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On the distribution of *Plumatella casmiana* in the European and Mediterranean parts of the Palaearctic region (Bryozoa, Phylactolaemata)

by

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Abstract: In 1991 *Plumatella casmiana* was found near Puerto Cruz (Tenerife, Canarian Islands). This new record as well as those reported during the last decades in central and western Europe (Bulgaria, Poland, Hungary, Austria, Italy, France, Luxembourg, Germany) and the east of the Mediterranean region (Israel) emphasize the cosmopolitan character of the species and make its distribution area look much less discontinuous as hitherto described. The question is: Has the species been overlooked previously or is it extending its distribution area?

Introduction

On July 28, 1991 we collected in the waterlily basin of the Botanical Garden near Puerto Cruz (Tenerife, Canarian Islands) two bryozoan colonies corresponding to *Plumatella casmiana* as revealed by the SEM study of the statoblasts (floatoblasts, leptoblasts). From previous studies only *P. repens* and *P. fungosa* were known from Tenerife (Massard & Geimer 1990b, 1991a).

Description

The two *P. casmiana* colonies – one smaller and one larger – were growing on the underside of a waterlily leaf, the larger colony in the middle of the leaf, partially extending on the petiole, the smaller one near the leaf rim.

The diameter of the larger colony is 1.5 cm. The smaller colony is flabelliform, 0.7 cm broad and 0.3 to 0.5 cm long. Both colonies have yellowish red-brown, distinctly keeled tubes. The septa are very apparent. The zoaria are entirely adherent, dichotomously branching with distal tubes laterally coalescent. The number of tentacles (14 measurements) varies from 25 to 31 (average: 28) (fig. 1).

Whereas the smaller colony did not contain any statoblasts, the larger colony yielded two kinds of them: normal floatoblasts with a pneumatic annulus fairly encroaching the capsule and thin-walled leptoblasts with a narrow annulus. Leptoblasts already germinating were present outside the zoarium. There were no sessoblasts.

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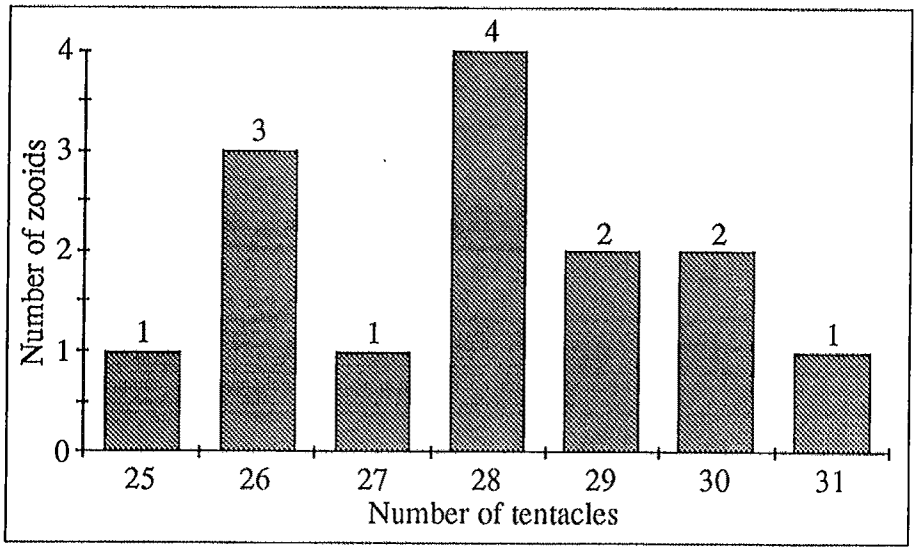


Fig. 1: Number of tentacles of the zooids.

Some statoblasts were retrieved for measurements under the light microscope and for closer SEM observation.

Floatoblasts are oval and have a well developed annulus. Dorsally they are more convex than on the ventral side. These features remind the "forma intermedia" type of floatoblasts described by Wiebach (1963a). The encroaching part of the annulus is rather transparent, so that the capsule border is clearly visible during light microscopy, especially on the ventral side. There is a light crescent-shaped depression in the polar part of the annulus.

Although cleansed in ultrasonic bath the few SEM-studied statoblasts still remained fairly incrusted with dirt. The resulting photographs of the floato- and leptoblasts (figs 2-11) show the same features as those of the *P. casmiana* material from Luxembourg described in 1986 (Geimer & Massard 1986), so there can be no doubt about the identification of the present species.

Tab. 1: Individual floatoblast measurements of *P. casmiana*.

L	W	A-p	A-l	C-l	C-w	F-l	F-w	L/W
389	213	84d	45-46d	305d		221d	122d	1.82
idem	idem	77-84v	48v	315v	192v	228v	120v	idem
355	204	72d	38-41d	297d		211d	125d	1.74
390	217	-	-	-	-	-	-	1.79

L = floatoblast length, W = floatoblast width, A-p = polar annulus width, A-l = lateral annulus width, C-l = capsule length, C-w = capsule width, F-l = fenestra length (fenestra = free part of the capsule), F-w = fenestra width, L/W = length-width ratio, d = dorsal side of the floatoblast, v = ventral side of the floatoblast.

Leptoblasts measurements: 283 x 140 µm, 316 x 120 µm, 256 x 167 µm.

Zoogeographical discussion

Plumatella casmiana is considered a cosmopolitan species with rather a discontinuous distribution (Lacourt 1968, Bushnell 1973, Wiebach & d'Hondt 1978). In the palaearctic region it was long known only from Russia (Annandale 1915, Behning 1921, 1924, Abrikosov 1927). Later on it was signalized in Hungary: Lake Balaton (Sebestyén 1961), Körös and Tisza (Kolosváry & Ferencz 1967), then in Bulgaria (Grancarova 1968, 1979) and in Poland (Kaminski 1984).

In western Europe the species was first detected near Arles in France (Wiebach 1963a), then in Lago Trasimeno and Lago di Rascino in Italy (Vigano 1966, 1968 a,b). Concerning Lago Trasimeno *P. casmiana* is also mentioned by Taticchi (1989). In 1985 *P. casmiana* colonies were discovered in an artificial waterbody near Echternach in Luxembourg filling in with water in 1976/77 (Geimer & Massard 1986, Massard & Geimer 1990a) and where the species is still flourishing (unpublished data).

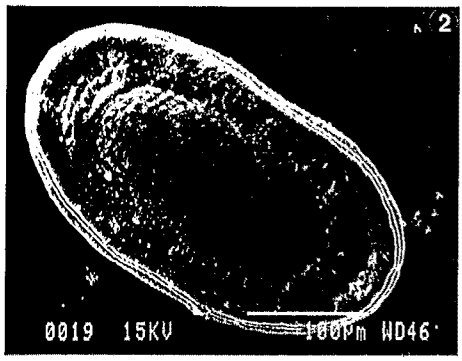
Wiebach (1963b) showed that a bryozoan found in the 19th century by W. Müller near Greifswald in Germany and described as "forma intermedia" of *P. princeps* (= *P. emarginata*) by Kraepelin (1887: 122, pl. VII) corresponds to *P. casmiana*. This had already been suspected by Rogick (1941). Rao & al. (1978) worked on *P. casmiana* material sent from Germany by Wiebach and collected in what the Indian scientists enigmatically call "Tellesch lake, Humburg" (Hamburg?). *P. casmiana* was found in the Landkreis Lüchow-Dannenberg, Lower Saxony (Martens 1983). It is also occurring in the Rhine-Main region (Franz 1992).

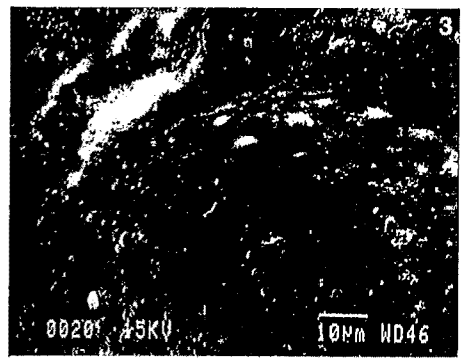
In Austria *P. casmiana* was recorded in Kärnten in the Klagenfurt region (Troyer-Mildner & Mildner 1987), then in a pond near Laxenburg and in a backwater of the Danube River (Wöss 1994).

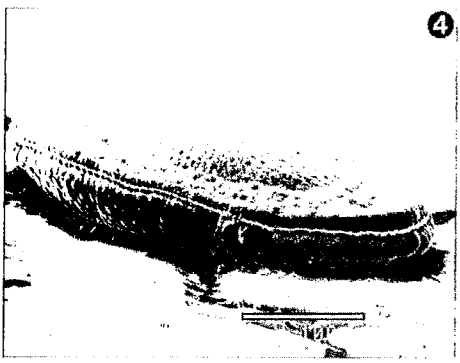
Thus *P. casmiana* is presently known from most western and central European regions where bryozoologists have been at work lately. It has also been recorded from Israel (Massard & Geimer 1991b, 1994, Massard & al. 1992, Dimentman & al. 1992). The species has not been recorded in Britain (Mundy 1980). Unless he is referring to the former GDR area, Kilias (1992) is obviously wrong when writing that *P. casmiana* has been hitherto unknown in Germany ("Im Gebiet nicht bekannt, aber zu erwarten.").

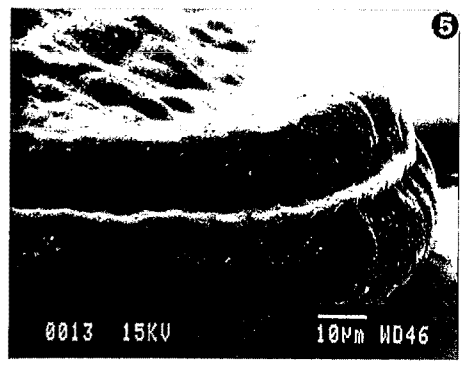
Toriumi (1955) states that the shape of the statoblasts of *P. stricta* Allmann, 1850 strongly resembles that of *P. casmiana* floatoblasts and he assumes that *P. stricta* may be a scanty adult form of *P. flabellum* which he considers as a possible synonym of *P. casmiana*. In fact *P. stricta* corresponds to *P. repens* Van Beneden, 1848 collected by Van Beneden near Brussels and Louvain. The species was known to Allman (1856) only by the figures published by Van Beneden (1848).

Geimer & Massard (1986) agreed with Toriumi that a certain resemblance between the floatoblasts represented by Van Beneden and those of *P. casmiana* cannot be excluded. But all this remains pure conjecture. Indeed there does not









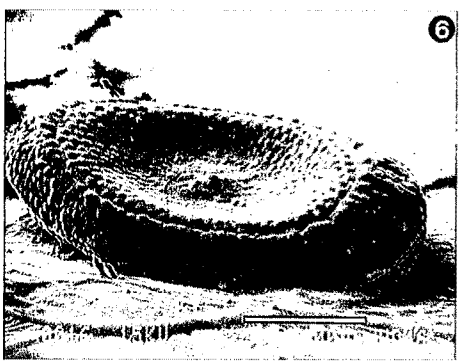
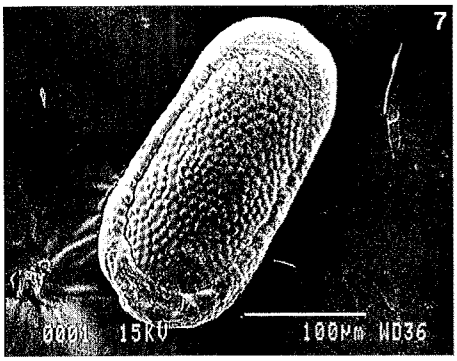
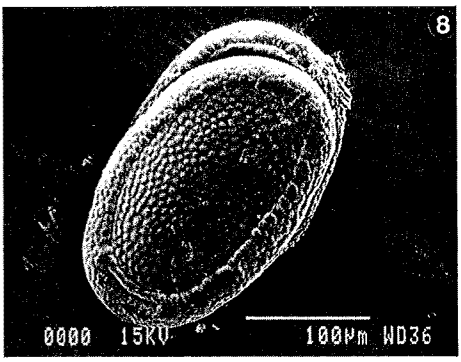
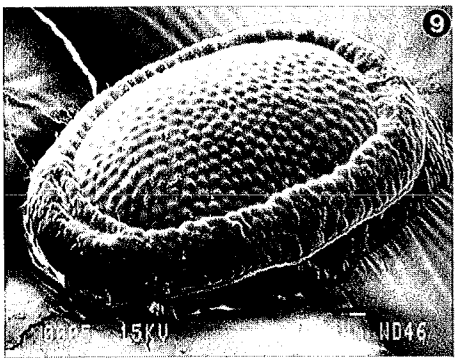
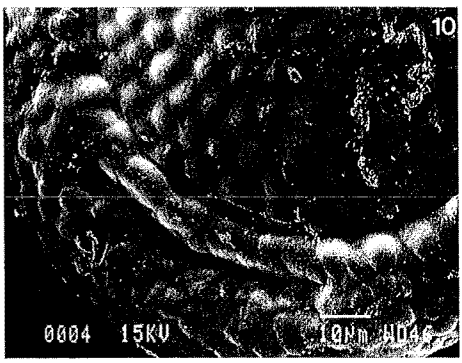


Fig. 2-6: Floatoblasts. Fig. 2. dorsal side, capsule with faintly visible tuberculation and reticulation. Fig. 3: detail of the dorsal side, capsule with tuberculation and reticulation. Fig. 4: dorsal side in lateral view, asymmetry of the two valves visible. Fig. 5: dorsal side, detail of the suture line. Fig. 6: ventral side.









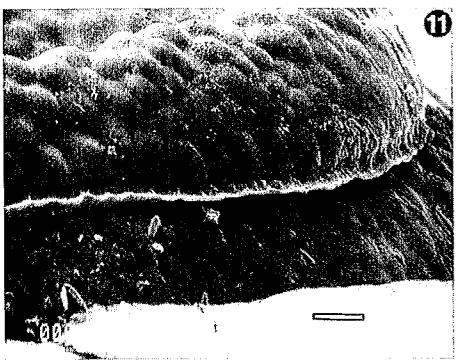


Fig. 7-11: Leptoblasts. Fig. 7: general view of the capsule and the annulus of a leptoblast (annulus deformed by dessication). Fig. 8: upper and lower valves of a leptoblast. Fig. 9: the same leptoblast in oblique view. Fig. 10: detail of this leptoblast, annulus with a narrow polar depression, capsule with tubercules. Fig. 11: rim of the annulus with suture zone.

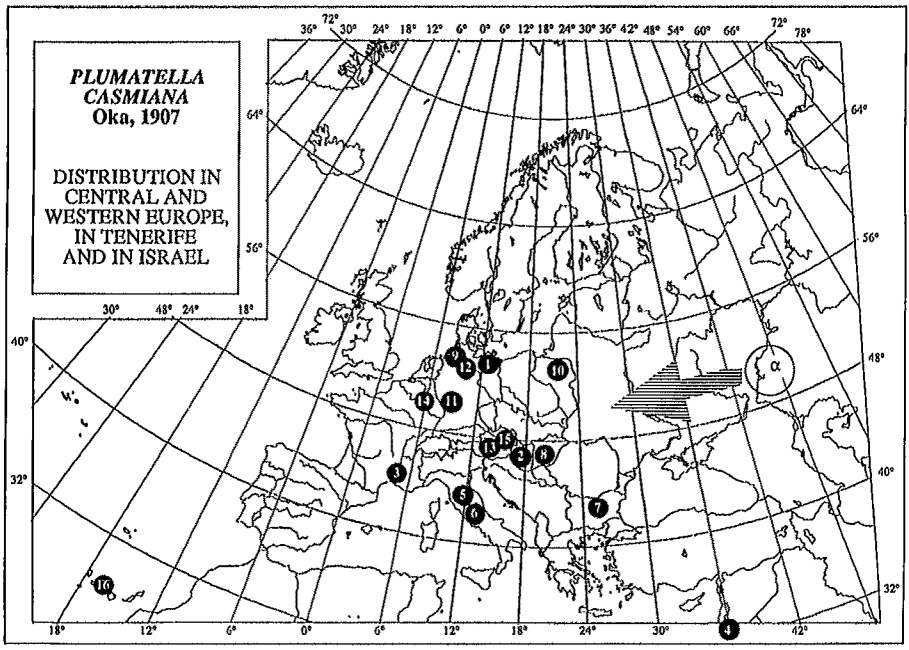


Fig. 12: *Plumatella casmiana* collection sites in chronological order: 1 = Greifswald, Germany (<1887), 2 = Lake Balaton, Hungary (1960), 3 = Arles, France (1961), 4 = Hula Nature Reserve, Israel (1964) and Birket Ram, Golan Heights (1967), 5 = Lake Trasimeno, Italy (1965), 6 = Lake Rascino, Italy (1966), 7 = Jantra and Rosica, Bulgaria (1966), 8 = Körös and Tisza, Hungary, 9 = Hamburg, Germany (<1978), 10 = Masurian Lake District, Poland (1979), 11 = Rhine-Main region, Germany (1982), 12 = Lüchow-Dannenberg, Germany (<1983), 13 = Kärnten, Austria (1984), 14 = Echternach, Luxembourg (1985), 15 = Laxenburg and a backwater of Danube River, Austria (1991), 16 = Puerto Cruz, Tenerife, Canarian Islands (1991).
α = part of the original Russian area with collection sites mentioned in early bryozoan literature: Jeruslan River (<1915), Talovka River (<1924), Saratov district (<1927).

exist any reliable material proving that *P. casmiana* occurred or is occurring in Belgium.

Besides normal oval floatoblasts Kafka (1887) encountered others with a small equally wide annulus in what he considered as young *P. fungosa* colonies. Geimer & Massard (1986) wondered if the small floatoblast figured by Kafka (1887) could not correspond to a leptoblast, thus the colonies being *P. casmiana*. So Bohemia may possibly be included in the older distribution area of *P. casmiana*.

In conclusion it can be said that *P. casmiana* has now been signalized from sites in most countries of the palaearctic region including the Canarian Islands. So its distribution area has greatly enlarged during the last decades, but the species still remains rather localized with important distances separating the different sites of its occurrence.

Concerning the Luxembourg occurrence of *P. casmiana* Geimer & Massard (1986) discussed its possible introduction by fish carried statoblasts, e.g. by grass carps (*Ctenopharyngodon idella*) and fatheads (*Hypophthalmichthys molotrix*) bought from German and Austrian fish breeders who probably had imported them from Hungary (lake Balaton region). According to our countryman Dr Jean-Paul Metz grass carps were introduced to Hungary in the 1950ies coming from China and Oriental USSR and transiting through fish breeding facilities in Ukraine and the European part of Russia. Concerning the Arles region he stressed that after World War II a Hungarian pisciculturist had created a huge pisciculture there with numerous species imported from Hungary. Dr Metz did not exclude a similar dissemination mecanism for Lago Trasimeno and other European sites (Geimer & Massard 1986).

Concerning the occurrence of *P. casmiana* in Israel a dispersal by migratory birds has been considered (Massard & Geimer 1991b).

Both factors – fishbreeding and bird migration – may possibly be involved in *P. casmiana* dispersal. Regarding the European regions where *P. casmiana* was practically unknown prior to the 60ies, it is doubtful that generations of bryozoologists should have overlooked it. So a recent introduction seems more plausible. A dispersal by fish breeders could give a reasonable explanation to the rapid but still discontinuous spreading of the species.

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References

Abrikosov, G. G., 1927. - Über die Süsswasser-Bryozoen der USSR. - Dokl. Akad. Nauk SSSR 19: 307-312.

Allman, G. J., 1856. - A monograph of the fresh-water Polyzoa, including all the known species, both British and foreign. - Ray Society London 17: I-VII, 1-119.

Annandale, N., 1915. - Report on a collection of Phylactolaematous Polyzoa from the Volga Region. - Trav. Soc. Nat. Saratov 5: 73-80.

Behning, A. L., 1921. - Materialien zur Hydrofauna des Flußes Jeruslan. - Arb. biol. Wolga Stn. Saratov 5: 257-325 [in Russian, English summary].

Behning, A. L., 1924. - K izyceniju priconnoj zieni reki volgi [Zur Erforschung der am Flußboden der Wolga lebenden Organismen]. - Monografii volzh. biol. Stn Saratov 1: 171-174 [in Russian].

Beneden, P. J. Van, 1848. - Recherches sur les Bryozoaires fluviatiles de Belgique. - Nouv. Mém. Acad. r. Belg. 21: 1-33.

Bushnell, J. H., 1973. - The freshwater Ectoprocta: a zoogeographical discussion. - In: G. P. Larwood (ed.): Living and fossil Bryozoa. London, Academic Press: 503-521.

Dimentman, C., H. J. Bromley & F. D. Por, 1992. - Lake Hula. Reconstruction of the fauna and hydrobiology of a lost lake. - Jerusalem, 170 p.

Franz, H., 1992. - Der Rhein und seine Besiedlung im Wandel: Schwebstoffzehrende Organismen (Hydrozoa, Kamptozoa und Bryozoa) als Indikatoren für den ökologischen Zustand eines Gewässers. - Pollichia-Buch 25: 1-167.

Geimer, G. & J. A. Massard, 1986. - Les Bryozoaires du Grand-Duché de Luxembourg et des régions limitrophes. - Trav. sci. Mus. Hist. Nat. Luxemb. 7: 1-187.

Grancarova, T., 1968. - Prinos kam izucavane na sladkovodnate briozoina fauna v Balgarija [Beitrag zur Erforschung der briozoischen Süsswasserfauna in Bulgarien, dtsch. Zusammenf.]. - Bull. Instit. Zool. Mus., Acad. bulg. Sci. 26: 39-46.

Grancarova, T., 1979. Bemerkungen über die Bryozoenfauna im bulgarischen und österreichischen Donauabschnitt. - In: Jubiläumstagung der Internationalen Arbeitsgemeinschaft Donauforschung. Limnologische Berichte. Sofia: 277-282.

Kafka, J., 1887. - Die Süsswasserbryozoen Böhmens. - Arch. naturw. Landesdurchf. Böhmens 6 (2): 1-79.

Kaminski, M., 1984. - Contributions to the knowledge of fresh-water Bryozoa of the Masurian Lake District. - Fragm. faun. 28 (4): 73-78.

Kilias, R., 1992. - Tentaculata. Kranzfühler. - In: E. Stresemann (Begr.), H.-J. Hannemann, B. Klausnitzer, K. Senglaub (Hrsg.): Exkursionsfauna von Deutschland. Bd. 1. Wirbellose (ohne Insekten). 8. Aufl. - Berlin, Volk und Wissen: 566-597.

Kolosváry, G. & M. Ferencz, 1967. - Die Bryozoen der Tisza, Maros und Körös. - Különnyomat a Móra Ferenc Múzeum Évkönyve 1966-1967 Évi Kötetébel, Szeged: 277-280.

Kraepelin, K., 1887. - Die Deutschen Süßwasserbryozoen. I. Anatomisch-systematischer Teil. - Abh. naturw. Ver. Hamburg 10: 1-168.

Lacourt, A. W., 1968. - A monograph of the freshwater Bryozoa. Phylactolaemata. - Zool. Verh. (Leiden) 93: 1-159.

Martens, J. M., 1983. - Die Tierwelt im Landkreis Lüchow-Dannenberg: Artenliste ausgewählter Gruppen. - Abh. Naturw. Ver. Hamburg (NF) 25: 383-409.

Massard, J. A. & G. Geimer, 1990a. - Notice sur les Bryozoaires du lac d'Echternach et du lac de la Haute-Sûre ainsi que sur la présence de l'Hydrozoaire Cordylophora caspia (Pallas, 1771) dans la centrale nucléaire de Cattenom. - Bull. Soc. Nat. luxemb. 90: 163-168.

Massard, J. A. & G. Geimer, 1990b. - Note on the freshwater Bryozoa (Ectoprocta, Phylactolaemata) of Tenerife. - Vieraea 19: 327-338.

Massard, J. A. & G. Geimer, 1991a. - Additional note on the freshwater Bryozoa of Tenerife (Phylactolaemata). - Bull. Soc. Nat. luxemb. 92: 149-157.

Massard, J. A. & G. Geimer, 1991b. - Note on the freshwater Bryozoa of Israel (Phylactolaemata). - In: F. Bigey (ed.): Bryozoaires actuels et fossiles : Bryozoa living and fossil. - Bull. Soc. Sci. nat. Ouest Fr., Mém. HS 1: 243-253.

Massard, J. A. & G. Geimer, 1994. - Distribution of freshwater and brackish-water Bryozoa (Phylactolaemata, Gymnolaemata) in Israel. - In: P.J. Hayward, J.S. Ryland & P.D. Taylor: Biology and Palaeobiology of Bryozoans. Fredensborg, Olsen & Olsen: 117.

Massard, J. A., G. Geimer, H. J. Bromley & C. Dimentman, 1992. - Additional note on the fresh and brackish water Bryozoa of Israel (Phylactolaemata, Gymnolaemata). - Bull. Soc. Nat. luxemb. 93: 199-214.

Mundy, S. P., 1980. - A key to the British and European freshwater Bryozoans. - Freshw. Biol. Ass., scient. Publ. 41: 1-32.

Rao, K. S., A. P. Diwan & P. Shrivastava, 1978. - Structure and environmental relations of sclerotized structures in freshwater Bryozoa. III. Observations on Plumatella casmiana (Ectoprocta: Phylactolaemata). - J. Anim. Morphol. Physiol. 25 (1 & 2): 8-15.

Rogick, M. D., 1941. - Studies on freshwater Bryozoa. X. The occurrence of Plumatella casmiana in North America. - Trans. Amer. microsc. Soc. 60(2): 211-220.

Sebestyén, O., 1961. - Occurrence of Plumatella casmiana Oka (Bryozoa) in Lake Balaton. - Annal. Biol. Tihany 28: 125-133.

Taticchi, M. I., 1989. - Some observations on the feeding of freshwater Bryozoa in nature (Lake Trasimeno, Perugia, Italy). - Riv. Idrobiol. 28 (3): 219-229.

Toriumi, M., 1955. - Taxonomical study on fresh-water Bryozoa. X. Plumatella casmiana Oka. - Sci. Rep. Tôhoku Univ. Ser. IV (Biol.) 21 (1): 67-77.

Troyer-Mildner, J. & P. Mildner, 1987. - Beitrag zur Kenntnis der Moostierchen (Tentaculata: Bryozoa) Kärntens. - Carinthia II, naturw. Beitr. Heimatk. Kärntens, 177 (97): 131-144.

Vigano, A., 1966. - Aggiornamenti su reperti di Briozoi dulcicoli nelle acque italiane. - Riv. Idrobiol. 5 (1, 2): 33-37.

Vigano, A., 1968a. - Plumatella casmiana Oka nell'Italia centrale. - Boll. Zool. 35: 365-366.

Vigano, A., 1968b. - Note su Plumatella casmiana Oka (Bryozoa). - Riv. Idrobiol. 7: 421-468.

Wiebach, F., 1963a. - Studien über Plumatella casmiana Oka (Bryozoa). - Vie et Milieu 14 (3): 579-596.

Wiebach, F., 1963b. - Das Moostierchen Plumatella casmiana. - Mikrokosmos 52 (3): 76-79.

Wiebach, F. & J. L. d'Hondt, 1978. - Bryozoa. - In: J. Illies: Limnofauna Europaea. 2. Aufl. - Stuttgart, G. Fischer: 492-493.

Wöss, E. R., 1994. - Seasonal fluctuations of bryozoan populations in five water bodies with special emphasis on the life cycle of Plumatella fungosa (Pallas). - In: Hayward, P. J., J. S. Ryland & P. D. Taylor: Biology and Palaeobiology of Bryozoans. Fredensborg, Olsen & Olsen: 211-214.