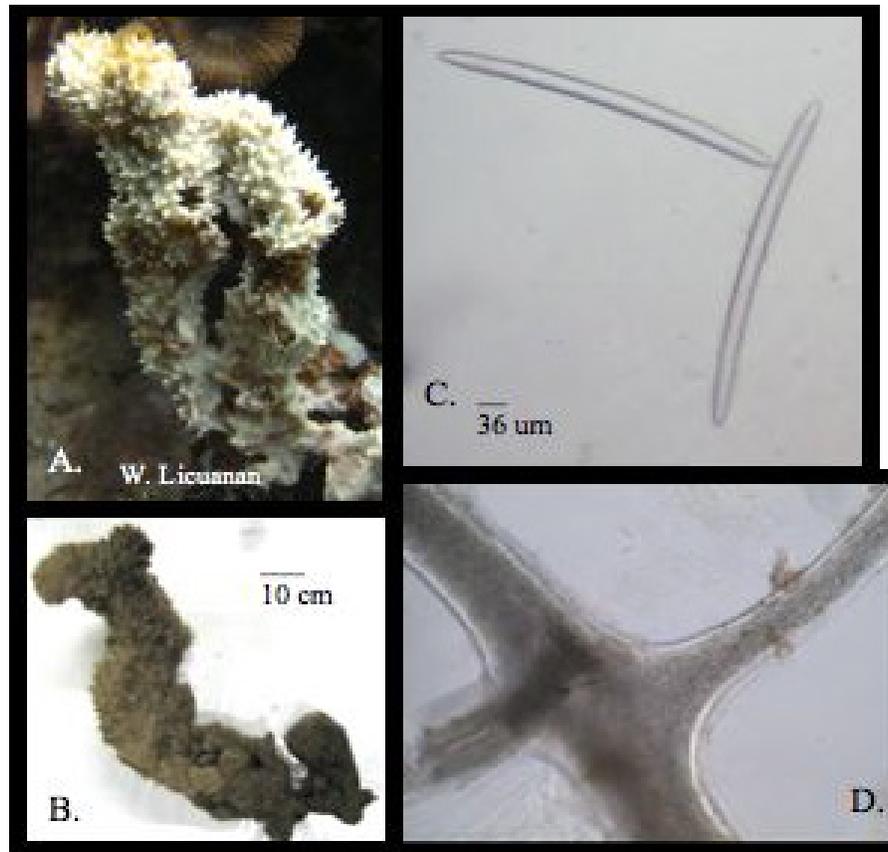


Figure 16. *Niphates* sp. in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D) Annotations: Single specimen, TAL-DUR-001 (DLSU Z.C.), Middle DuenasReef, Talim Bay, Lian, Batangas, 13°14'18.9"North, 120°37'53.4"East, May 4, 2009, 9 m deep; collected by Dr. W. Licuanan.

*Diagnosis:* Erect to branching growth appearance; spiny texture although brittle; surface rough with mucus produced; oscules irregularly distributed on the intersection of the branches and some on top, with unequal diameters; dirty white in situ and turned dark olive green when fixed; skeletal arrangement is tangential network of secondary fibers appearing free oxeas.

**Family Petrosiidae Van Soest 1980**

*Diagnosis:* Sponges with massive, volcano, or vase-shaped and bulging; stony or brittle texture indicative of abundance of siliceous spicules over spongin; smooth surface

sheltered by a tough crust; megascleres oxeas to strongylotes, microscleres, if present, smaller oxeas; skeleton arrangement forms an isotropic reticulation of spicule tracts, in which indefinite primary and secondary tracts are obvious.

**Genus Xestospongia De Laufenbels, 1932**

Sponges generally shaped roundish meshes and missing a special ectosomal skeleton, but with isotropic reticulation of single spicules or spicule tracts; megascleres oxeas, sometimes strongylote and stylote forms; without microscleres.

*Diagnosis:* Dark yellow in situ and adobe when preserved; texture rough and stony; sponge incompressible; oscules scantily distributed and knot-like in appearance; spicules are bent oxeas some with pointed ends; skeletal arrangement arranged in bundles.

*Diagnosis:* Sponge dark yellow in situ, adobe when preserved; texture rough and stony; incompressible body; oscules scantily distributed and knot-like in appearance; spicules are bent oxeas with pointed ends, and styles; skeletal arrangement is in bundles and forming a circular appearance.

### **Genus Petrosia (Strongylophora)**

Sponges generally have three categories of oxeas or strongyles, plus centrangulate microxeas; stony texture; spongin absent; megacleres strongyle, oxeas, and/or microxeas; skeletal arrangement has a thick irregular tangential reticulation of free strongyles and oxeas with unreliable sizes protruding centrangulate microxeas; small sausage-shaped strongyles apparent.

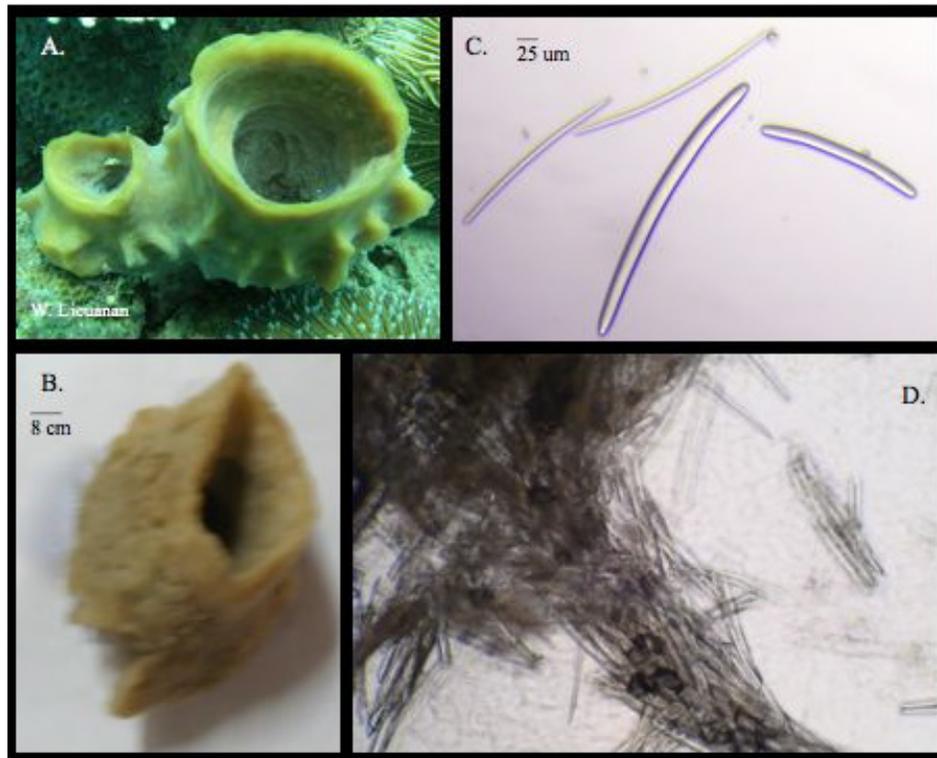


Figure 17. *Xestospiingiatestudinaria* in situ (A) and fixed (B) Spicules: oxeas (C) Skeletal arrangement (D). Annotations: Single specimen, TAL-TOA-004 (DLSU Z.C.), Torso 4A, Talim Bay, Lian, Batangas, 13°58'30.7"North, 120°36'56.8"East, May 7, 2009, 6.3 m deep, collected by Dr. W. Licuanan.

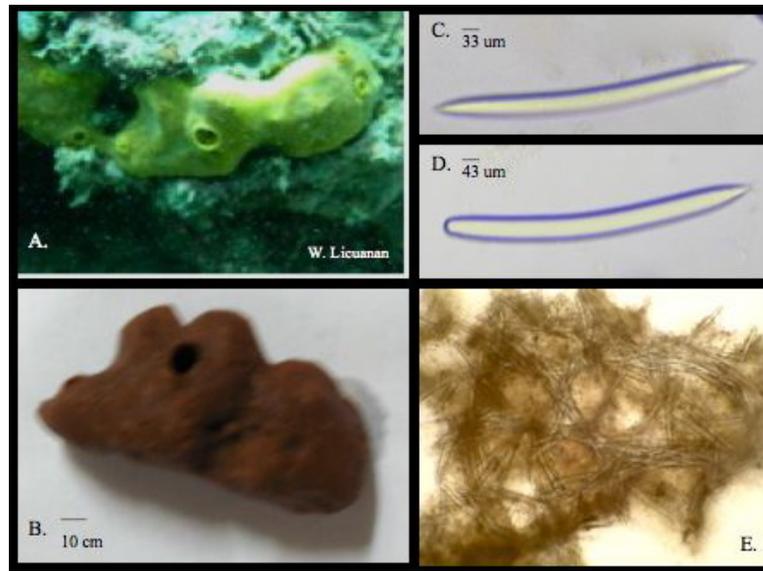


Figure 18. *Xestospongia* sp. in situ (A) and preserved (B) Spicules: oxea (C) and style (D) Skeletal arrangement (E) Annotations: Two specimen, TAL-TOA-005 (DLSU Z.C.), Torso 4A, Talim Bay, Lian, Batangas, 13°58'30.7"North, 120°36'56.8"East, May 7, 2009, 6.3 m deep; collected by Dr. W. Licuanan.

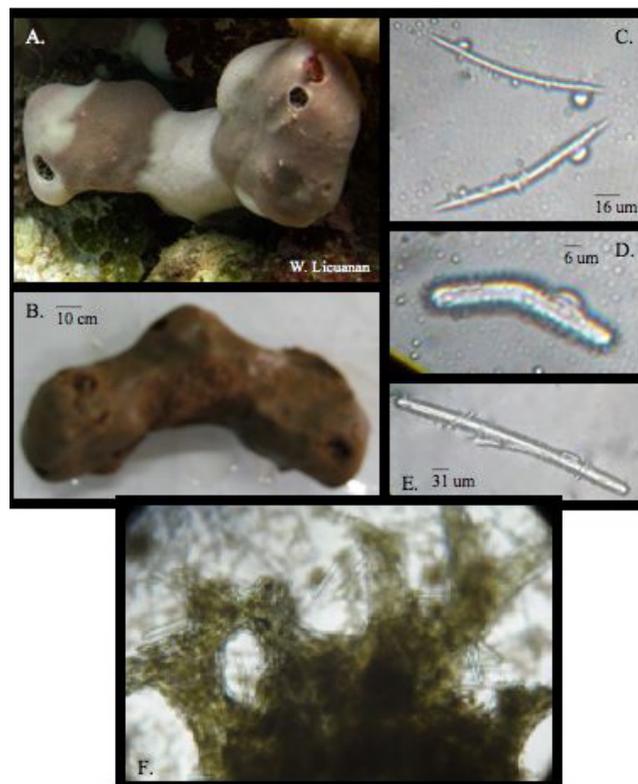


Figure 19. *Petrosia* (Strongylophora) sp. in situ (A) and fixed (B) Spicules: oxeotes (C) stylote (D) and strongyles (E) Skeletal arrangement (F) Annotations: Single specimen, TAL-CHA-002 (DLSU Z.C.), Clubhouse 2A, Talim Bay, Lian, Batangas, 14°00'17.8"North, 120°36'58.1"East, May 2, 2009, 4–5 m deep; collected by Dr. W. Licuanan.

*Diagnosis:* Sponge dark red brown in situ and adobe when preserved; granular appearance and texture rough and stony; incompressible body; xeaotes, stylotes, and strongyles present, stylotes sausage-like; skeletal arrangement in bundles, forming a circular network.

***Family Irciniidae Gray, 1867***

*Diagnosis:* Sponges generally gigantic, occasionally scattering, in varying assortment of forms including pad-like, large and cushion-like, lobate and digitate; exterior is conulose, micro-conulose, tuberculate, or smooth; skeleton pithed and concentrically coated with primary and secondary fibers; sponges not easy to tear due to nearby filaments.

***Genus Sarcotragus Schimdt, 1862***

Sponge with spreading, finger-shaped, and compact; surface conulose and

unarmored; fibrous skeleton apparent with very well sponging filaments; consistency firm, hard to compress, and tough, due to the filaments.

*Diagnosis:* Creeping and digitate growth forms; surface has small cone-like projections; light green in situ with a tinge of yellow, dark when preserved; rubbery and compressible; instead of spicules, spongin fibers present entangled with detritus materials.

***Family Chondropsidae Carter, 1886***

*Diagnosis:* Encrusting, massive, flabellate, or digitate growth appearance, surface usually reticulate or with poresieves, with spicular detritus nearby; with megascleres strongyles and occasionally styles; microscleres when present are arcuate isochelae and sigmas; skeletal arrangement irregularly plumose.

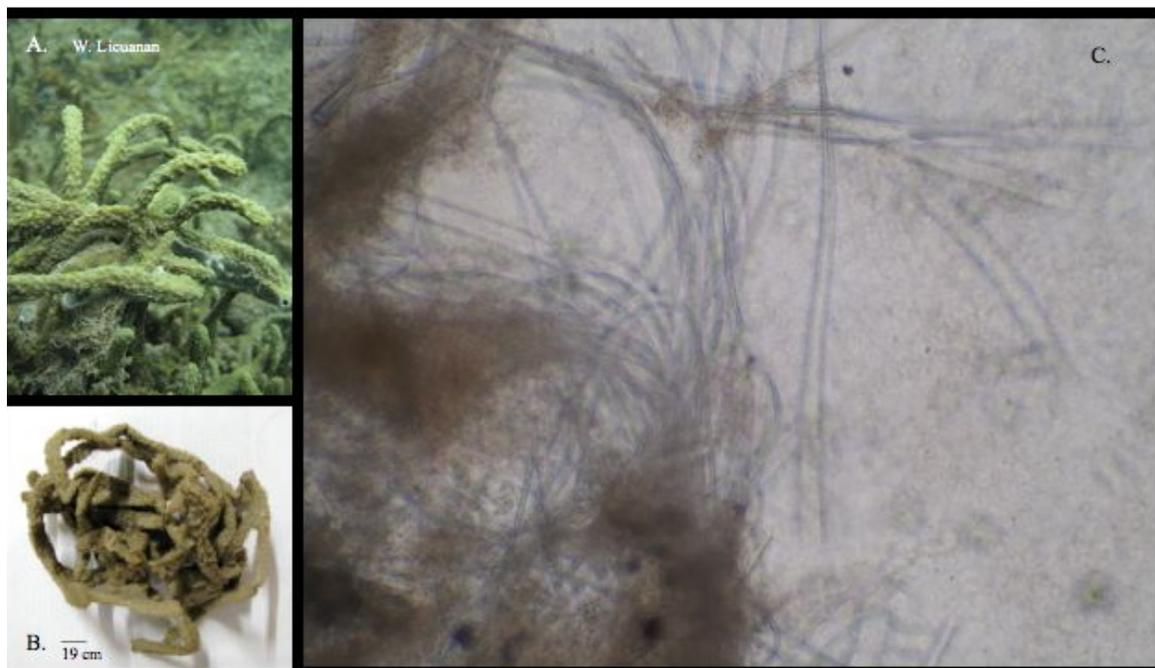


Figure 20. *Sarcotragus* sp. in situ (A) and fixed (B) Skeletal arrangement (C) Annotations: Single specimen, TAL-DUR-002 (DLSU Z.C.), Middle Duenas Reef, Talin Bay, Lian, Batangas, 13°58'49.6"North, 120°37'53.4"East, May 4, 2009, 9 m deep; collected by Dr. W. Licuanan.

**Genus Phoriospongia Marshall, 1880**

Sponges usually sandy in texture, megascleres subtylostyles or styles, and microscleres sigmas; skeleton with indistinct radial to plumose arrangement.

*Diagnosis:* In situ salmon pink in color, yellow brown when preserved; growth form foliose, texture elastic and compressible, however individual branches incompressible; spicules present are tylotes with blunt ends; microscleres present are C-shaped sigmas; skeletal arrangement radial, cored by styles, sand or foreign spicules.

**Family Clionidae D'Orbigny, 1851**

*Diagnosis:* Sponges proficient excavators; megascleres tylostyles; microscleres usually lacking, if present include microxeas, spirasters, amphiasters, microrhabds, or raphides.

**Genus Spheciospongia Marshall, 1892**

Sponges in general massive with complex pore sieves; usually excavated from source/origin; megascleres tylostyles however can be tailored into styles: tylostrongyles and strongyles.

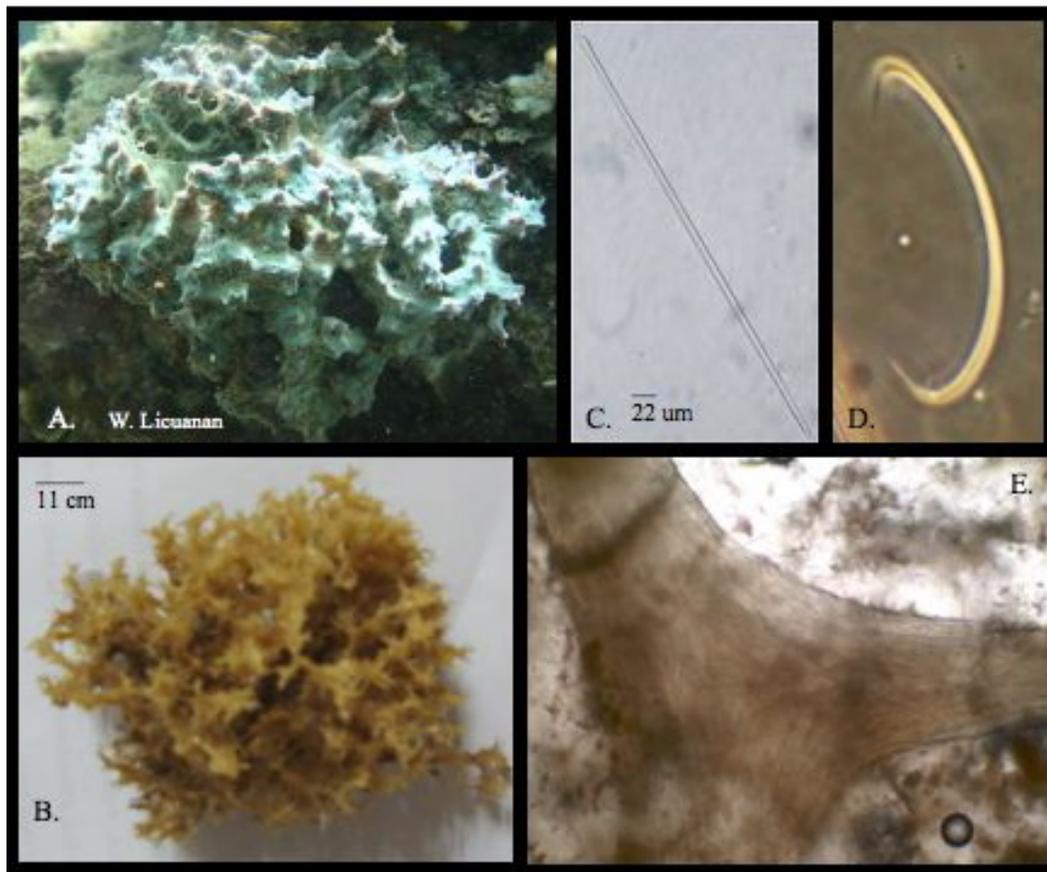


Figure 21. *Phoriospongia* sp. in situ (A) and fixed (B) Spicules: subtylostyle (C) and C-shaped sigma (D) Skeletal arrangement (E) Annotations: Single specimen, TAL-GAA-001 (DLSU Z.C.), Galvez 5A, Talin Bay, Lian, Batangas, 14°00'17.8"North, 120°36'58.1"East, May 3, 2009, 4–5 m deep; collected by Dr. Wilfredo Licuanan.

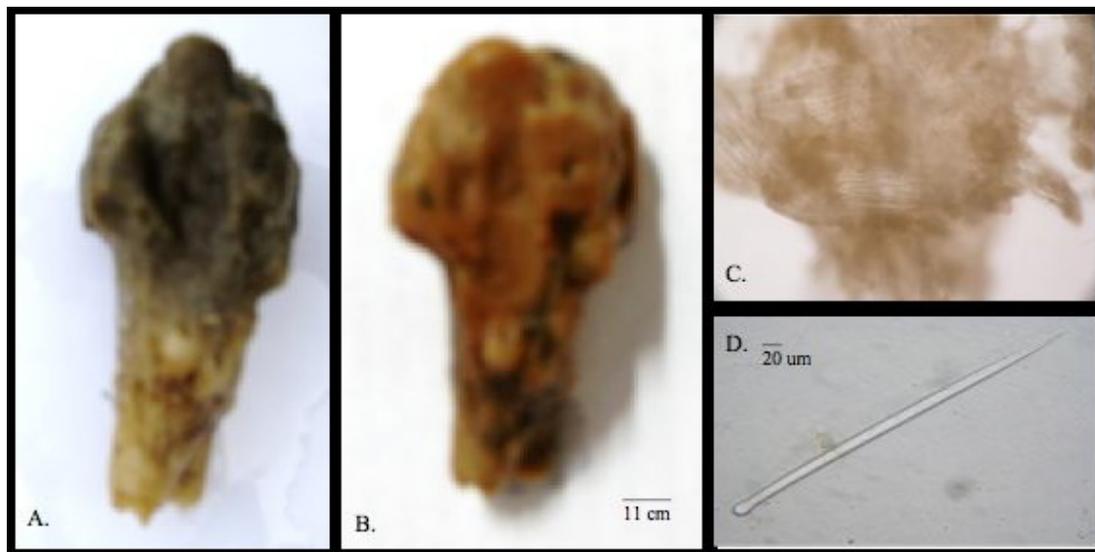


Figure 22. *Spheciospongia* sp. in situ (A) and fixed (B) Skeletal arrangement (C) Spicules: subtylostyle (D) Annotations: Single specimen, TAL-ROC-004 (DLSU Z.C.), Roces, Talim Bay, Lian, Batangas, 13°96'77.3"North, 120°61'47.02"East, May 8, 2009, 1m deep; collected by J. Tan.

**Diagnosis:** Knob-shaped in appearance; live specimen reddish brown, lighter when fixed, with the knob part in black; at the top of sponge are complex incurrent pore sieves; texture has elastic somewhat incompressible; spicules present: tylostyles with knob-like and pointed end, slightly bent; skeletal arrangement similar to a tangential network.

The three unidentified specimens (Fig. 23) were seagrass-inhabiting encrusted type and colored green in situ, sponge with creamy finger-like projections growth form and a sponge brown in situ with flabellated growth form and dorsally located oscules.

A comparison of the current findings covering nine sampling sites and a one-time collection of 24 specimens contrasted with an earlier unpublished study (Elmido et al., 1995), where 75 specimens were pooled from three collection periods, showed both survey a sponge collection all belonging to Demospongiae (Table 3). The 1995 collection however represented greater species diversity, but with the absence of Family Chalinidae including

the genus *Haliclona* that interestingly represented 29.2% ( $n = 7$ ) of the collection in the current survey. Comparatively, common to the present and 1995 surveys, which span a time difference of almost 20 years, are Genera *Xestospongia*, *Clathria*, *Petrosia*, *Petrosia (Strongylophora)*, *Ciocalypta*, *Callyspongia*, *Callyspongia (Cladochalina)*, and *Niphates*.

The dominance of Demospongiae sponges agrees with earlier reports in the Batangas area (Villaroman, 1996; Caberoy, 1981) and Cebu (Longakit, 2005). Several *Haliclona* spp. have been identified in Cebu (Longakit, 2005) and Tayabas Bay, Luzon (Caberoy, 1981), but not in Janao Bay, Batangas (Villaroman, 1996), and in the present survey in Talim Bay. There is clearly a marked decline in species diversity of sponges in Talim Bay reported in this study relative to earlier data (Elmido et al., 1995). The difference in the distribution of sponge species is likely considering differences in environmental conditions, notwithstanding the likely influence of pollution and other environmental and biological and community-

driven factors causing degradation of marine life in the area where several communities exists. In view of the documented decline in species diversity in the present survey, it is

important to closely monitor the underlying factors affecting sponge survival based on species loss and re-emergence and/or emergence of new species at Talim Bay.

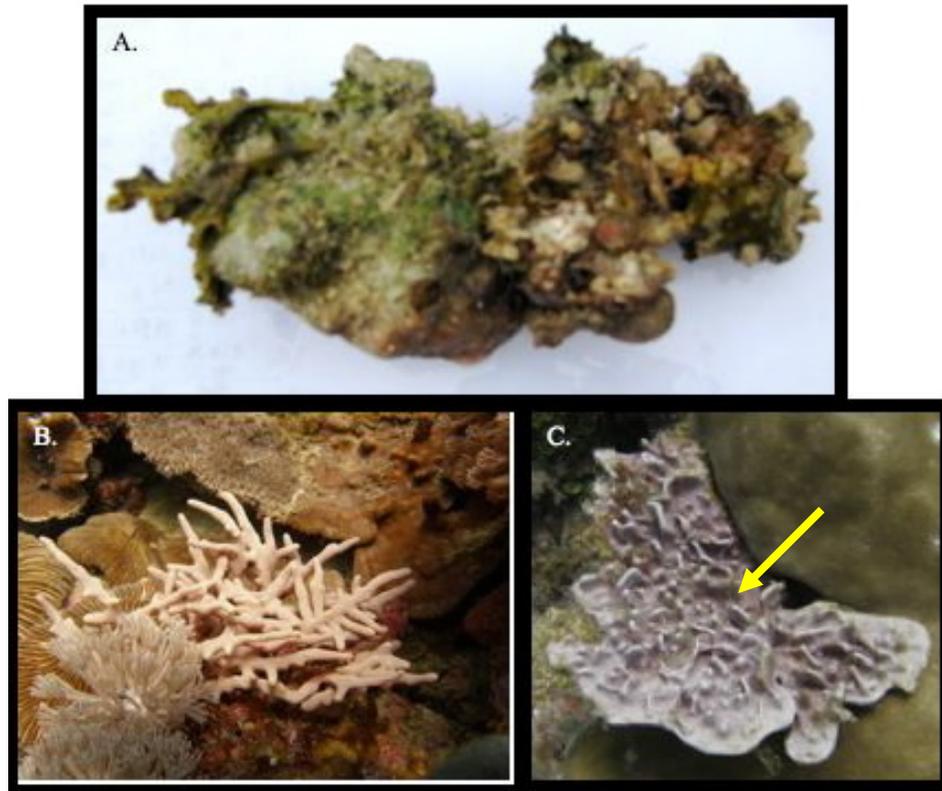


Figure 23. Three unidentified sponges. (A) Incrusted form and seagrass in habiting (Roces Mangrove). (B) Sponge with finger-like projection growth pattern (Inner Talim Bay). (C) Sponge with flabellated growth pattern showing oscules on top (Clubhouse 2A). Annotations: One each from Clubhouse 2A,  $14^{\circ}00'17.8''$ North,  $120^{\circ}36'58.1''$ East, 4.5 m deep; Inner Talim Bay,  $13^{\circ}58'35.7''$ North,  $120^{\circ}36'27.8''$ East, 6 m deep, and Roces Mangrove,  $13^{\circ}58'3.82''$ North,  $120^{\circ}36'52.99''$ East, 1 m deep.

Table 3. Comparison of Current Findings With Those of Elmido et al. (1995)

Parameters	Current Findings	Elmido et al. (1995)
Collection sites	<ul style="list-style-type: none"> <li>• Clubhouse 2A</li> <li>• Galvez 5A</li> <li>• Inner Talim 6A</li> <li>• Middle Duenas Reef</li> <li>• Layag-layag 3A</li> <li>• Outer Talim 7A</li> <li>• Toroso 4A</li> <li>• Roces Mangrove Waterway</li> <li>• Roces</li> </ul>	<ul style="list-style-type: none"> <li>• Reyna</li> <li>• Talin Point</li> <li>• Sampang</li> </ul>
Class	Demospongiae	Demospongiae
Number of families	10	18
Number of genus	14	30
Species	<ul style="list-style-type: none"> <li>• <i>Xestospongia testudinaria</i></li> <li>• <i>Xestospongia</i> sp.</li> <li>• <i>Clathria</i> sp.</li> <li>• <i>Axinella</i> sp.</li> <li>• <i>Ciocalypta</i> sp. 1 and 2</li> <li>• <i>Callyspongia</i> sp.</li> <li>• <i>Callyspongia (Cladochalina) samarensis</i></li> <li>• <i>Haliclona</i> sp.1, 2, 3, 4, and 5</li> <li>• <i>Haliclona (Gellius)</i> sp. 1</li> <li>• <i>Haliclona (Sigmatocia)</i> sp.</li> <li>• <i>Niphates</i> sp.</li> <li>• <i>Petrosia (Strongylophora)</i> sp.</li> <li>• <i>Sarcotragus</i> sp.</li> <li>• <i>Phoriospongia</i> sp.</li> <li>• <i>Sphaciospongia</i> sp</li> <li>• <i>Chalinulanematifera</i></li> </ul>	<ul style="list-style-type: none"> <li>• <i>Xestospongia testudinaria</i></li> <li>• <i>Xestospongia weidenmayeri</i></li> <li>• <i>Xestospongia</i> sp.1</li> <li>• <i>Petrosialignosavar. plana</i></li> <li>• <i>Petrosiasimilis</i></li> <li>• <i>Petrosia</i> sp.1</li> <li>• <i>Ciocalyptaamorpha</i></li> <li>• <i>Clathriafrondifera</i></li> <li>• <i>Niphatesamorpha</i></li> <li>• <i>Niphates digitalis</i></li> <li>• <i>Ircinia fasciculate (Pallas)</i></li> <li>• <i>Ircinia ramose</i></li> <li>• <i>Plakortis simplex</i></li> <li>• <i>Raspaliawilkinsoni</i></li> <li>• <i>Acanthellacarteri</i></li> <li>• <i>Acanthella</i> sp.1</li> <li>• <i>Phakelliacarduus</i></li> <li>• <i>Suberitesdomuncula</i></li> <li>• <i>Terpioszeteki</i></li> <li>• <i>Tertillahirsutam</i></li> <li>• <i>Cinachyraaustralensis</i></li> <li>• <i>Adociaimplexiformis</i></li> <li>• <i>Adocia</i> sp.1</li> <li>• <i>Sigmatociaacoerulea</i></li> <li>• <i>Sigmatociasymbiotica</i></li> <li>• <i>Rhizocalinaincrustata</i></li> <li>• <i>Amphimedonviridis</i></li> <li>• <i>Amphimedon</i> sp.1</li> <li>• <i>Callyspongiafallax</i></li> <li>• <i>Callyspongia vaginalis</i></li> <li>• <i>Pellinanodosa</i></li> <li>• <i>Biemnafortis</i></li> <li>• <i>Liosinagranularis</i></li> <li>• <i>Myxillacrucifera</i></li> <li>• <i>Dysideafragilis</i></li> <li>• <i>Carterospongiafoliascens (Pallas)</i></li> <li>• <i>Aplysillasulfurea (Schulze)</i></li> <li>• <i>Ianthellabasta (Pallas)</i></li> <li>• <i>Dactylospongiaelegans</i></li> <li>• <i>Verongia</i> sp.1</li> <li>• <i>Halichondria panacea</i></li> </ul>

## ACKNOWLEDGMENT

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