NEW SPECIES OF CNIDARIA IN THE BLACK SEA: *HALAMMOHYDRA* SP. AND *STYLOCORONELLA* SP., INTERSTITIAL FORMS AT MID-LITTORAL SANDY BEACHES

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Abstract The paper signals for the first time in the Black Sea the presence of new Cnidaria species belonging to genera *Halammohydra* and *Stylocoronella*. In October 1996, at Vama Veche beach (Southern part of the Romanian Coast, 45 km South of Constantza), in the samples collected from mediolittoral strip consisting of medium-coarse sand with broken shells, some polypoid individuals were found among other interstitial organisms. Difficulties connected with biological material preserved with formaldehide, then the scarcity of literature and insuccesses in finding living specimens for analyses, postponed the publication of the results sooner. Finding again in 2003 new specimens of the same type and in the same zone, and again in preserved samples determined the authors to write the present note.

Keywords: Psammobiothic interstitial Cnidaria, meiofauna, mid-littoral, Black Sea biodiversity

INTRODUCTION

The Black Sea breaking-wave zone (mid-littoral or pseudo-littoral benthic level, synonymous withy inter-tidal level of the seas characterized by tides), which extends for a small area, practically because of the lack of tides, was less studied from an ecological point of view (Băcescu *et al.*, 1967; Băcescu, Gomoiu & Dumitrescu, 1968; Gomoiu, 1963, 1965, 1967, 1968, 1969; Gomoiu et Gomoiu, 1968; Gomoiu et Baltac, 1968; Mokievskyi, 1949, 1960; Petran, 1963; Stoicovici et Gomoiu, 1968; etc.).

After a long absence in the researches concerning this sandy zone, in October 1966 at Vama Veche – Romanian South Coast (Fig. 1), in samples with coarse sand and broken shells collected from the upper mid-littoral strip (to the maximum limit of waves breaking onto the beach), were found for the first time in the Black Sea, some specimens of polypoid individuals. These new forms at the Romanian littoral are representatives of some interstitial Cnidaria belonging to the genera *Halamohydra* (Fig. 2) and *Stylocoronella* (Fig. 3); we mention that all observations and identifications were performed only on samples preserved in formaldehyde 5 %. After the sorting of the samples, Cnidaria specimens were transferred in alcohol mixed with glycerin and are kept by the first author.

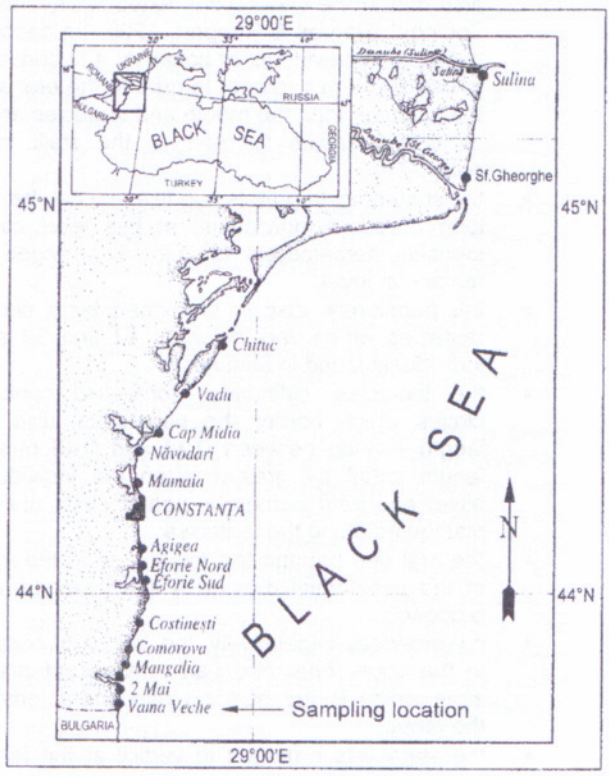

Fig. 1 Romanian Coast of the Black Sea and sampling location

DESCRIPTION OF THE NEW FORMS

Phyllum **CNIDARIA**
Class **HYDROZOA**
Order **HYDROIDA**
Suborder **HALAMMOHYDRA**

Genus *Halammohydra* (Fig. 2)

The polyp is elongated, its distal end is cup-like, the length of complete individuals varies between 2. 0 mm and 3.5 mm (the analysis was performed on ten individuals, only two of them being intact):

- the attaching disc is quite large in comparison with the total length of the polyp, the maximum size of the diameter is 0. 45 mm;

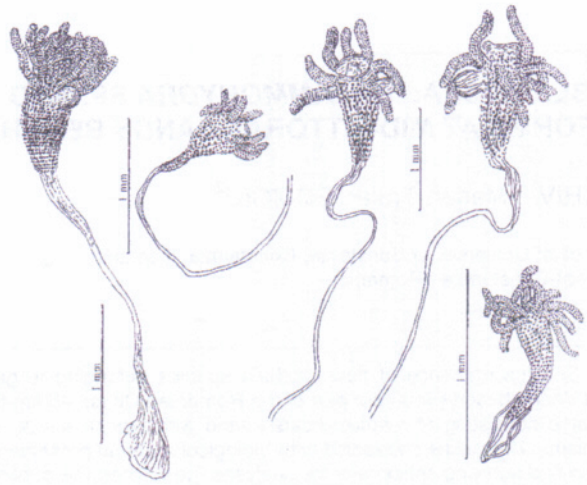

Fig. 2 *Halamohydra* sp. (original drawings after preserved material)

- the stalk is cylindrical, long, thin (it can sometimes be 2 mm long), without nematocysts; Salvini Plawen (1966) calls this stalk „*hydrocaulus*" as it is also met in the well-known textbook „Invertebrate Zoology" (Barnes & Ruppert, 1995: "In describing hydrozoan individuals or colonies, it is convenient to use the term hydranth to refer to the oral and of the polyp bearing the mouth and tentacles and the term hydrocaulus to refer to the stalk of the polyp.");
- the subtentacular part is cup-like and can be 1 mm long at some individuals; at this level can be identified nematocysts as uniformly arranged as at tentacular level;
- the peristomial disc is surronded by a circle of tentacles which vary between 12 and 16 at the individuals found in samples;
- the tentacles, cylindrical, form two concentric circles which border the peristomial disc, their length varying between 0.34 and 0.46 mm (the length might be greater when the individual is alive) and bear numerous nematocysts uniformly distributed along the tentacles;
- the oral end bearing the mouth lies in the middle of the peristomial disc on a small protuberance-proboscis;
- it reproduces vegetatively, the „budding" occurring in the upper one third part of the subtentacular zone which is the budding part characteristic of the group;
- the statocysts arranged in verticil at the tentacle bases are described as having a constant presence at the hydropolyps of interstitial Cnidaria; maybe these structures are visible at living organisms; as our observations were performed on preserved material, we cannot signal the presence of these structures at the individuals analysed by us as the structures become imperceptible because of formaldehyde.

The systematics of the interstitial Cnidarians is still uncertain and it is not totally accepted by all scientists due to the great morphological variability of the individuals as a function of age, substratum particularities: grain size, mineral or biogen origin, water mass hydrodynamics etc. The first description of the mesopsamic representatives from the cnidarians group is attributed to Remane (1926), and the systematics is done by Swedmark and Teissier (1957).

The representatives of the Cnidaria Phyllum, Hydrozoa class may be included in three orders:
– the Actinulida order - includes species to whom the polyp may be fixed or free, hermaphrodite or not, the jellyfish stage is missing from the life cycle of some species; the Actinulida order is described as the most numerous interstitial cnidarians' group, the polyps having neotenous characters; the species *Halammohydra octopodides* (Remane), *Halammohydra schulze* (Remane), *Halammohydra vermiformis* (Swedmark), *Otohydra vagans* (Swedmark & Teissier) were cited from this order;
– the Tubularidea order includes fixed species, in the true sense of the term sedentary: *Psammohydra nana* (Schulz), *Siphonohydra adriatica* (Swedmark & Plawen);
– the Armohydridae order, with a more peculiar morphology *Armohydra janoviczi* (Swedmark & Teissier);

Two other species are cited: *Boreohydra simplex*, living in muds and *Boreohydra simplex*, whose systematic appointment is still uncertain (Swedmark, Teissier, 1957).

Despite some difficulties related to the extraction of these animals (as well as for the entire mesopsammon) alive and keeping their corporeal integrity, from their habitats, Swedmark and Tessier try to present an analysis of the morphological variation at the mesopsamic cnidarians from the *Halammohydra* genus.

The species described by Remane (1927), *Halammohydra octopodides* (found at Kiel) and *Halammohydra schulze* (found in Helgoland), are considered as characteristic for the littoral mesopsamon and are quite frequently met at the Baltic Sea, North Sea, English Channel and the Mediterranean. A new form of *Halammohydra schulze* is met in the Roscoff fauna and comparisons with already described forms are attempted.

As for the number of tentacles - considered a taxonomical criterion for these organisms (constantly done as being on a tetrameric structure) as well as of statocysts at *Halammohydra schulze*, a high enough morpho-logical variability was established at the specimens found at Roscoff (Swedmark, Teissier, 1957); apparently, the variability (especially as tentacles' number) is the result of the individuals' age; at the young forms the tentacles' number is low. To the four primary temtacles of the larva others are added (always as a multiple of 4) succesively; the growth of these tentacles is sensibly affected - as rhytem/speed, by the particular ecological conditions of each habitat. The final number of tentacles of adult forms (reproducing sexually) is 32, but it seems that this number is not reached by all individuals; Remane describes a material (from Helgoland), where the number of tentacles varies from 14 to 24 (this may signify either an exam of too few individuals or that at Helgoland the ecological conditions do not allow the

final multiplication of the tentacles; subsequent studies will confirm or infirm this).

After the examination of a simmilarly reduced number of *Halammohydra schulze* individuals from the Mediterranean (Marseilles), it looks like the Mediterranean form of the species has 12-20 tentacles, but corresponding to the Helgoland morphological type.

A local variation of the tentacles' number was established at the species *Halammohydra octopodides* present at Roscoff - 7-8 tentacles (90% of the specimens had 7 tentacles) (Swedmark & Teissier, 1957), while Remane (1927) mentions the specimens from Kiel as having 10-13 tentacles.

Nematocysts are generally considered as qualitative characters constantly present at all interstitial cnidarians species; however, it is signalled that in different geographic regions, a given species of *Halammohydra* may differently combine 3 nematocysts types of the genus (usually presenting one or another type).

The local forms also show different preferences for the substratum type. A direct correlation was evidenced between the substratum type (grain size), its nature (terrigenous or biogenous-shelly type) and the morphological variations and, even more, some variations related to aspects of their biology.

The conclusion is that these organisms have a large capacity of adaptation to certain environmental factors, this fact determining the appearance of local populations with obvious morphological variations which can easily mislead to errors concerning their systematics. Remane (1927) stated at that time that this world is not sufficiently studied, supposing that in fact this group of organisms is spread over a larger area than it was belived at that time as it presents an amazing capacity of adapting and conquering sandy habitats. We consider that the assertion of such a great researcher as Remane is today as valid as it was at that time.

Phyllum **CNIDARIA**
Class **SCYPHOZOA**
Order **Stauromedusae** Sessile scyphozoans attached by a stalk on the aboral side of the trumpet-shaped body.

Genus *Stylocoronella*
(Fig. 3)

Besides the interstitial hydropolyps previously presented, a representative (a unique fixed individual;) of the interstitial sciphozoans from the *Stylocoronella* genus (Salvini Plawen, 1966) was also identified in the same samples with coarse sand and broken shells from Vama Veche, in October 1966.

- The polyp respects the schiphozoan prototype:
- it is elongated, with the upper region oval shaped, the length of whole organisms cannot be appreciated as we do not have an intact individual;
- the attaching disk could not be observed;
- the cylindrical stalk (peduncle), long, tapered, presents a dilated portion close to the subtentacular zone and lacks cnidoblasts.

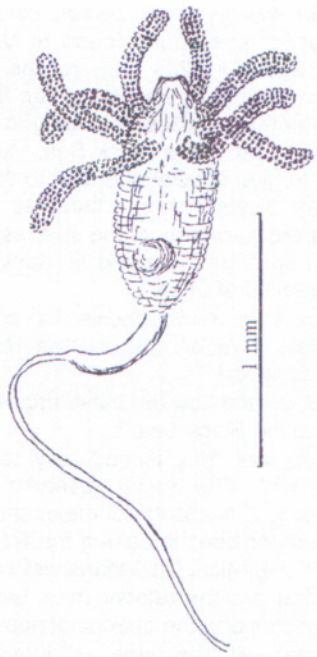

Fig. 3 *Stylocoronella* sp. (original drawings after preserved material)

- the tentacles (they were eight at the specimen we found), cylindrical, forming only one row, border the peristomial disc, their length varies between 0.62-0.76 mm; numerous nematocysts are uniformly arranged along the tentacles;
- the oral end is situated on the central proboscis, which is elongated and able to rise;
- it reproduces vegetatively, the „budding" occurring in the lower one third part of the subtentacular level which is the budding part characteristic of the group;
- literature describes the presence of ocelli (ocellar spots) at tentacle bases, but these structures are visible only on a living organism, so we cannot assert their presence;
- the species of the genus are described as being passive predators, dependent on water currents, sessile, yet they can move on small distances with the help of the stalk; when they separate from t6he substratum, they need a longer period of time to become attached again; the stalk and the tentacles to a smaller extent, have a contractile capacity and these contractions seem to be produced in a greater degree by light/shadow changes than water current changes; they prefer sands which are coarse but clean, poor in detritus (Salvini Plawen, 1966).

The systematics of these species is questionable; it is certain that histological studies bring proofs beyond doubt concerning the fact that they belong to Scyphozoa group; up to now only *Stylocoronella* genus with *S. adriatica* and *S. riedli* species is known and the specialists have not yet defined the systematics of the group. It is supposed that these organisms have a large morphological variability, function of populated habitats, as it comes out in the case of interstitial Hydrozoa, but proofs are scarce.

For the moment, we cannot continue with the identification of specimens found at Vama Veche in 1966 and again in 2003 up to the species; they represent a novelty at the Romanian littoral and it is sure that no other species belonging to this group has been found so far in the Black Sea. Our duty for next summer is to give special attention to these forms and analyse as many living samples as possible. Elucidating the taxonomy of the species recently found remains an open problem and so does the answer to some problems that arise:

- Are they new species for science, for the Black Sea or only for the Romanian Black Sea littoral ?
- When and how did these organisms penetrate into the Black Sea ?
- Why are they limited only to Vama Veche beach? The same research effort for the study of mediolittoral meiobenthos was made at other beaches along the Romanian littoral, but interstitial Cnidarians were no more found.
- What are the relationships between the new species and the aboriginal populations ?
- How will the size of interstitial Cnidaria populations evolve in the future ?

At the moment, without discussing more about the problem, we present some of the general characteristics of the autochthonous populations living at midlittoral benthic level, of the interstitial benthic community where *Halamohydra* species and *Stylocoronella* were found, there characteristics coming out of the data provided by the 54 samples collected monthly in 1996 from May to October (Table 1).

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Table 1 General characteristics of the benthos populations from the mid-littoral zone at Vama Veche beaches in October 1966 and average monthly values for May - October 1996: F% - Constancy; D_{AVG}, B_{AVG} - Average density (sps.dm^{-2}) or biomass (B - g.dm^{-2}); D_{ECO}, B_{ECO} - Ecological density (sps.dm^{-2}) or biomass (B - g.dm^{-2}); D_D%, D_B% - Dominance; Rk_D, Rk_B - Rank of species after the density or biomass

Crt. No.	Taxonomic Grup	Abv. Group	Species	October 1966		Average values resulted from May - October 1966 sampling								
				D-sps.dm^{-2}	B-g.dm^{-2}	F%	D_{AVG}	D_{ECO}	D_D%	R_{kD}	B_{AVG}	B_{ECO}	D_B%	R_{kB}
1	Cnidaria	CND	*Actinulida sp.* (Hydrozora)	2.8	0.0003	16.7	0.46	2.78	0.01	35	0.00	0.00	0.00	36
2		CND	*Stylocoronella sp.* (Sciphoza)	1.0	0.0001	16.7	0.17	1.00	0.00	38	0.00	0.00	0.00	38
3	Turbellaria	TUR	*Plagiostonum ponticum* (Preya)	104.7	0.0628	100.0	414.68	414.68	6.29	6	0.25	0.25	7.71	4
4		TUR	*Pseudomonocelis ophicocephala* (Schm.)	381.1	0.1524	100.0	210.42	210.42	3.19	8	0.08	0.08	2.61	7
5		TUR	*Monocelis lineata* (Muller)	298.6	0.1792	100.0	151.53	151.53	2.30	11	0.09	0.09	2.82	6
6		TUR	*Archilina endostyla* (Ax.)			83.3	146.53	175.83	2.22	12	0.06	0.07	1.82	9
7		TUR	*Polycladida sp.*	6.7	0.0040	100.0	73.84	73.84	1.12	15	0.04	0.04	1.37	10
8	Nematoda	NEM	Nematoda *var. gen. et sp.*	62.2	0.0001	100.0	611.81	611.81	9.29	5	0.00	0.00	0.03	23
9	Archiannelida	ARH	*Nerilla antennata* (Schm.)	618.9	0.3713	100.0	934.72	934.72	14.19	3	0.56	0.56	17.38	2
10		ARH	*Nerilla stygicola* (Ax.)	780.0	0.4680	100.0	914.03	914.03	13.87	4	0.55	0.55	16.99	3
11		ARH	*Saccocirrus papillocercus* (Bob.)	1593.9	1.7533	100.0	1180.19	1180.19	17.91	1	1.30	1.30	40.22	1
12		ARH	Archiannelida var. juv.	131.1	0.0656	100.0	188.66	188.66	2.86	9	0.09	0.09	2.92	5
13		ARH	Archiannelida var. larvae	45.0	0.0135	100.0	101.57	101.57	1.54	13	0.03	0.03	0.94	11
14	Polychaeta	POL	*Brania clavata* (Clapar.)	3.3	0.0010	83.3	4.17	5.00	0.06	18	0.00	0.00	0.04	24
15		POL	*Grubea limbata* (Clapar.)	1.1	0.0003	83.3	1.76	2.11	0.03	25	0.00	0.00	0.02	25
16		POL	*Sphaerosyllis bulbosa* (South.)	8.9	0.0071	100.0	8.24	8.24	0.13	17	0.01	0.01	0.21	16
17		POL	*Mycrophtalmus sczelkovii* (Mecz.)	4.4	0.0036	66.7	2.85	4.28	0.04	22	0.00	0.00	0.07	18
18		POL	*Nerine cirratulus* (Delle Ch.)			16.7	0.19	1.11	0.00	36	0.00	0.00	0.00	37
19		POL	*Nereis rava* (Ehlers)			16.7	0.09	0.56	0.00	40	0.00	0.01	0.03	32
20		POL	*Scolelepis ciliata* (Kefer.)			50.0	0.72	1.44	0.01	30	0.00	0.00	0.01	33
21		POL	*Spio filicornis* (Muller)			33.3	0.35	1.06	0.01	33	0.00	0.00	0.00	34
22		POL	*Fabricia scabella* (Ehren.)	27.2	0.0027	66.7	22.55	33.82	0.34	16	0.00	0.00	0.07	20
23	Oligochaeta	OLI	Oligochaeta *var. gen. et sp.*	452.8	0.0906	100.0	248.66	248.66	3.77	7	0.05	0.05	1.54	8
24	Ostracoda	OST	Ostracoda *var. gen. et sp.*	104.4	0.0068	100.0	170.23	170.23	2.58	10	0.01	0.01	0.34	14
25	Copepoda	COP	Harpacticoida *var. gen. et sp.*	1316.7	0.0263	100.0	1054.26	1054.26	16.00	2	0.02	0.02	0.65	13
26	Amphipoda	AMF	*Gammarus olivi* (Edwards)			66.7	2.53	3.79	0.04	23	0.00	0.00	0.07	19

Table 1 *(continued)*

Crt. No.	Taxonomic Grup	Abv. Group	Species	October 1966		Average values resulted from May - October 1966 sampling								
				D-sps.dm^{-2}	B-g.dm^{-2}	F%	D_{AVG}	D_{ECO}	D_D%	R_{kD}	B_{AVG}	B_{ECO}	D_B%	R_{kB}
27		AMF	*Stenothoe monoculoides* (Mont.)			50.0	0.79	1.57	0.01	29	0.00	0.00	0.02	26
28		AMF	*Amphytoe vaillanti* (Lucas)			66.7	1.94	2.92	0.03	27	0.00	0.00	0.05	22
29	Isopoda	ISO	*Sphaeroma serratum* (Fabricius)	5.0	0.0045	83.3	1.85	2.22	0.03	24	0.00	0.00	0.05	21
30		ISO	*Sphaeroma pulchellum* (Colosi)			50.0	0.63	1.26	0.01	31	0.00	0.00	0.02	28
31		ISO	*Eurydice dollfusi* (Monod.)			33.3	0.35	1.06	0.01	34	0.00	0.00	0.03	27
32		ISO	*Eurydice pontica* (Czern.)	2.2	0.0060	100.0	1.44	1.44	0.02	26	0.00	0.00	0.12	17
33		ISO	*Idotea baltica* (Audouin)			50.0	1.67	3.33	0.03	28	0.05	0.10	1.55	12
34		ISO	*Naesa bidentata* (Adams)			16.7	0.17	1.00	0.00	39	0.00	0.00	0.00	35
35	Arachnida	ARA	*Copidognathus fabricii* (Lohmann)	7.8	0.0005	66.7	3.43	5.14	0.05	20	0.00	0.00	0.01	30
36		ARA	*Copidoghnatus ponteuxinus* (Mot.& Soa.)	51.4	0.0036	83.3	120.69	144.83	1.83	14	0.01	0.01	0.26	15
37		ARA	*Halacarellus basteri affinis* (Trou.)	8.3	0.0006	50.0	4.54	9.07	0.07	21	0.00	0.00	0.01	31
38		ARA	*Rhombognathus pascens* (Lohmann)			66.7	5.14	7.71	0.08	19	0.00	0.00	0.01	29
39	Insecta	INS	*Podura aquatica* (Linne)	0.6	0.0000	33.3	0.37	1.11	0.01	32	0.00	0.00	0.00	39
40		INS	*Annurida maritima* (Guerin)			16.7	0.19	1.11	0.00	37	0.00	0.00	0.00	40
			Density - sps.dm^{-2} or Biomass - g.dm^{-2}	6020.2	3.2242		6588.38		100%		3.23		100%	