



An example of the importance of labels and fieldbooks in scientific collections: A freshwater sponge misunderstood for a marine new genus and species

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The demosponge genus *Crelloxea* Hechtel, 1983 was created to allocate a single species, *Crelloxea spinosa* Hechtel, 1983, described based on specimens collected by Jacques Laborel in northeastern Brazil in 1964 and deposited at the Porifera Collection of the Yale Peabody Museum. The genus *Crelloxea* was originally defined as "Crellidae with dermal and interstitial acanthoxeas and acanthostrogyles, with skeletal oxea and without microscleres or echinators" (Hechtel, 1983). *Crelloxea* was allocated in the marine sponge family Crellidae (Order Poecilosclerida), which is characterized by a tangential crust of spined ectosomal spicules (oxeas, anisoxeas or styles), a choanosomal plumose skeleton of smooth tornotes, sometimes a basal skeleton of acanthostyles erect on the substrate, microscleres usually arcuate chelae or absent, and surface with areolated pore fields (van Soest, 2002). Nowadays, *Crelloxea* is considered a junior synonym of *Crella* (*Grayella*) Carter, 1869 (van Soest, 2002; van Soest *et al.*, 2015).

Hechtel (1983) referred to the collection site of *Crelloxea spinosa* simply as "Tropical Brazil", with no mention of the precise locality or the nearest city. Muricy *et al.* (2011) briefly reviewed this record and discovered, with the help of the collector, that the specimen was collected at Olho d'Água Lagoon, in Jaboatão dos Guararapes (Pernambuco State). Since Olho d'Água is a fresh- to brackish-water lagoon, Muricy *et al.* (2011) suggested that *C. spinosa* could be a freshwater sponge and emphasized the need to investigate this hypothesis.

In this contribution we redescribe the holotype of *Crelloxea spinosa*, with emphasis on characters that demonstrate unequivocally that it is a freshwater sponge, *Spongilla alba* Carter, 1849. We concluded that the uncertainty about the precise location of the collection site ultimately led to this misidentification. We also show how, on the other hand, additional information on the back of the label and the keeping of the fieldbook by the collector for 47 years allowed us to correct this unfortunate mistake.

Systematics

Class Demospongiae Sollas, 1885

Suborder Spongillida

Family Spongillidae Gray, 1867

***Spongilla* Lamarck, 1816**

***Spongilla alba* Carter, 1849**

(Fig. 1)

For synonyms see Penney & Racek (1968) and Muricy *et al.* (2011).

New synonyms: *Crelloxea spinosa* Hechtel, 1983: 70.

Crella spinosa, Santos *et al.*, 2002: 393.

Crella (Grayella) spinosa, van Soest, 2002: 560; Muricy *et al.*, 2011: 162.

Specimens examined. *Crelloxea spinosa* Holotype YPM-9019, Schizotype MNRJ-14956, Olho d'Água Lagoon, Jaboatão dos Guararapes, Pernambuco State, 08°12'8.72"S 34°56'36.5"W, coll. J. Laborel, 13.v.1964.

General morphology. Eight fragments of an encrusting sponge measuring 2–8 cm long by 0.2–1.0 cm thick (Fig. 1A). Colour greyish brown in ethanol. Surface hispid, uneven, with low and irregular tubercles and ridges (1 mm high). Oscules not observed. Consistency soft.

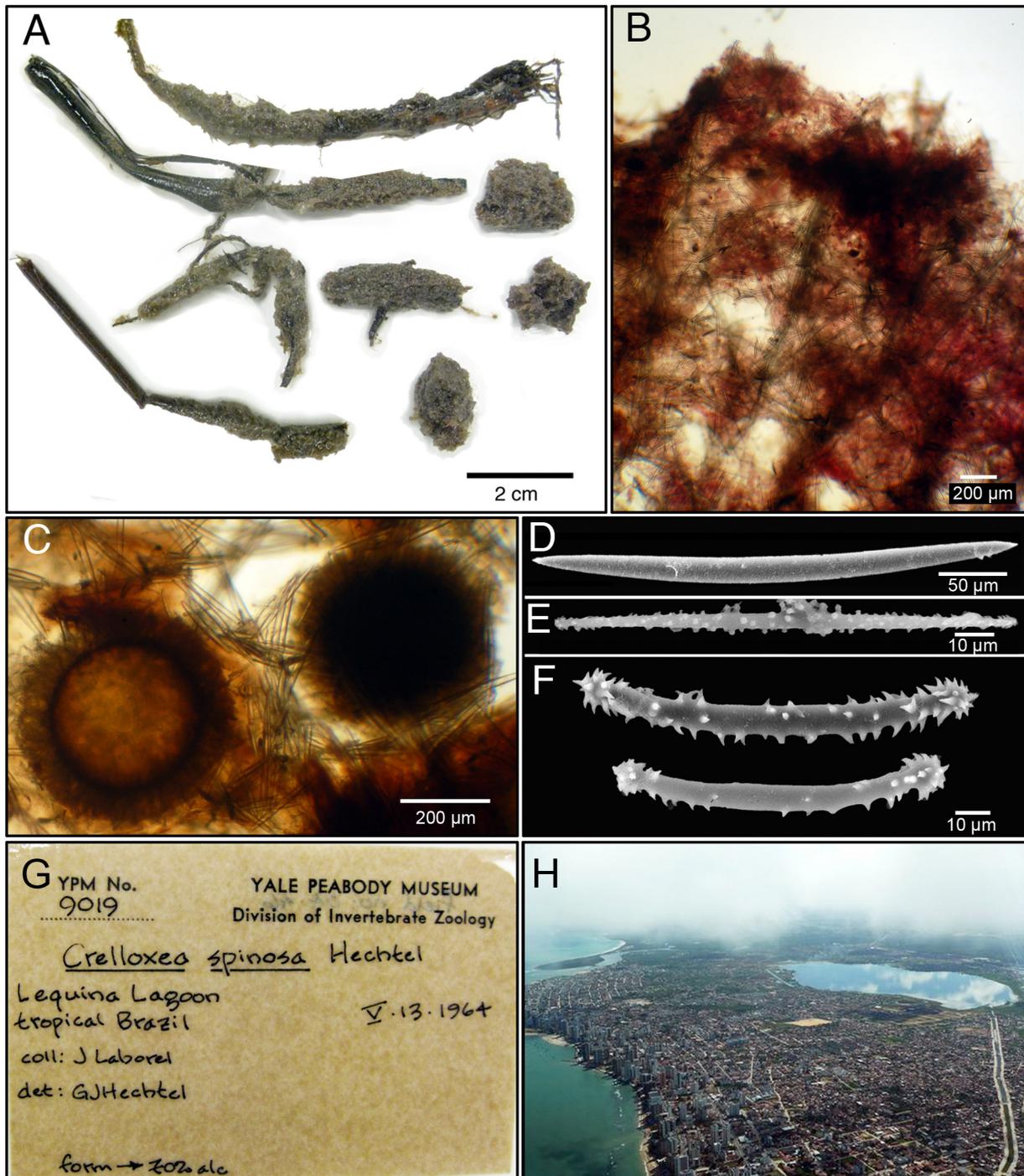


FIGURE 1. *Crelloxea spinosa* holotype (YPM 9019). A, external morphology. B, transverse section of ectosome and choanosome. C, gemmules. D, oxea. E, acanthoxea. F, acanthostrongyles. G, current label of the holotype of *Crelloxea spinosa*. Notice the hand-written statement "Field no. 04-46" on the back of the label, just below the inscription "Yale Peabody Museum" at the top right. H, aerial view of Jaboatão dos Guararapes, in Recife metropolitan area, with Olho d'Água Lagoon at the top right.

Skeleton. In transverse sections, the skeleton is an anisotropic reticulation of oxeas forming paucispicular (3–5 spicules across) ascending primary lines connected by very irregular, long paucispicular secondary lines. Acanthoxea and acanthostrongyles are sparsely dispersed in both the ectosome and the choanosome. Spongin and dispersed spicules are abundant (Fig. 1B).

Gemmules. Rare, roughly spherical, averaging 540 µm, with a central cavity surrounded by a thick cortex with gemmuloscleres embedded transversally (Fig. 1C).

Spicules. Megascleres predominantly straight to slightly curved, robust, smooth oxeas (249–346–408/9–17–21 µm; Fig. 1D). Microscleres thin, fusiform acanthoxeas densely spined (96–114–144/3–4 µm; Fig. 1E). Near both extremities, the spines are acutely pointed, directed towards the center of the spicule, where the spines become blunt and irregularly microspined. Gemmuloscleres straight to slightly curved acanthostrongyles (75–103–126/3–7–9 µm), with large acerate spines concentrated near the extremities and mostly curved towards the center of the spicule, where there are few acerate and no blunt spines (Fig. 1F).

Ecology. Specimens were collected on roots and leaves of *Eleocharis* sp. in a shallow fresh- to brackish water coastal lagoon with still waters. Average salinity in the lagoon can vary from 5–29 ppt in six months (Coelho, 1966). The location is currently a highly polluted urban lagoon with high sedimentation, but it was probably less polluted in 1964. Despite exhaustive searches, no more sponges were found there in recent years.

Distribution. Cosmopolitan: Afghanistan, Australia, Egypt, India, Indonesia, Japan, Madagascar, Iran, Phillippines, Thailand, Curaçao, El Salvador, Venezuela, U.S.A. (Florida, Louisiana, South Carolina). In Brazil: Amazonas River (Amazonas State); Mundaú-Manguaba Lagoons in Maceió and Ipanema River in Santana do Ipanema (Alagoas State); a locality not informed, Feia Lagoon in Campos dos Goytacazes and Quissamã, and Jacarepaguá in Rio de Janeiro (Rio de Janeiro State) (reviewed by Muricy *et al.*, 2011). This is the first record of *Spongilla alba* in Pernambuco State, although an unidentified Spongillidae was already recorded from Olho d'Água Lagoon (Coelho, 1966; Santos *et al.*, 2002), which probably belongs to the same species discussed here. *Spongilla alba* is currently accepted as cosmopolitan due to the lack of morphological differences between the disjunct populations worldwide, but genetic studies are necessary to verify if it is a truly cosmopolitan species or a complex of sibling species.

Discussion

Our reexamination of the holotype of *Crelloxea spinosa* showed that it differs from typical Crellidae by its megascleres (fusiform oxeas instead of tornotes; absence of echinating acanthostyles), microscleres (presence of acanthostrongyles) and surface (a "shaggy" surface with hispid tubercles and ridges *vs.* a complex cribriform surface in Crellidae). These differences were already noticed by Hechtel (1983) and van Soest (2002). Our discovery of typical spongillid gemmules in the holotype excludes definitively the hypothesis of a phylogenetic relationship with Crellidae *sensu* van Soest (2002).

Futhermore, several other features indicate unequivocally that the holotype of *Crelloxea spinosa* is a freshwater sponge, such as the reticulated skeleton formed by oxeas and acanthoxeas, and the gemmoscleres acanthostrongyles embedded transversally in the gemmule coats. The confirmation that the collection site is a fresh- to brackish water coastal lagoon and that the substrate was the stems and leaves of *Eleocharis* sp. further support this conclusion. The external morphology, skeletal architecture, microscleres and gemmuloscleres are all very similar in size and shape to those of *Spongilla alba*, a common species in mesohaline environments, especially coastal lagoons in Brazil's tropical and subtropical regions (Volkmer-Ribeiro & Machado, 2007). We therefore propose that *Crelloxea spinosa* is a junior synonym of *Spongilla alba*; accordingly, the genus *Crelloxea* is removed from the synonym of *Crella* and included in that of *Spongilla*.

What caused this misidentification? Hechtel (1983) stressed that "several specimens lack precise locality data, due to disintegration of labels". We believe that he was confounded by a poorly preserved label and induced to an erroneous interpretation by the fact that all other sponges in the Laborel collection were of marine origin (J. Laborel, pers. comm.). The holotype's current label was hand-written and states that the specimens were collected at "Lequina Lagoon, Tropical Brazil" (Fig. 1G); in the back of the label there is a hand-written statement "Field no. 04–46". The original label, hand-written by the collector Jacques Laborel, is missing. The sponge was fixed in acid formalin, which may have destroyed at least partially the original label. When the replacement label was made, it is possible that a partially erased, hand-written name "Olho d'Água" lagoon was misinterpreted as "Lequina" lagoon. There are, however, no lagoons, rivers or localities named "Lequina" in Brazil. Therefore, Hechtel (1983) stated the collection site of the specimen vaguely as "Tropical Brazil" probably because he could not find the location of the non-existent "Lequina lagoon". Coincidentally, this was the only freshwater sponge in the Laborel collection, and due to the lack of data on the locality of collection Hechtel might have been induced to assume it was of marine origin like all the other samples.

The precise collection site was discovered thanks to the hand-written field number "04–46" on the back of the label.

When we contacted the collector in 2011 (47 years after the collection), he still had the fieldbooks of his PhD thesis about the Brazilian coral reefs, made in 1961–1965. There he found the following information of specimen 04–46 (translated from French): "possible spongillid with gemmule-like structures, collected in May 1964 over leaves of *Eleocharis* in Olho d'Água lagoon (Recife southern metropolitan area, near Barra das Jangadas estuary)" (Fig. 1H). The mystery was thus finally solved, thanks to a field number written on the back of the label and a fieldbook carefully preserved by the collector for 47 years and, indeed, for all his life. Sadly, Prof. Jacques Laborel died in April 2011, only two months after giving us the crucial information that solved the puzzle. We hope his example will encourage other researchers to preserve their field notes as carefully as he did. Museums could also encourage collectors and donors to deposit a copy of their fieldbooks together with the biological collections to ensure a longer preservation of field data.

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