

GIAMPIETRO BRAGA, KAMIL ZÁGORSĚK & MIKLÓS KÁZMER

COMPARISON BETWEEN VENETIAN AND WESTERN CARPATHIAN
LATE EOCENE BRYOZOAN FAUNAS



1996

Reports of Shallow Tethys 4
International Symposium

Albrechtsberg (Austria) 8-11 September 1994

Supplemento agli Annali dei Musei Civici di Rovereto
Sezione Archeologia, Storia e Scienze Naturali,
vol. 11 (1995)

Ann. Mus. civ. Rovereto	Sez.: Arch., St., Sc. nat.	Suppl. vol. 11 (1995)	259-270	1996
-------------------------	----------------------------	-----------------------	---------	------

GIAMPIETRO BRAGA, KAMIL ŽÁGORSĚK & MIKLÓS KÁZMER

COMPARISON BETWEEN VENETIAN AND WESTERN CARPATHIAN LATE EOCENE BRYOZOAN FAUNAS

Abstract - GIAMPIETRO BRAGA, KAMIL ŽÁGORSĚK & MIKLÓS KÁZMER - Comparison between Venetian and Western Carpathian late Eocene Bryozoan faunas.

From a critical examination of the previous papers about the upper Eocene Bryofaunas of the N.E. Italy (Venetia region) and Western Carpathian mountains (Slovakia and Hungary) it appears that there are 148 valid species (97 Cheilostomata and 51 Cyclostomata).

The remarkable lithostratigraphical and faunistical affinities of the two sedimentary basins are compared and emphasized, especially with regard to the Bryozoan associations.

The paleogeography and the relationships of these tethyan areas are briefly outlined.

Key words: Bryozoa, Tethys, Paleogeography.

PREVIOUS STUDIES

The early studies on the Bryozoans of Venetia were carried out by Reuss and concerned the Lonte Valley (REUSS, 1848).

As a matter of fact, in such a paper Reuss made the material come from a «nicht naeher Bekannten Fundortes im Wiener Beckens» (a not well-known place somewhere in the Vienna basin). Such an indefinite locality was subsequently specified by Reuss himself (1874) as Lonte Valley or Onte Valley (Fortuna house) in the Eastern Lessini Mountains. At that time Reuss referred those outcrops to Lower Oligocene, but nowadays they can be surely dated as Upper Eocene, owing to their index fauna (Late Priabonian : level of Blue Marls with Bryozoans).

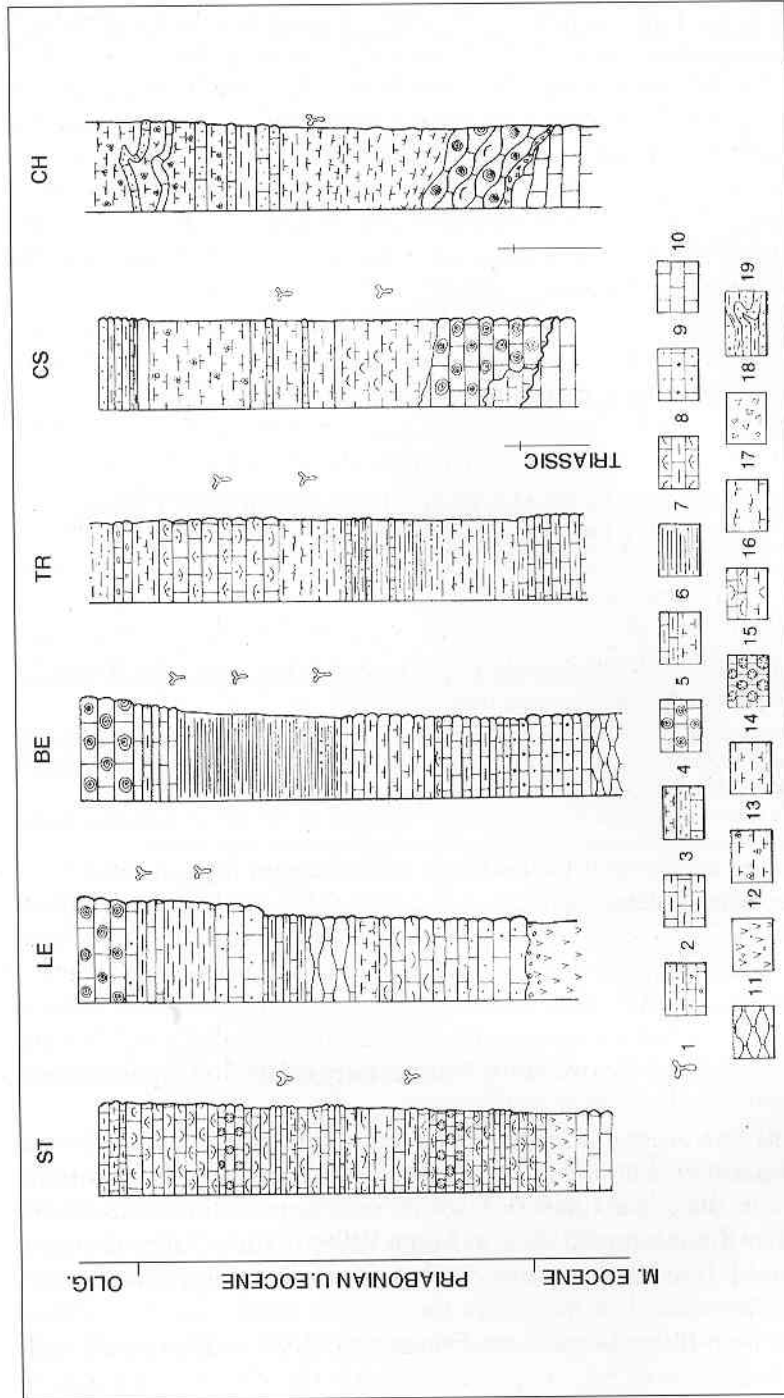


Fig. 1 - The simplifying lithostratigraphic columns (not in scale) of the Southern Alps and Carpathian basins. Respectively from the left to right hand: ST (Southern Trentino); LE (Lessini Mt.); BE (Berici Mt.); TR (W.Trevigiano hills); CS (W.Carpathian-Slovakia); CH (W.Carpathian-Hungary). Symbols: 1 = Bryozoan levels; 2 = siltites and conglomerates; 3 = marly limestones; 4 = marls, silty clay and fine sands; 5 = algal limestones; 6 = marly limestones and marls; 7 = clay; 8 = biocalcarenes and marly limestones; 9 = calcarenites and calcirudites; 10 = limestones; 11 = nodular limestones; 12 = volcanics; 13 = Globigerina marls; 14 = silty marls; 15 = coral limestones; 16 = Discocyclusina marls and limestones; 17 = reef limestones; 18 = breccias; 19 = flysch/turbidites

In his subsequent papers, Reuss (1868 and especially 1869) reported a paleontological study on Bryozoans and Corals from some localities of the Lessini Mountains, Berici Mountains and Vicenza fore Alps. Such localities are Montecchio Maggiore, Priabona, Granella, Castelgomberto, Lonte Valley, Crosara and Sangonini (Marostica-Vicenza hills).

If we exclude the insignificant work of Gottardi (1885) we mention the valuable paper of Waters about the Cheilostomatous Bryozoa of Vicentine and Southern Trentino (1891) and his subsequent note (1892) on Cyclostomatous. No more papers appear up to our days.

This long silence was broken by Accordi (1947) with a brief but interesting paper about the occurrence of specimens belonging to Conescharellinidae in Bryozoan marls near Verona (Lessini Mountains).

Since 1963 one of the Authors (Gp.B.) began studying the Bryozoan levels of Cenozoic of the Veneto and Southern Trentino and his researches are now in progress (see References).

The Bryozoa of west Carpathian area, especially from those belonging to Buda marls was studied by Pergens (1896). Recently in two short papers Dudich (1962 and 1971) dealt with these eocenic Bryozoans.

At present Zágorsěk spend a great time of his field work to sample new outcrops on Carpathian area and some papers have been issued on this topic (see References).

LITHOSTRATIGRAPHIC OBSERVATIONS

The Paleogene of Venetia with beds rich in Bryozoan crops out in a wide area including Southern Trentino, Lessini and Berici Mountains and the piedmont hills (Western Trevigiano) between Brenta and Piave rivers (Fig. 1-column 1-4). This area was an important element in Tertiary time and paleogeographically and structurally belongs to the Southern Alps (fig. 2: left on the bottom), characterized by shallow water sedimentation of carbonate, marls and clay rich in Corals, Fish, Algae, Molluscs, Macroforaminifera and, especially in Upper Eocene, in Bryozoa.

The Formation of Priabona Marls represents - with the Priabonian - the stratotype of Upper Eocene. Such a formation is characterized by marly limestones with lenses of algal biolithites and, on the top, by very thin foliated beds of soft marls rich in Bryozoans (BRAGA & BARBIN, 1989). Such marls are coeval with Brendola and Lonte Valley marls, which were studied in the past century by Reuss (1848, 1869).

This lithostratigraphic succession is rather uniform from west to east (Fig. 1, column 1-4), probably more clayey in the Berici and in the West Trevigiano hills.

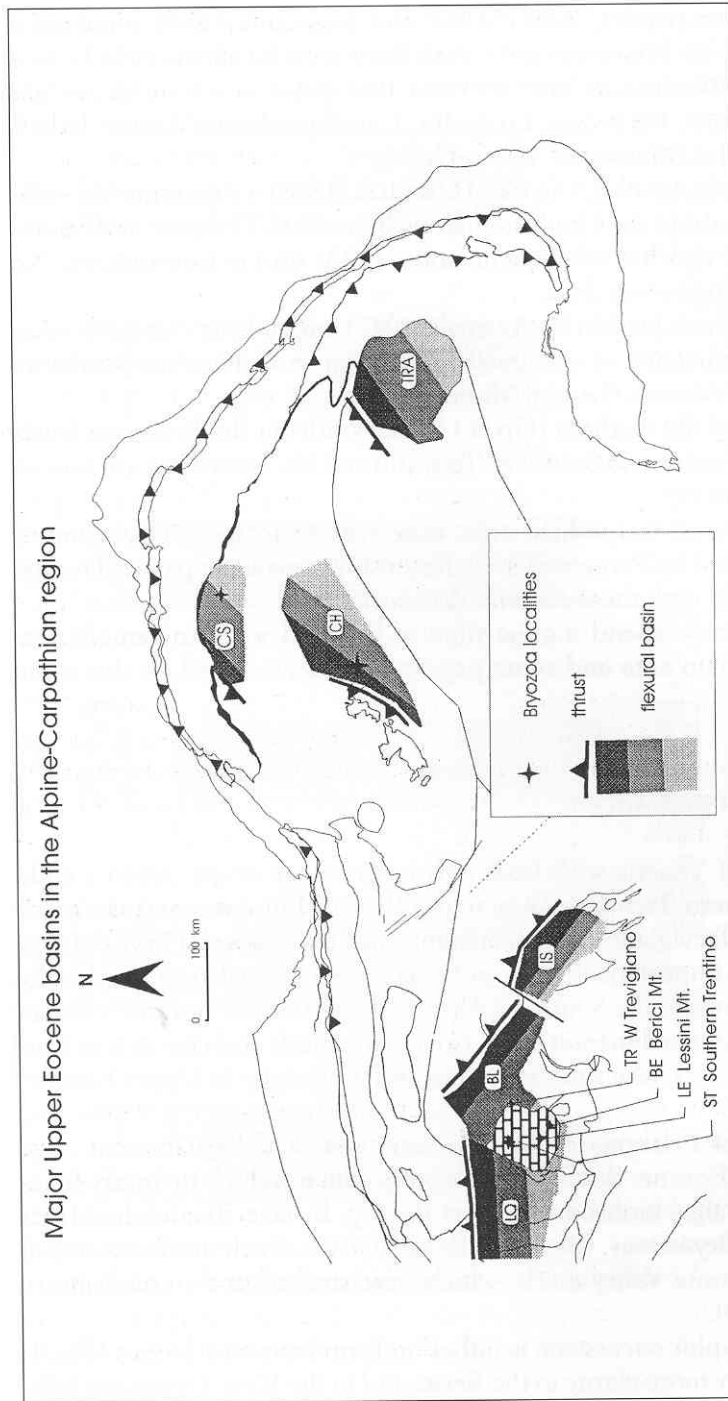


Fig. 2 - Major Upper Eocene basins in the Alpine-Carpathian region. The Belluno (BL) and Istria (IS) basins are foreland flexural basins of the Dinarides. The Lombardian basin (LO), the Hungarian Paleogene basin (CH), the Central Carpathian Paleogene basin (CS), and the Transylvanian basin (TRA) are retroarc flexural basins of the Alps and Carpathians, respectively. Other symbols: TR: W. Trevisiano; BE: Berici Mt.; LE: Lessini Mt.; TM: Southern Trentino. Sources for the Eocene basins: Lombardy: Bernoulli *et al.* (1988); Venetia and Belluno: Bosellini (1989), Luciani (1989), Doglioni & Bosellini (1987); Istria: Drobne (1977), Cavallin & Pirini Radrizzani (1983); Hungarian Paleogene basin: Tari *et al.* (1993); Central Carpathian Paleogene basin: Gross *et al.* (1984), Kovacs M. (pers. comm. 1994); Transylvanian basin: Ciulavu *et al.* (1994).

In all successions however the Bryozoan level is almost on top of the Priabonian and is an important key bed in studying the Upper Eocene sequences.

The Bryozoa marls show an extremely rich diversity (Tab. 1), with abundant representation of rigid-erect branching growth forms, indicative of relatively fast water flows well supplied with particulate food, especially microalgae.

According to sedimentological characteristics, faunal content, growth-form parameters, and inferences concerning the species in life, the depth range of the shelf would have been within the photic zone of the inner-outer interval, not more than 100 m (GORDON & BRAGA, 1994).

While the lithostratigraphic sequences in the Venetia are almost complete and pass continuously from the Mesozoic to Paleogene - there are only some hard grounds and local disconformity between the U.Cretaceous and Middle Eocene - in the Carpathian area the outcrops are affected by intense tectonic events and by an important phase of transgression.

The Upper Eocene sediments of the western Carpathians of Slovakia (Liptov and Rajec basins) can be divided into four Formations slightly different among them. All the sequences, transgressive on Triassic sediments, have algal limestones and heteropic coral reefs on the bottom coming up to Discocyclinae, Bryozoa and Globigerinae marls on the top (Fig. 1, column 5), with an comprehensive character of «flysch» facies.

In the surrounding of Budapest (Buda hills) the Upper Eocene formations cover mostly Triassic Dachstein limestones. The Late Eocene transgression deposited thick basal conglomerate then limestones with *Nummulites fabianii* and Discocyclinae. It is followed by neritic Bryozoan limestones and marls, then by pelagic Globigerina marls (Buda Marls). The latter extends also up to the Oligocene.

The Buda Hills sequence indicates subsidence within the Bryozoan marls from the euphotic zone to significantly greater depths (ZÁGORSEK, 1993).

SOME OBSERVATIONS ON FAUNAL CONTENT

The Bryozoa horizon set on top of Priabonian sequences of the Venetia basins (Southern Alps) and is stratigraphically very close to all Bryozoan horizons occurring in the more comprehensive alpine-carpathian sedimentary basin, extending from N. E. Italy to Transylvania basin (Fig. 2). Specifically this paper deal with faunal comparisons among the Bryozoa occurring in the marls of Venetia, of Liptov and Rajec basins (Slovakia) and of the well known Buda marls. As above said all lithostratigraphic sequences (Fig. 1) are typical of an epicontinental sedimentation with not only Bryozoans but also Discocyclinae, Nummulites, Molluscs and other neritic faunas.

OCCURRENCE OF BRYOZOAN SPECIES IN VENETIA AND WESTERN
CARPATHIAN MOUNTAINS

Tab. 1

Cyclotomata	ST	LE	BE	TR	CS	CH
<i>Bitubigera biseriata</i> (PHILIPPI), 1843				x		
« <i>Ceriopora</i> » <i>spongiosa</i> PHILIPPI, 1844	x					
<i>Crisia elongata</i> MILNE-EDWARDS, 1848	x	x	x	x	x	
<i>Crisia baueri</i> REUSS, 1848			x	x		
<i>Crisia boernesi</i> REUSS, 1848	x	x	x	x	x	
<i>Crisia subaequalis</i> REUSS, 1869			x	x		
<i>Decurella toarensis</i> MONGEREAU & BRAGA, 1967			x	x		
<i>Desmeplagioccia tenuis</i> (REUSS), 1869		x	x	x		
<i>Diastopora rotula</i> REUSS, 1848						x
<i>Exidmonea atlantica</i> Auct.	x		x		x	
<i>Exidmonea giebeli</i> STOLICZKA, 1862		x	x		x	x
<i>Exidmonea concava</i> (REUSS), 1869	x	x	x	x		x
<i>Exidmonea crisiiforme</i> ZÁGORSEK, 1992					x	
<i>Exidmonea boernesi</i> (STOLICZKA), 1862					x	
<i>Exidmonea villaltae</i> (REGUANT), 1861					x	
<i>Exochoecia compressa</i> (REUSS), 1848		x	x		x	
<i>Fascigera dimidiata</i> (REUSS), 1848	x	x		x	x	
<i>Filisparsa cuvillieri</i> DEBOURLE, 1974					x	
<i>Filisparsa fallax</i> CANU & BASSLER, 1920			x			
<i>Filisparsa orakeiensis</i> STOLICZKA, 1864			x			
<i>Heteropora subreticulata</i> REUSS, 1869		x	x		x	
<i>Heteroporella deformis</i> (REUSS), 1848					x	x
<i>Hornera asperula</i> REUSS, 1869	x	x	x		x	
<i>Hornera concatenata</i> REUSS, 1869	x	x	x	x	x	
<i>Hornera d'Achiardi</i> REUSS, 1869		x				
<i>Hornera frond. f. frondiculata</i> MONGEREAU		x	x	x	x	x
<i>Hornera seriatopora</i> REUSS, 1848					x	
<i>Hornera simplicissima</i> BRAGA & BARBIN, 1988			x			
<i>Hornera subannulata</i> PHILIPPI, 1843				x	x	
<i>Hornera sulcosa</i> REUSS, 1866	x					
<i>Hornera verrucosa</i> REUSS, 1866		x	x			
<i>Lichenopora beyrichi</i> REUSS, 1851	x			x	x	x
<i>Lichenopora coronata</i> (REUSS), 1848					x	
<i>Lichenopora goldfussi</i> REUSS, 1864	x					
<i>Lichenopora grignonensis</i> M.-EDWARDS, 1838	x			x	x	x
<i>Lichenopora interrupta</i> REUSS, 1869		x		x		
<i>Lichenopora radiata</i> SAVIGNY-AUDOUIN, 1834	x			x		x
<i>Mecynoecia iranensis</i> (FURON & BALAV), 1959					x	
<i>Mecynoecia proboscidea</i> (M.-EDWARDS), 1838	x	x	x	x	x	x
<i>Mecynoecia pulchella</i> (REUSS), 1848	x	x	x	x		x
<i>Nematifera reticuloides</i> CANU & BASSLER, 1926					x	
<i>Nematifera susannae</i> ZÁGORSEK, 1922					x	x
<i>Oncousoecia biloba</i> (REUSS), 1848	x	x	x	x		
<i>Platonea pluma</i> (REUSS), 1848		x	x		x	
<i>Pleuronea pertusa</i> (REUSS), 1848	x					
<i>Pleuronea reticulata</i> (REUSS), 1869		x	x			
<i>Radiopora</i> (Domopora) <i>pileolus</i> REUSS, 1869	x					x
<i>Reteporidae coronopus</i> CANU & BASSLER, 1922	x			x	x	x
<i>Reteporidae sparsa</i> (REUSS), 1864	x			x		
<i>Tervia serrata</i> (REUSS), 1869	x	x	x			x
<i>Tubulipora foliacea</i> REUSS, 1848	x			x		
<i>Ybselosoecia typica</i> (MANZONI), 1878		x				
<i>Adeonella minor</i> (REUSS), 1869	x	x	x	x	x	x

Continued

Cheilostomata	ST	LE	BE	TR	CS	CH
<i>Adeonellopsis porina</i> (ROEMER), 1863		x		x	x	x
<i>Adeonellopsis subteres</i> (ROEMER), 1863		x	x		x	x
<i>Alderina subtilimargo</i> (REUSS), 1864	x	x		x	x	x
<i>Anornithopora polygona</i> VOIGT, 1971					x	
<i>Bactridium bagenowi</i> REUSS, 1848		x	x			x
<i>Batopora multiradiata</i> REUSS, 1869	x	x	x	x	x	x
<i>Batopora rosula</i> (REUSS), 1848	x	x	x	x	x	
<i>Batopora stoliczkaei</i> REUSS, 1867		x				
<i>Biflustra savartii texturata</i> (REUSS), 1848	x	x	x			
<i>Buffonelloides rhomboidalis</i> CANU & BASSLER, 1920						x
<i>Caberoides continua</i> (WATERS), 1891	x	x	x			
<i>Calpensia gracilis</i> (MÜNSTER), 1826			x			
<i>Calpensia hexagona</i> ŽÁGORŠĚK, 1994					x	x
<i>Calpensia nobilis</i> (ESPER), 1796			x			
<i>Calpensia polysticha</i> (REUSS), 1848		x	x		x	x
<i>Cellaria reussi</i> (D'ORBIGNY), 1851	x	x	x		x	
« <i>Cellepora</i> » <i>circumcincta</i> (REUSS), 1869		x				
« <i>Cellepora</i> » <i>conglomerata</i> (GOLDFUSS), 1821			x			x
« <i>Cellepora</i> » <i>diplostoma</i> (REUSS), 1848		x	x			
« <i>Cellepora</i> » <i>globularis</i> (BRONN), 1837	x	x	x			x
« <i>Cellepora</i> » <i>pektusa</i> (SMITT), 1867		x				
<i>Chaperia spinella</i> ŽÁGORŠĚK, 1994					x	x
<i>Chilidoniopsis tenerrima</i> (REUSS), 1869	x	x	x			x
<i>Conopeum bookeri</i> (HAIME), 1850						x
<i>Crassimarginatella macrostoma</i> (REUSS), 1848	x	x	x		x	
<i>Cribrilaria chelys</i> (KOSCHINSKY), 1885		x				
<i>Cribrilaria baueri</i> (REUSS), 1848		x	x		x	x
<i>Cribrilaria radiata</i> (MOLL), 1803	x	x	x	x	x	x
<i>Cyclicopora laticella</i> CANU & BASSLER, 1920						x
<i>Ditaxipora pannonicensis</i> BRAGA, 1980	x	x				
<i>Ditaxiporina septentrionalis</i> (WATERS), 1891	x	x	x			
<i>Escharina phymatopora</i> (REUSS), 1869		x	x		x	x
<i>Escharoides aliferus</i> (REUSS), 1869		x	x		x	x
<i>Escharoides coccineus</i> (ÅBILDGAARD), 1806	x	x	x	x	x	x
<i>Escharoides crenilabis</i> (REUSS), 1848						x
<i>Escharoides labiosa</i> (REUSS), 1869		x				
<i>Fedora bidentata</i> (REUSS), 1869	x	x	x		x	
<i>Gigantopora duplicata</i> (REUSS), 1848		x	x	x	x	x
<i>Hemicycloporella parajuncta</i> CANU & BASSLER, 1917					x	
<i>Hippomenella bragai</i> ŽÁGORŠĚK, 1994					x	
<i>Hippomenella transversora</i> CANU & BASSLER, 1920					x	
<i>Hippopleurifera schreibersi</i> (REUSS), 1848		x	x		x	
<i>Hippoporina angistoma</i> (REUSS), 1848			x			
<i>Hippoporina arrecta</i> (REUSS), 1848						x
<i>Hippoporina exarata</i> (REUSS), 1848		x				x
<i>Hippoporina lyratostoma</i> (REUSS), 1866	x	x			x	x
<i>Hippoporina punctifera</i> CANU, 1907					x	
<i>Hippoporina sparsifera</i> (REUSS), 1869		x	x			x
<i>Hippoporina stenosticha</i> (REUSS), 1869		x				
<i>Houzeauina parallela</i> (REUSS), 1869		x	x			x
<i>Kionidella excelsa</i> KOSCHINSKY, 1885		x	x	x	x	x
<i>Lacerna larva</i> (REUSS), 1848		x				
<i>Lacrimula perfecta</i> (ACCORDI), 1947	x	x	x	x	x	x
<i>Lunulites quadrata</i> (REUSS), 1848	x	x	x	x	x	
<i>Margaretta cerooides</i> (ELLIS & SOLL.) 1876	x	x	x	x	x	x
<i>Margaretta filiformis</i> CANU & BASSLER, 1929			x			
<i>Margaretta turgida</i> (TEWARI & SRIVAST.), 1967					x	

Continued

Cheilostomata	ST	LE	BE	TR	CS	CH
<i>Membraniporella ulrichi</i> CANU & BASSLER, 1920						x
<i>Meniscopora syringopora</i> (REUSS), 1848		x	x		x	x
<i>Metrarabdotos moniliferum</i> (MILNE-EDW.), 1836					x	
<i>Monoporella grottriani</i> (STOLICZKA), 1862				x		
<i>Mucronella patens</i> CANU & BASSLER, 1920					x	
<i>Nellia tenella</i> LAMARCK, 1816		x	x	x		
<i>Onychocella subpyriformis</i> (D'ARCHIAC), 1846	x	x	x	x	x	x
<i>Orbitulipora petiolus</i> LONSDALE, 1850	x		x			
<i>Perigastrella granulata</i> ŽAGORSĚK, 1994					x	
<i>Perigastrella oscitans</i> CANU & BASSLER, 1920						x
<i>Perigastrella serrulata</i> (REUSS), 1848						x
<i>Phylactellipora tubiceps</i> (REUSS), 1866				x		
<i>Porella denticulata</i> (STOLICZKA), 1864			x			
<i>Poricellaria complicata</i> (REUSS), 1869				x		
<i>Porina coronata</i> (REUSS), 1848	x	x	x	x	x	x
<i>Porina duplicata</i> (REUSS), 1869		x			x	
<i>Porina labrosa</i> (REUSS), 1848	x	x	x		x	
<i>Ramphonotus appendiculata</i> (REUSS), 1848			x	x		
<i>Ramphonotus monopora</i> (REUSS), 1869		x			x	x
<i>Reteporella tamaninii</i> BRAGA, 1980	x					
<i>Reussia regularis</i> (REUSS), 1866	x				x	x
<i>Rhambostomella brendolensis</i> WATERS, 1891		x	x	x		
<i>Rosseliana rosselii</i> (ADOUIN), 1826		x	x		x	
<i>Schizoporella bisulca</i> (REUSS), 1869		x	x			
<i>Schizoporella nodulifera</i> (REUSS), 1869		x	x			x
<i>Schizoporella scrobiculata</i> (REUSS), 1848		x			x	x
<i>Scrupocellaria brendolensis</i> WATERS, 1891		x	x	x	x	
<i>Scrupocellaria gracilis</i> REUSS, 1869	x	x	x	x		x
<i>Scrupocellaria montecchiensis</i> WATERS, 1891		x	x			
<i>Sertella simplex</i> (BUSK), 1859		x	x		x	x
<i>Sertella tuberculata</i> (REUSS), 1869	x	x	x		x	x
<i>Smittina cervicornis</i> (PALLAS), 1766					x	x
<i>Smittina concinna</i> (BUSK), 1854					x	
<i>Smittistoma mortisaga</i> (STOLICZKA), 1862				x		
<i>Sparsiporina elegans</i> (REUSS), 1848	x	x	x	x	x	
<i>Stamenocella midwayanica</i> CANU & BASSLER, 1917		x	x			
<i>Steginoporella firma</i> (REUSS), 1868		x				
<i>Steginoporella baidingeri</i> (REUSS), 1848	x	x	x		x	x
<i>Steginoporella montenati</i> DAV. & POUYET, 1972						x
<i>Stenosipora protecta</i> (KOSCHINSKY), 1885	x	x			x	
<i>Stenosipora reussi</i> STOLICZKA, 1862	x	x	x			x
<i>Tubucella gibbosa</i> CANU & BASSLER, 1920						x
<i>Tubucella papillosa</i> (REUSS), 1848	x	x	x	x	x	x
<i>Vibracella pachyderma</i> (REUSS), 1848						x
<i>Vibracella trapezoidea</i> (REUSS), 1848	x	x	x	x	x	x
<i>Vincularia fragilis</i> DEFANCE, 1820		x	x			
<i>Vincularia subsymmetrica</i> (CANU), 1907		x				

Legenda: ST = Southern Trentino (Monte Baldo, Brentonico, Val di Gresta); LE = Lessini Mt. (Priabona, Val di Lonte, Montecchio Maggiore, Bressana, Boro-Granella); BE = Berici Mt. (Brendola, Monteccio di Costozza, Toara); TR = W. Trevigiano (Possagno); CS = W. Carpathian Mt. (Liptov, and Raje basin - Slovakia; Hybica, Partizanska Lupca, Vychodna and Rajeche, Teplice); CH = W. Carpathian Mt. Hungary (Buda, hills: Matyashegy).

In the Table 1 are listed all the species belonging to different areas. From an updated taxonomic revision, made with the close supervision of two of the Authors (Gp.B. & K.Z.), it appears that there are 148 valid species (97 Cheilostomata and 51 Cyclostomata). In former times was made a similar study on comparison among the Bryofaunas of the N.E.Italy, Hungary and Transylvania (GHIURCA & MONGEREAU,1981), and the whole number of the species appears higher than our figure. A careful reading of this list shows a lot of synonymic species, especially owing to preliminary revision of Reuss' material stored in the Natur Historische Museum Wien (BRAGA, 1991).

The affinities among the Bryofaunas of Venetia sequences are very remarkable, but it is significant also between the Southalpine and Carpathian basins.

To confirm these considerations we compare all Upper Eocene faunas using the Kojumdgieva similarity test. The similarity coefficient K is calculated as follow : $K = (Ca\% + Cb\%)/2$ in which $Ca\% = C/A \times 100$ and $Cb\% = C/B \times 100$ where A = number of species from locality a, B = number of species from locality b and C = number of species common between a and b.

	ST	LE	BE	TR	CS	CH
ST	—	59.7	53.7	58.9	50.8	47.3
LE	59.7	—	80.0	53.2	56.7	55.4
BE	53.7	80.0	—	51.9	54.6	51.0
TR	58.9	53.2	51.8	—	49.2	42.2
CS	50.8	56.7	54.6	49.2	—	54.7
CH	47.3	55.4	51.0	42.2	54.7	—

Tab. 2 - Comparison of Bryozoa Priabonian faunas between Veneto Region (N.E.Italy) and Western Carpathian (Slovakia and Hungary), using the Kojumdgieva similarity test.

In the table 2 we can see the resulting figures that are very significant (more than 50). Only the values which compare the faraway basins are lower but still high (one K value between 30 to 50 is good).

THE EOCENE PALEOGEOGRAPHY RELATIONS

Between the Southern Alps and Hungary : there was direct marine connections between them (KÁZMER & KOVACS,1985).

Between Hungary and the 'Central Carpathian Paleogene in Slovakia : the latter was a «flysch» basin; although there was more or less permanent marine

connection between the two basins, these were not as straightforward than towards the Southern Alps. A kind of mountain chain, or rather a range of islands separated the Hungarian and the Slovakian Paleogene basins. Probably there were narrow passages between the islands (figs 2 and 3).

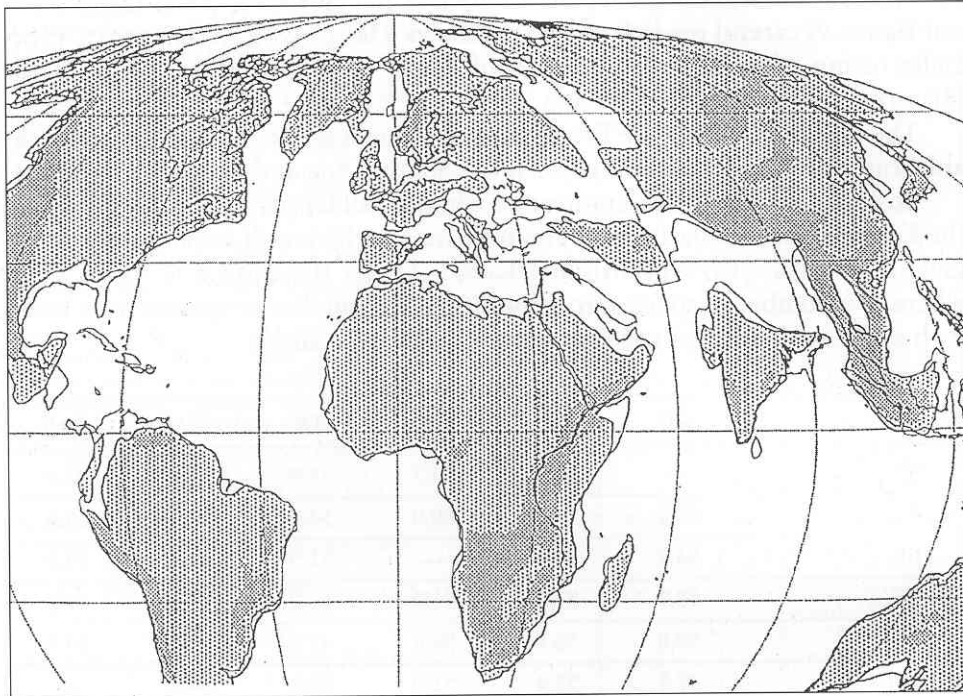


Fig. 3 - The tethyan coastlines in the Priabonian epoch (37 Ma). From A.G.Smith,D.G.Smith and B.M.Funnel (1994) - Atlas of Mesozoic and Cenozoic coastlines, Cambridge University Press.

REFERENCES

- ACCORDI B. (1947) - Nuove forme di Briozoi eocenici. *Studi Trent. Sc.Nat.*,25, p.103-110.
- ANTOLINI P., BRAGA GP. & FINOTTI F., (1980) - I Briozoi dei dintorni di Rovereto. Monte Baldo settentrionale e Valle di Gresta. *Mus. Civ. Rovereto*, Pub. n.82, 103 p.
- BERNOULLI D.,HERB R. & GRÜNIG A., (1988) - The Ternate Formation a late Eocene bioclastic submarine fan of the Lombardian basin (Southern Alps). AAPG Mediterr. Basin Conference Nice, Sept 25-28, *Poster Session, Abstract*, 3 p., 1 fig.
- BOSELLINI A. (1989) - Dynamics of Tethyan carbonate platforms. *Soc. of Economic Paleontologists and Mineralogists. Spec. Publ.* 44, p. 3-13, Tulsa.

- BRAGA GP., (1963) - I Briozoi del Terziario veneto. I Contributo. *Boll. Soc. Pal. It.*, 2, p. 16-55.
- BRAGA GP., (1975) - I Briozoi dell'Eocene di Possagno (Trevigiano occidentale). *Schweiz. Pal. Abb.*, 97, p. 141-148.
- BRAGA GP., (1991) - Reuss' collection of Cheilostome Bryozoans from Venetia stored in Natur-Historisches Museum Wien: a proposed revision. Bryozoaires actuels et fossiles: Bryozoa living and fossil (F.P. Bigey Ed.), *Bull. Soc. Sci. Nat. Ouest Fr.*, Mém. HS 1, p. 49-59.
- BRAGA GP. & BARBIN V., (1989) - Bryozoaires du Priabonien stratotypique (Province Vicenza), Italie. *Revue Paléobiol.* 7, p. 495-545.
- CAVALLIN A. & PIRINI RADRIZZANI C., (1983) - Evoluzione del settore settentrionale della piattaforma carbonatica Adriatica. *Riv. Ital. Pal. e Strat.*, 89/2, p. 223-242, Milano.
- CIULAVU D., BERTOTTI G., ANDRIESEN P., CLOETINGH S., DINU C., HUISMANNS R. & SANDERS C., (1994) - Tectonics of the Transylvania Basin. *Romanian J. of Tectonics and Regional Geol.*, 75, Suppl. 1, p. 7-8, Bucaresti.
- CSONTOS L., NAGYMAROSY A., HORVATH F. & KOVAC M., (1992) - Tertiary evolution of the intra-Carpathian area. *Tectonophysics*, 208, p. 221-241.
- DAL PIAZ G.V., DEL MORO A., MARTIN S. & VENTURELLI GP., (1988) - Post-collisional magmatism in the Ortler-Cevedale massif (Northern Italy). *Jb. Geol. Bundes.* 131/4, p. 533-551, Wien.
- DOGLIONI C. & BOSELLINI A., (1987) - Eoalpine and mesoalpine tectonics in the Southern Alps. *Geol. Rundsch.*, 76/3, p. 735-754, Stuttgart.
- DROBNE K., (1977) - Alveolines paléogènes de la Slovénie et de l'Istrie. *Schw. Paleont. Abhandl.*, 99, 174 p.
- DUDICH E., (1962) - A biológiai aktualizmus elvének Alkalmázása fosszilis Bryozoákra. *Foldt. Kozl.* 93/3.
- DUDICH E., (1971) - Mohaállatok és vörösalgak a csakvar-18. sz. furas eocénjéből. *M. all. Foldt. Intez.* AZ 1968, p. 55-61.
- GHIURCA V. & MONGEREAU N., (1985) - La faune de Bryozoaires éocènes d'Europe orientale. Recent and Fossil Bryozoa. (G. LARWOOD & C. NIELSEN Ed.), 93-100.
- GORDON D.P. & BRAGA GP., (1994) - Bryozoa: Living and fossil species of the catenicellid subfamilies Ditaxiporinae Stach and Vasignyllinae nov. In: A. Crosnier (ed.), *Resultats des Campagnes MUSORSTOM*, v. 12, *Mém. Mus. ntn. Hist. nat.*, p. 55-85.
- GOTTARDI G.B., (1885) - Briozoi fossili di Montecchio Maggiore. *Atti Soc. Ven. Trent. Sci. Nat.*, 9, p. 297-308.
- GROSS P., KOHLER E. & SAMUEL O., (1984) - New lithostratigraphical articulated of Innercarpathians Paleogene. *Geologické prace, Spravy* 81, p. 103-117, Bratislava (in Slovakian).
- KÁZMER M., (1985) - Microfacies pattern of the Upper Eocene limestones at Budapest, Hungary. *Annales Univ. Sci. Budapestinensis, Sect. Geol.* 25 (1983), p. 139-152.

- KÁZMER M. & KOVACS S., (1985) - Permian-Paleogene paleogeography along the eastern part of the Insubric-Periadriatic lineament system : Evidence for continental escape of the Bakony-Drauzug unit. *Acta Geol. Hungarica*, 28/1-2, p. 71-84, Budapest.
- LUCIANI V., (1989) - Stratigrafia sequenziale del Terziario nella catena del Monte Baldo (Provincia di Verona e Trento). *Mem. Sci. Geol.*, 41, p.263-351, Padova.
- PERGENS E., (1896) - Bryozoaires des environs de Buda. *Bull. Soc. Belge de Geol.*, 10, pp.359-368.
- REUSS A.E., (1848) - Die fossilen Polyparien des wiener Tertiärbeckens. *Haidinger's Natur Abb.*, 2, p.1-109.
- REUSS A.E., (1868) - Palaeontologische Studien ueber die älteren Tertiärschichten des Alpen. I Abt., Die fossilen Anthozoen der Schichten von Castelgomberto. *Denkschr. k. Akad. Wiss.*, 28, p.1-56.
- REUSS A.E., (1869) - Palaeontologische Studien über die älteren Tertiärschichten der Alpen. II Abt., Die fossilen Anthozoen und Bryozoen der Schichtengruppe von Crosara. *Denkschr. k. Akad. Wiss.* 29, p. 215-298.
- SMITH A.G., SMITH D.G. & FUNNEL B.M., (1994) - Atlas of Mesozoic and Cenozoic coastlines. *Cambridge University Press*.
- TARI G., BALDI T. & BALDI-BEKÉ M., (1993) - Paleogene retroarc flexural basin beneath the Neogene Pannonian basin: a geodynamic model. *Tectonophysics*, 226, p. 433-455.
- WATERS A.W., (1891) - North Italian Bryozoa. *Quart. Journal Geol. Soc.*, 47, p. 1-34.
- WATERS A.W., (1892) - North Italian Bryozoa, II part : Cyclostomata. *Quart. Journal Geol. Soc.*, 48, p. 153-162.
- ZÁGORSĚK K., (1992) - Priabonian (Late Eocene) Cyclostomata Bryozoa from the Western Carpathians (Czechoslovakia). *Geologica Carpathica* 43 (4), p. 235-247.
- ZÁGORSĚK K., (1993) - Changes in Bryozoa community in the Upper Eocene sequence of Matyashegy (Budapest, Hungary). *Discussiones Palaeontologicae*, 39, p. 91-96.
- ZÁGORSĚK K., (1994) - Late Eocene (Priabonian) Cheilostomata Bryozoa from the Liptov Basin - Western Carpathians (Slovakia). *N. Jb. Geol. Palaeont.*, 193/3, p.361-382, Stuttgart.

Gp. Braga's Research was supported by Grant MURST-60%-1994 (Prof. G. PICCOLI) and that of ZágorsĚk by Grant 66D/93 (prof. MISIK) and by Slovak Literary Foundation.

Indirizzo degli autori:

Giampietro Braga - Department of Geology, Paleontology and Geophysics
via Giotto 1 I-35137 Padova (Italy)

Kamil ZágorsĚk - Department of Geology and Paleontology, Comenius University
Mlyská dolina 1/G 842-15 Bratislava (Slovakia)

Miklos Kazmer - Department of Paleontology, Eotvos University,
Ludovik ter 2 - H-1083 Budapest (Hungary)
