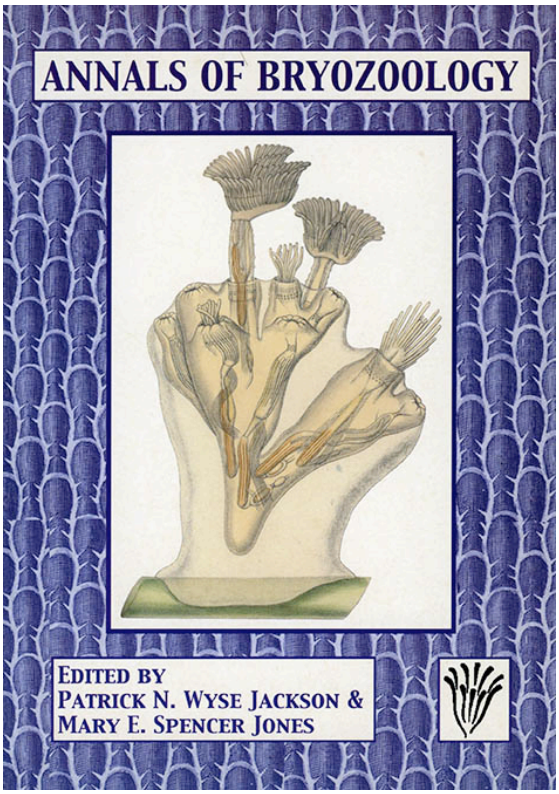

Paper in:

Patrick N. Wyse Jackson & Mary E. Spencer Jones (eds) (2002) *Annals of Bryozoology: aspects of the history of research on bryozoans*. International Bryozoology Association, Dublin, pp. viii+381.

Thirty four years of bryozoology: the I.B.A. International Conferences (1968-2001)[1]

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1. Introduction

Annoscia and Cheetham[2] report that the International Bryozoology Association (I.B.A.) was founded after the first informal meeting called to discuss Bryozoa in Stockholm in 1965, while the first I.B.A. Conference was held in San Donato Milanese, near Milan, in 1968. Since then eleven conferences have been celebrated, the last of which was in Ireland. Most of the communications to these twelve conferences have been published in their respective Proceedings.

It seems reasonable to suggest that these Proceedings reflect the activity and research interests of bryozoologists around the world and offer a faithful picture of modern-day bryozoology. A thirty-four year period is sufficient I feel to provide scientometric information about the number of contributors, their country of origin and the main lines of research in bryozoology.

This paper presents the results drawn from a review of the eleven volumes of proceedings, corresponding to the 11 Conferences, with supplementary data on the 12th Conference provided by Patrick Wyse Jackson, convenor of that meeting. Taken together, the proceedings offer valuable insights into recent developments in bryozoology.

2. The I.B.A. Conferences

The following lists the twelve I.B.A. Conferences held to date, giving their location; date; the organizing institution; convenor(s);and bibliographic reference to the scientific proceedings:

1. San Donato Milanese, Italy; 12th-16th August, 1968; AGIP Direzione Mineraria. Enrico Annoscia; Annoscia, E. (ed.), 1968. Proceedings of the First International Conference on Bryozoa. *Atti della Societa di Scienze Naturalia del Museo Civico di Storia Naturale di Milano.* Volume 108, Milano.
2. Durham, England; 6th-16th September, 1971; University of Durham; Gilbert P. Larwood; Larwood, G.P. (ed.), 1973. *Living and Fossil Bryozoa.* Academic Press, London and New York.
3. Lyon, France; 2nd-11th September, 1974; University Claude Bernard; Louis David; Pouyet, S. (ed.), 1975. *Bryozoa 1974.* Proceedings of the Third Conference. International Bryozoology Association. *Documents des Laboratoires de Geologie de la Faculte des Sciences de Lyon*, HS 3 (fasc. 1, 2). Universite Claude Bernard, Lyon.
4. Woods Hole, Massachusetts, U.S.A.; 7th-17th September, 1977; Marine Biological Laboratory; Marie B. Abbott; Larwood, G.P. and Abbott, M.B. (eds), 1979. *Advances in Bryozoology.* Academic Press, London.
5. Durham, England; 1st-6th September, 1980; University of Durham; Gilbert P. Larwood; Larwood, G.P. and Nielsen, C. (eds), 1981. *Recent and Fossil Bryozoa.* Olsen & Olsen, Fredensborg.
6. Vienna, Austria; 18th-23rd July, 1983; University of Vienna; Norbert Vávra; Nielsen, C. and Larwood, G.P. (eds), 1985. *Bryozoa: Ordovician to Recent.* Olsen & Olsen, Fredensborg
7 Bellingham, Washington, U.S.A.; 4th-9th August, 1986; Western Washington University. June R.P. Ross; Ross, J.R.P. (ed.), 1987. *Bryozoa: Present and Past.* Western Washington University Press, Bellingham.
8 Paris, France; 17th-22nd August, 1989; Muséum National d'Histoire Naturelle and Université P & M. Curie; Françoise P. Bigey and Jean-Loup d'Hondt. Bigey, F.P. and J.L. d'Hondt (eds), 1991. *Bryozoaires Actuels et Fossiles.* Bulletin de la Societe Sciences Naturelles de la Ouest de France, Memoire H.S. 1. Nantes.
9 Swansea, Wales; 25th July-1st August, 1992; University of Swansea; John S. Ryland and P.J. Hayward; Hayward, P.J., Ryland, J.S. and Taylor, P.D. (eds) 1994. *Biology and Palaeobiology of Bryozoans.* Olsen & Olsen, Fredensborg.
10 Wellington, New Zealand; 30th January-3rd February 1995; NIWA; Dennis P. Gordon; Gordon, D.P., Smith, A.M. and Grant-Mackie, J.A. (eds), 1996. *Bryozoans in Space and Time.* NIWA, Wellington.
11 Panama City, Republic of Panama; 26th-31st January 1998; Jeremy B.C. Jackson; Herrera-Cubilla, A. and Jackson, J.B.C. (eds), 2000. *Proceedings of the 11th International Bryozoology Association Conference.* Smithsonian Tropical Research Institute, Panama.
12 Dublin, Ireland; 16th-21st July, 2001; Trinity College, Dublin; Patrick N. Wyse Jackson; Wyse Jackson, P.N., Buttler, C.J. and Spencer Jones, M.E. (eds), 2002. *Bryozoan Studies 2001.* A.A. Balkema, Rotterdam (scientific papers), and Wyse Jackson, P.N. and Spencer Jones, M.E. (eds) 2002. *Annals of Bryozoology.* International Bryozoology Association, Dublin (historical papers).

3. Participation

Participation at conferences has ranged from 49 at the first meeting to double that at the most recent meeting in Ireland. Table 1 shows the number of participants at each conference, the number of papers and posters presented, the number of papers published in the proceedings and the number of authors involved in the writing of those published papers. As can be seen there is no information available concerning the numbers of participants that attended some conferences.

Table 1. Number of papers, authors and participation at each I.B.A. Conference

Conference	Papers/posters presented	Papers Published	Number of authors of published papers	Number of delegates
1	45	45	46	49
2	65	58	64	?
3	55	54	54	67
4	53	38	53	65
5	50	35	44	?
6	53	39	56	?
7	75	40	54	92
8	75	55	78	85
9	77	45	65	74
10	74	43	72	73
11	78	45	68	66
12	114	70*	95	104

*published in two volumes; one containing scientific contributions and the other historical papers.

Table 2 shows the number of conferences that each author has contributed to either with a presentation of scientific findings or a discussion on some aspects of bryozoology.

Table 2. Number of published contributions presented at the I.B.A. conferences by individual authors (excludes data from Dublin)

Number of conferences	10	9	8	7	6	5	4	3	2	1
Number of contributors	3	4	2	6	9	7	15	40	42	184

The most frequent contributors are Professors Frank McKinney of Boone, Appalachian State University, and June R. P. Ross of Bellingham, Western Washington University, and Ehrhard Voigt from Hamburg University. They have all presented papers at 11 conferences.

As can be seen a total of 312 bryozoologists have authored papers presented at the first eleven IBA conferences. Some of them are collaborators on various aspects (biology or geology) of bryozoology, but they are not bryozoologists. However, this figure, 312 in the

first 31 years, does not differ much from the number of active bryozoologists around the world. This is estimated at between 200 and 300, as reported in *Bryozoa*, the annual newsletters of the I.B.A. (for example, there were 244 members in 1986, and 238 in 1995).

Table 3 lists the number of contributors by country at each of the conferences (country populations in millions, according to *Encyclopaedia Britannica* 1991, are included in brackets) and the total number of contributors at each conference.

Only three African countries are represented, though only in Egypt is there a team of bryozoologists. One contributor from Algeria was a resident in Algeria at the time of the 1st and 6th conferences but now works in France. One of the handicaps of contemplating only the I.B.A. conferences is that there are some bryozooloogists who, for a variety of reasons, have never attended these conferences. Morocco, for example, is not present, but a number of monographs and papers have been published in recent years by Moroccan bryozoologists.

4. Research interests

According to the web page edited by Phil Bock: "Systematic List of Families of Bryozoa"[3] the general classification of the Phylum Bryozoa,containing exclusively the Ectoprocta, is as follows:

Class Stenolaemata
- Order Cyclostomata
- Order (?) Hederellida
- Order Cryptostomida
- Order Cystoporida
- Order Trepostomatida
- Order Fenestrida

Class Gymnolaemata
- Order Ctenostomata
- Order Cheilostomata

Class Phylactolaemata

The Phylactolaemata, are exclusively a freshwater class, the body walls of which have no skeleton, though they produce resistant bodies called statoblasts. Such bodies have been reported as fossils from the Pleistocene and Upper Tertiary and also from the Cretaceous, although this is controversial.[4] It is also necessary to note that the number of Phylactolaemata families is very small compared with that of other bryozoan classes; there are only five in total.

Nearly all other Bryozoa have mineralized skeletons and their characteristics are essential for specific identification. McKinney & Jackson claim, "most descriptions of

Table 3. Number of contributors to the conference proceedings by country at each I.B.A. conference (country populations in millions shown in brackets)

Conference	1	2	3	4	5	6	7	8	9	10	11	12*
EUROPE												
United Kingdom (57)	4	10	6	4	11	11	5	11	13	18	14	18
Ireland (4)								3	2	1	1	3
Italy (59)	3	2	3		1	6	2	10	4		5	3
Spain (39)			2				2	6	4			1
France (57)	5	4	10	6	4	5	4	5	5	2	3	4
Luxembourg (0.4)								2	2	2		2
Germany (79)	7	6	4	4	2	3	4	4	2	6	5	10
Austria (8)	1		1	1	1		1	4	2	1	3	2
Hungary												1
Sweden (8)	3	1	1		2		1					1
Denmark (5)		1	2			2	3	2	1		3	4
Norway (4)								2	1	1	1	2
The Netherlands (15)	1	2	1	1			1	1				1
Belgium (10)	1											
Czech Republic (16)								1				1
Slovakia (5)											1	
Croatia (4)												2
Romania (23)	1	1	1		1	2						
Poland (38)								1				1
USSR (286)	3	6	5		1							
AMERICA												
USA (249)	13	25	15	33	15	17	23	17	13	17	21	27
Canada (27)		1				1	1			1		
Jamaica (2.5)					1							
Panama (2.3)						1				2	2	1
Brazil (150)	1											1
Chile (13)	1			1				4	3	3	3	2
OCEANIA												
Australia (17)		1	1	2	2	1	1	1	3	5	3	6
New Zealand (3.5)			1				1	2	2	8	1	3
ASIA												
Japan (123)	1	2	2	1	1	2	2		4	2		3
South Korea (43)										1		
China (1,134)					2			1				
Taiwan (22)												2
India (685)		2				4			1			
Singapore (2.5)										1	1	
Iran (49)											1	
AFRICA												
Algeria (23)	1					1						1
Egypt (48)							2	1	3		1	1
South Africa (43)												1
TOTAL	**46**	**64**	**55**	**53**	**44**	**56**	**53**	**78**	**65**	**72**	**68**	**104**

* The figures for Dublin refer to participants, not all of whom contributed to the conference proceedings.

living bryozoans with calcified skeletons do not differ substantially from descriptions of fossil species in the same class. This is because the majority of taxonomists who work on living bryozoans have depended on skeletal characters for species recognition, to the virtual exclusion of soft organs and other attributes. The dominant focus has been on morphology of zooids. In addition to presence or absence of structures, a variety of linear measures of size, shape, skeletal construction, and types of heterozooids have been used for both living and fossil species".[5]

Hederellida (2 families), Cryptostomida (32 families), Cystoporida (13 families), Trepostomatida (33 families), and Fenestrida (13 families) are exclusively Palaeozoic; while Cheilostomata (130 families) is exclusively Meso-Cenozoic (including Recent). Cyclostomata (31 or 58 families according to different opinions) and Ctenostomata (41 families) are reported from the Palaeozoic until Recent.

Thus, the first classification of contributions to the I.B.A. Conferences is: general contributions on bryozoans; contributions on Palaeozoic bryozoans; contributions on Meso-Cenozoic (only fossils) bryozoans; contributions on Recent bryozoans; contributions on freshwater phylactolaemates. Table 4 shows the percentage of contributions in each category at each Conference.

Table 4. Percentage of contributions by topic at the I.B.A. Conferences

Conference	1	2	3	4	5	6	7	8	9	10	11	12*
General	16	7	9	11	3	3	2	4	0	2	11	21
Palaeozoic	18	19	20	13	23	13	42	27	18	12	4	21
Meso-Cenozoic	44	21	30	29	31	21	17	16	22	26	20	20
Recent	22	45	43	50	43	56	35	47	51	42	48	26
Freshwater	4	7	4	8	6	5	2	4	9	7	15	12

* % figures refer to papers published in the scientific proceedings only and not the historical proceedings.

Research on living and fossil bryozoans gave rise to roughly the same number of contributions over the last 31 years, according to this data. At five conferences (1, 3, 5, 7 and 12) the contributions on fossil bryozoans exceeded those dealing with living specimens. In contrast, the number of contributions on recent Bryozoa was greater than that devoted to fossil bryozoans at the other seven conferences. It is also interesting to note the large number of contributions on Palaeozoic bryozoans at the 7th Conference.

5. Perspectives

The study of Bryozoa, as the study of any group of organisms, may be carried out from

a number of perspectives. I analyzed the contributions at the first eleven I.B.A. Conferences according to the following classification:

- Bryozoology, including the history of bryozoan research.
- Biology, comprising anatomy, physiology, genetics, etc..
- Description of faunas and Catalogues of species in collections or in rock-stratigraphic units.
- Ecology and Paleoecology.
- Biogeography and Paleobiogeography.
- Evolution and related topics.
- Stratigraphy and Sedimentation.
- Applied use of bryozoans.
- Others (mainly descriptions of new methods).

Some contributions clearly belong to more than one perspective. On the other hand, the perspective to which each contribution belongs is, in some cases, difficult to decide, and is always somewhat subjective. Table 5 shows the results of this analysis. Biology, Description of faunas and Catalogues, and Ecology and Paleoecology are the main aspects tackled in bryozoan research.Their variation in percentages are shown in figure 3.

Table 5. Number of contributions on different perspectives of bryozoan research

Conference	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Bryozoology	2	0	3	0	0	2	0	0	0	1	0
Biology	15	27	12	18	15	14	12	15	11	12	18
Description/ Catalogues	14	13	21	12	9	10	14	20	13	7	5
Ecology and palaeoecology	5	15	13	8	7	7	11	16	18	15	11
Palaeobiogeography and biogeography	2	1	2	0	5	3	2	0	3	5	4
Evolution	1	2	4	1	3	1	3	4	0	2	5
Stratigraphy and sedimentology	0	0	0	0	1	1	1	2	1	1	2
Applied use	3	0	0	0	0	0	0	1	0	1	0
Others	4	3	3	2	0	3	2	4	1	0	4

Clearly, the systematic study of newly collected material, including the description of new taxa, is normally published in monographs or papers that are longer than normal contributions to the I.B.A. Conference Proceedings. However, some new taxa are described in the twelve proceedings. Table 6 shows the new species and new genera included in such contributions. Also one new Cretaceous superfamily, seven new families (from Cretaceous to Recent),and two Palaeozoic subfamilies were established. For

comparative purposes, between 1990 to 1992, the *Zoological Record* reported 379 new Paleogene species. As can be seen in Table 6, only 11 new Paleogene species are included in the I.B.A. Proceedings.

Table 6. Number of new species and genera (in brackets) established in the I.B.A. Proceedings

Conference	1	2	3	4	5	6	7	8	9	10	11	12
Recent		1	8(6)	4		2		19(10)	6(1)	7(1)		1(1)
Neogene	2	1										1(1)
Paleogene	2		1(1)				1(1)			(1)	7	
Cretaceous	2(2)	1	2	8(1)	2(1)		1	1(2)		(1)		(2)
Jurassic		2(1)							1			
Triassic					1(1)		(1)	1				
Palaeozoic										(1)		1

One perspective designated is the applied use of bryozoans. At the first Conference the application of the fossil bryozoan in oil research was included by the organizers as this conference was supported by a leading Italian oil company: AGIP Mineraria. This perspective virtually disappeared from all subsequent conferences. However, at the 8th and 10th Conferences, papers were delivered on the medical applications of substances produced by some bryozoan species. Indeed, the title of the Keynote Address by David J. Newman at the 10th Conference was particularly significant: "Bryostatin – from bryozoan to cancer drug".

6. Conclusions

The analysis of contributions at the twelve I.B.A. conferences, covering a period of 34 years, is perhaps a rudimentary method for determining the evolution of recent bryozoology. However, the data, tables and figures presented here give a general perspective on the bulk of work being undertaken around the world, the number of bryozoologists and the countries from which they work, the aspects of bryozoology most frequently dealt with, and also the frequency of research in each geological period.

Notes

1 This paper is a slightly modified version of S. Reguant, 'Thirty one years (1968-1998) of bryozoology: the I.B.A. international conferences', *Memorias de la Real Academia de Ciencias y Artes de Barcelona* 58(4) (1999), 141-153. (Used with the permission of the Reial Academia). This present paper includes additional information about the 12th international conference held in Dublin in 2001.

2 E. Annoscia, 'Conference Chairman Address', *Atti della Società Italiana di Scienze Naturali*

e del Museo Civico di Storia Naturale di Milano, 108 (1968), 5-6; Cheetham, this volume

3 P. Bock, 'Systematic List of Families of Bryozoa', Webpage: http:// www.civgeo.rmit.edu.au/bryozoa/famsys.html (dated 2000)

4 R.S. Boardman, A.H. Cheetham, D.B. Blake, J. Utgaard, O.L. Karklins, P.L. Cook, P.A. Sandberg, G. Lutaud and T.S. Wood, 'Introduction, Order Cystoporata, Order Cryptostomata', in *Part G. Bryozoa. Revised. Volume 1. Treatise on Invertebrate Paleontology*, edited by R.C. Moore and R.A. Robison (Boulder, Colorado, and Lawrence, Kansas, The Geological Society of America Inc, and the University of Kansas, 1983).

5 F.K. McKinney and J.B.C. Jackson, *Bryozoan Evolution* (Chicago and London, University of Chicago Press, 1989).