



## Review

**Most cited papers in Toxicon**Jorge A. Guimarães<sup>a</sup>, Célia R. Carlini<sup>a,b,\*</sup><sup>a</sup>Center of Biotechnology, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves 9500, Prédio 43.421, CEP 91501970 Porto Alegre, RS, Brazil<sup>b</sup>Department of Biophysics, Instituto de Biociências, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves 9500, Prédio 43.422, CEP 91501970, Porto Alegre, RS, Brazil

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**Abstract**

Citation of a published work is one of the parameters considered in the analysis of relevance and importance of scientific contributions. In 2002, for the first time the Impact Factor of Toxicon has risen above 2.0, placing it at the 17th position among 76 journals in the ‘toxicology’ field. The aim of this article was to identify the most cited articles in Toxicon, that have contributed to the steady increase of its Impact Factor. The number of citations, complete reference and type of all documents appearing in Toxicon in the period 1963–2003 were retrieved from the ISI Web-of-Science homepage. The documents retrieved were sorted by the number of citations received. A ‘citation index’, defined as the number of citations divided by the number of years since publication, was calculated for each document. It was clearly seen that reviews in Toxicon received 4.4-fold more citations than articles. Unexpectedly, it was found that recent papers were proportionally more cited than old ones. A decrease in the proportion of papers dealing on ‘snake’\* through out the period and the broadened range of subjects of the most cited papers recently published in Toxicon reflects an increased ‘visibility’ in other fields of toxinology. Research on plant toxins gained its own space in Toxicon with newer publications showing high citation indexes. It can be postulated that these facts helped to increase Toxicon’s Impact Factor from 1.248 in 1999 to 2.003 in 2002. With the increased number of issues in Toxicon as well as publications of subject-dedicated volumes containing mostly reviews, the Impact Factor of Toxicon is expected to keep rising in the near future.

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*Keywords:* Impact factor; Citation; Snakes; Cyanobacteria; Plant toxins**Contents**

1. Introduction . . . . .	345
2. Methods . . . . .	346
3. Results and discussion . . . . .	346
References . . . . .	354

**1. Introduction**

Citation of a published work by other researchers is one of the parameters considered in the analysis of

relevance and importance of the scientific contribution described in the cited paper. Although we recognize the existence of some problems and challenges to be solved in the use of citation counts (Guimarães, 2000), citations of papers still provides the best recognition of the quality of a single work and offer better measure of the originality of an author’s contribution than article counts. In fact, citation indexes are now well accepted as the recognition of greater academic status and, in some areas, as the currency of the academic performance (Bodenhorn, 2003). The Institute for Scientific Information gathers

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citation counts in all areas of knowledge and publishes the *Journal of Citation Reports*, with the Impact Factor of several thousand of journals. The Impact factor is calculated as the ratio between the total number of citations received by a journal in a given year divided by number of articles published in the same journal in the two-years preceding period.

In 2002, the Impact Factor of *Toxicon* has risen above 2.0, for the first time, placing it at the 17th position among 76 journals in the subject category 'toxicology'. The aim of this article was to identify the most cited articles in *Toxicon* since 1963, that have contributed to make the journal a respected and qualified vehicle in the Toxinology field.

## 2. Methods

The number of citations, complete reference and type of all documents appearing in *Toxicon* in the period ranging from 1963 to 2003 were retrieved from the ISI Web-of-Science homepage (<http://isi3.isiknowledge.com>) by searching the database *Science Citation Index Expanded*, a multidisciplinary index to 5900 major journals across 150 disciplines of the sciences. The major criteria allowed for search are: date of publication, topic (subject), author(s), source (journal title), country and full address of the author's institution, and type of publication. The documents retrieved were then sorted by the number of citations received up to the last week of February, 2004. A 'citation index', defined as the number of citations divided by the number of years since publication, was calculated for each document. Words in the title and/or abstract were considered as indicative of the main subject of the documents.

## 3. Results and discussion

As a first step, full articles and reviews published in *Toxicon* within the period 1963–December 2003 were retrieved using the 'source' field to match *Toxicon* as the only criteria. This choice retrieved 5398 entries of which 3510 were classified as articles and 121 as reviews. The other entries were abstracts of meetings (922), editorial materials (45), obituaries (29), letters (87), bibliographies (23), notes (637) and corrections (23). The total number of full articles and reviews (3631) published in *Toxicon* corresponded to 0.014% of all published documents indexed in the database. Fig. 1 shows the distribution of major subjects of all documents published in *Toxicon* up to 2003. In that 40-year period, snakes and PLA<sub>2</sub> together accounted for about one third of publications, while bacteria and cyanobacteria accounted for another quarter, thus identifying the main

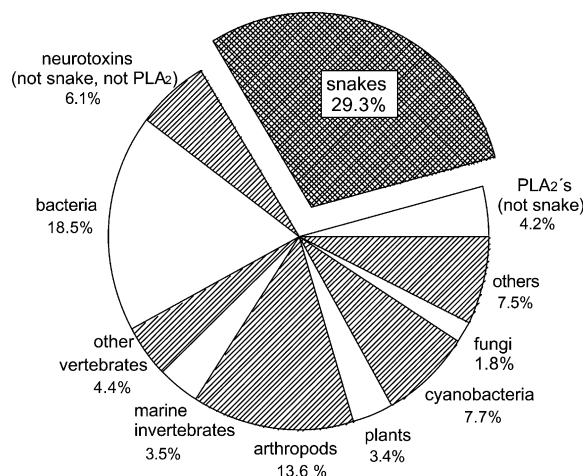


Fig. 1. Major subjects of all publications in *Toxicon* in the period 1963–2003. The main subjects of all types of publications ( $N = 5398$ ; includes abstracts of meetings) appearing in *Toxicon* in the period 1963–December 2003 were subdivided into 11 groups. The percentage of publications in each category is represented in the figure.

subjects published in *Toxicon*. Does this preference still remain the same today? Are the papers in these subjects the most cited ones?

In order to rank the publications according to number of citations, they were divided in groups of no more than 300 papers, the maximal number acceptable for the sorting process to be processed by the ISI Web of Science. Initially, papers with at least 50 citations were retrieved resulting in 138 documents (~2.5% of all publications in *Toxicon*) which are shown in Table 1, ranked by the number of citations. Ranking of the citation indexes as well as the major subject of each paper are also indicated in Table 1.

Among the publications in Table 1 are 17 reviews, 2 letters, 6 notes and 113 articles, corresponding to 14, 2.3, 0.9 and 3.2% of total number of publications in each category, respectively. It is clearly seen that reviews in *Toxicon* received 4.4-fold more citations than articles. None of the 922 abstracts of meetings, which appeared in *Toxicon* up to 1988, received more than 24 citations. It is worth stressing that the ratio 'all documents' to 'articles' and 'reviews' is about 1.5 considering all areas and all journals indexed in the ISI Web-of-Science databases. A similar ratio was found for *Toxicon* (5398–3631) over the entire 1963–2003 period. After the decision that *Toxicon* would no longer publish abstracts of meetings, this ratio reduced to 1.15 (2567 'all documents'; 2215 'articles plus reviews') in the period 1989–2003. This decision certainly contributed to the steady rise of the Impact Factor of *Toxicon* to reach the value 2.003 in 2002.

Table 1  
Most cited papers in *Toxicon* (with at least 50 citations in February 2004)

Most cited papers <sup>a</sup>	Number of citations	Citation index <sup>b</sup>		Subject
		Value	Ranking	
Kini and Evans (1989) (R)	200	14.28	4	PLA2's-snakes
Couraud et al. (1982)	178	8.47	13	Scorpions
Carmichael et al. (1988) (L)	159	10.60	8	Cyanobacteria
Takasaki et al. (1988)	156	10.40	9	Snakes-cardiotoxins
Daly et al. (1987) (R)	135	8.43	14	Frogs
Krishnamurthy et al. (1986)	134	7.88	15	Cyanobacteria
Yang (1974)	131	4.72	40	Snakes
Gutierrez and Lomonte (1995) (R)	126	15.75	3	Snakes-PLA2's-myotoxins
An and Carmichael (1994)	120	13.33	7	Cyanobacteria
Karlsson et al. (1972)	116	3.74	71	Snakes-PLA2's-neurotoxins
Gutierrez et al. (1984)	105	5.52	32	Snakes-PLA2's-myotoxins
Bagnis et al. 1980	104	4.52	43	Cyanobacteria-fishes
Daly et al. (1978)	104	4.16	53	Frogs
Lomonte and Gutierrez (1989)	103	7.37	17	Snakes-PLA2's-myotoxins
Kini and Evans (1992) (R)	99	9.00	12	Snakes-hemotoxins
Vishwanath et al. (1987)	96	6.00	25	PLA2's-snakes
Kini and Iwanaga (1986a)	96	5.64	30	Snake-PLA2's-neurotoxins
Ho et al. (1986) (R)	96	5.64	30	Snakes
Habermann (1989) (R)	95	6.78	21	Cyanobacteria-neurotoxins
Arni and Ward (1996)	95	13.57	6	PLA2's-snakes
Norton (1991) (R)	92	7.66	16	Coelenterates
Honkanan et al. (1994)	90	10.00	10	Cyanobacteria
Condrea et al. (1981a)	90	4.09	55	PLA2's-snakes
Brand et al. (1972)	89	2.87	80	Insects
Homsibrandeburgo et al. (1988)	89	5.93	26	Snakes-PLA2's-myotoxins
Burnett and Calton (1977) (R)	88	3.38	71	Coelenterates
Meriluoto et al. (1989)	88	6.28	21	Cyanobacteria
Lewis et al. (1991)	85	7.08	19	Cyanobacteria-fishes
Denson (1969)	85	2.50	92	Snakes-hemotoxins
Yang et al. (1981)	84	3.82	60	PLA2's-snakes
Dasgupta and Sathyamoorthy (1984)	83	4.38	49	Bacteria
Botes et al. (1982a,b)	82	3.72	63	Cyanobacteria
Markland (1998) (R)	81	16.20	2	Snakes-hemotoxins
Kocholaty et al. (1971)	79	2.46	93	Snakes
Macek and Lebez (1988)	77	5.13	35	Coelenterates
Aird and Kaiser (1985)	76	4.22	51	Snakes
Sampaio et al. (1983)	74	3.70	65	Scorpions
Yoshizumi et al. (1990)	73	5.61	31	PLA2's-snakes
Gopalakrishnakone et al. (1984)	73	3.84	59	PLA2's-snakes-neurotoxins
Chippaux et al. (1991) (R)	71	5.91	27	Snakes
Harada et al. (1994)	71	7.88	15	Cyanobacteria
Kogure et al. (1988)	71	4.73	39	Neurotoxins
Yotsu et al. (1987) (N)	71	4.43	46	Bacteria-Fishes
Norton and Pallaghy (1998)	70	14.00	5	Cys-knot proteins
Nukina et al. (1984)	70	3.68	66	Cyanobacteria
Beress et al. (1975)	70	2.50	92	Coelenterates
Harada et al. (1988)	69	4.60	42	Cyanobacteria
Hokama et al. (1977)	69	2.65	87	Cyanobacteria
Kini and Iwanaga (1986b)	68	4.00	57	Snakes-PLA2's-neurotoxins
Meier and Theakston (1986)	68	4.00	57	Snakes
Mahmood and Carmichael (1986)	68	4.00	57	Cyanobacteria
Mandelbaum et al. (1982)	68	3.24	73	Snakes-hemotoxins
Ferlan and Lebez (1974)	68	2.34	96	Coelenterates

(continued on next page)

Table 1 (continued)

Most cited papers <sup>a</sup>	Number of citations	Citation index <sup>b</sup>		Subject
		Value	Ranking	
Ouyang et al. (1992) (R)	67	6.09	24	Snakes-hemotoxins
Suganuma et al. (1992)	67	6.09	24	Cyanobacteria
Broad et al. (1979) (N)	67	2.79	81	Snakes
Kochva (1987) (R)	67	4.18	52	Snakes
Thelestam and Blomqvist (1988) (R)	66	4.40	48	Bacteria
Gutierrez et al. (1985)	65	3.61	67	Snakes-hemotoxins
Dufourcq et al. (1982)	65	3.09	76	Snakes-cardiotoxins
Carmichael et al. (1979)	64	2.66	86	Cyanobacteria
Gutierrez et al. (1980)	64	2.78	82	Snakes
Fletcher and Jiang (1993) (R)	62	6.20	23	Snakes-cardiotoxins
Endean et al. (1969)	62	1.82	110	Coelenterates
Lutz (1979)	62	2.58	89	Bacteria
Mattocks et al. (1989)	62	4.42	47	Plants
Glenn et al. (1983)	62	3.10	75	Snakes
Harada et al. (1990)	61	4.69	41	Cyanobacteria
Fontecillacamps et al. (1982)	61	2.90	79	Scorpions
Theakston and Warrell (1991)	61	5.08	36	Snake-antivenoms
Thompson and Wannemacher (1986)	61	3.38	71	Fungi
Watanabe et al. (1988)	61	4.06	56	Cyanobacteria
Ishikawa et al. (1977)	60	2.30	98	Snakes-neurotoxins
Zlotkin et al. (1971)	59	1.84	108	Scorpions
Zlotkin et al. (1972a)	59	1.90	106	Scorpions
Gutierrez et al. (1988) (N)	59	3.93	58	Snakes-antivenoms
Wollberg et al. (1988)	59	3.93	58	Snakes-cardiotoxins
Terao et al. (1986)	58	3.41	70	Cyanobacteria
Runnegar and Falconer (1986)	58	3.41	70	Cyanobacteria
Gelderblom et al. (1983)	58	2.90	79	Fungi
Fohlman and Eaker (1977)	58	2.23	100	Snakes-PLA2's-myotoxins
Gutierrez et al. (1981)	58	2.63	88	Snakes-antivenom
Ownby et al. (1984)	58	3.05	77	Snakes-antivenom
Habermann and Chengraude (1975)	58	2.07	103	Neurotoxins
Kini and Evans (1990) (R)	58	4.46	45	Snakes-hemotoxins
Noguchi and Hashimoto (1973) (N)	58	1.93	105	Fishes-bacteria
Seyberth et al. (1972)	57	1.83	109	Bacteria-fungi
Abbas et al. (1993)	57	5.70	28	Fungi
Kochva et al. (1982)	57	2.71	84	Snakes
Jellett et al. (1992)	57	5.18	34	Cyanobacteria-shellfishes
Holmes (1991)	57	4.75	38	Cyanobacteria
Hawkins et al. (1997)	57	9.50	11	Cyanobacteria
Ismail (1995) (R)	56	7.00	20	Scorpions
Rothschild et al. (1970)	56	1.69	114	Insects
Kao and Fuhrman (1967)	55	1.52	118	Neurotoxins
Condrea et al. (1981b)	55	2.50	92	PLA2's-snakes
Chen et al. (1987)	55	3.43	69	PLA2's-snakes
Chang et al. (1977) (L)	55	2.11	102	Snakes
Harris and Macdonell (1981)	55	2.50	92	PLA2's-snakes
Tsetlin et al. (1982)	54	2.57	90	Neurotoxins
Dickey et al. (1990)	54	4.15	54	Cyanobacteria
Zlotkin et al. (1972b)	54	1.74	112	Scorpions
Russell et al. (1973)	54	1.80	111	Snakes-antivenoms
Fiorentini et al. (1988)	54	3.60	68	Bacteria
Andersen et al. (1993)	54	5.40	33	Cyanobacteria
Maeda et al. (1978)	54	2.16	101	Snakes
Ownby et al. (1983)	54	2.70	85	Snakes-antivenoms
Rezende et al. (1991)	54	4.50	44	Spiders

(continued on next page)

Table 1 (continued)

Most cited papers <sup>a</sup>	Number of citations	Citation index <sup>b</sup>		Subject
		Value	Ranking	
Baden and Mende (1982)	53	2.52	91	Cyanobacteria
Noguchi et al. (1969)	53	1.55	117	Cyanobacteria-crustaceans
Denson et al. (1972)	53	1.71	113	Snakes-hemotoxins
Harvey et al. (1982)	53	2.52	91	Snakes-cardiotoxins
Rosenberg et al. (1989)	53	3.78	61	Snakes-PLA2's
Nakanishi (1985)	53	2.94	78	Cyanobacteria
Ismail et al. (1992)	53	4.81	37	Scorpions
Cessi and Fiume (1969) (N)	53	1.55	117	Fungi
Peterson et al. (1983)	53	2.65	87	Bacteria
Proctor et al. (1975)	52	1.85	107	Cyanobacteria
Gutierrez et al. (1989)	52	3.71	64	Snakes-PLA2's-myotoxins
Harada et al. (1991)	52	4.33	50	Cyanobacteria
Ederly et al. (1972)	52	1.67	115	Insects
Baden et al. (1981)	52	2.36	95	Cyanobacteria
Runnegar et al. (1987) (N)	52	3.25	72	Cyanobacteria
Craik et al. (2001)	51	25.50	1	Cys knot proteins
Beisel (1972)	51	1.64	116	Bacteria
Delori et al. (1981)	51	2.31	97	Scorpions
Ovadia and Kochva (1977)	51	1.96	104	Snakes-antivenoms
Terao et al. (1994)	51	5.66	29	Cyanobacteria
Ji et al. (1996)	51	7.28	18	Scorpions
Runnegar et al. (1991)	50	4.16	53	Cyanobacteria
Benoit et al. (1986)	50	2.94	78	Cyanobacteria
Carlini and Guimarães (1981)	50	2.27	99	Plants
Baloda et al. (1983)	50	2.50	92	Bacteria
Botes et al. (1982a,b)	50	2.38	94	Cyanobacteria
Oshima et al. (1987)	50	3.12	74	Cyanobacteria-shellfishes
Kimura et al. (1982)	50	2.38	94	Cyanobacteria-fishes
Dawson (1998) (R)	50	10.00	10	Cyanobacteria
Nakamura and Yasumoto (1985)	50	2.77	83	Fishes-bacteria

<sup>a</sup> Includes articles, reviews (R), notes (N) and letters (L).

<sup>b</sup> Citation index: number of citations divided by the number of years since publication up to 2003.

The percentage of papers in each of the major subjects in Table 1 is represented in Fig. 2. It can be seen that subjects 'Snakes' (39%) and 'Cyanobacteria' (28.2%, including blue green algae and dinoflagellates) have an increased representation among the most cited papers as compared to all publications (Fig. 1), emphasizing the interest and concentrations of authors and readers of *Toxicon* in these topics. As expected, 95 (70%) out of the 138 papers with at least 50 citations were published 15 or more years ago (1988 or before). So far, only 34 out of the 2090 articles (including reviews) published in *Toxicon* in the 90s or later received 50 or more citations. An expressive number (~85%) of the papers in Table 1 with 70 citations or more are among the five most cited articles of their first authors.

For a second type of analysis, the two most cited articles or reviews of each period (the number of years was chosen

to comprise up to 300 papers) were retrieved. Eventually three or more papers were considered, if the numbers of citations were equal. Table 2 shows the number of citations these papers received up to February 2004 and their citation index. A total of 66 papers were found, being 28 revisions, about half of them published in the last ten years. When the citation index is used for ranking these papers, a very different pattern was found, as recent papers generally scored higher than older ones. Considering the recent decisions of increasing the number of issues in *Toxicon* from 12 to 16 per year and publishing of subject-dedicated volumes containing mostly review articles, it can be expected that the Impact Factor of *Toxicon* will keep rising in the near future.

Table 3 shows the 36 papers with a citation index of 7.0 or higher, found either in Tables 1 or 2. Among these, 11 articles were published in the year 2000 or after, and only 5

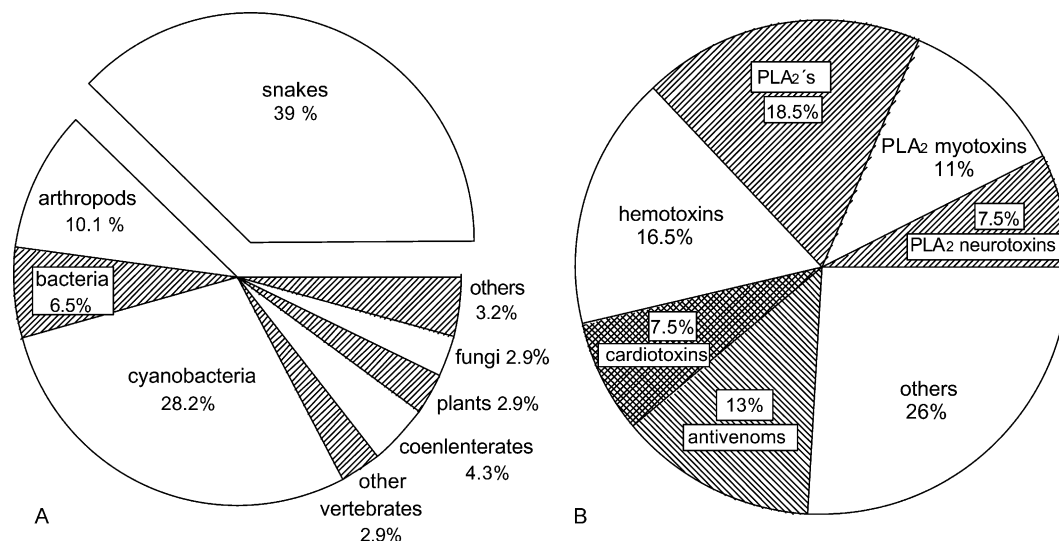


Fig. 2. Major subjects of publications in *Toxicon* with 50 or more citations in February 2004. The main subjects of papers in *Toxicon* with at least 50 citations in February 2004 (from Table 1) were grouped and represented as percentage of the total number (138) of publications (panel A). Papers (total of 54) in the category 'snakes' were then subdivided into more specific topics, as shown in panel B.

were 15 years old or more. Of the 36 papers listed, 14 are review papers. Only one publication not classified as review or article appeared in Table 3 (a letter by Carmichael and co-workers in 1988). The predominance of papers on snake venoms components, including PLA<sub>2</sub>'s, as observed in Figs. 1 and 2, is not seen in this analysis. Instead, toxic cyanobacteria/fungi (11 papers) and spider/scorpion toxins (7 papers) were also among the more frequent subjects (Fig. 3). Two papers on Cys-knotted proteins, with representatives found in plants, fungi and animals, scored among the 7 highest citation indexes.

The uncommon observation that recent papers were proportionally more cited than old ones, as indicated by their citation indexes, agrees with the increase of *Toxicon*'s Impact Factor in the last years (from 1.248 in 1999 to 2.003 in 2002). On the other hand, as shown in Table 4 the percentage of full papers (abstracts of meetings not included) dealing with snake venom components and/or phospholipases published in *Toxicon* remained around 20% over three periods of time within the period ranging from 1963 to 2003. However, there was a decrease in the proportion of these papers from ~39 to 29% when data in Table 1 are compared with that in Table 3. The broadened range of subjects of the most cited papers published recently in *Toxicon* reflects an increased 'visibility' of the journal in other fields of toxinology over the last decade.

To retrieve papers published in *Toxicon* dealing with plants, the 'topic' field of the ISI Web-of-Science search page had the argument: 'plant\* OR seed\* OR root\* OR leaf OR leaves OR flower\* OR bark\* OR fruit\*', with

asterisk \* used as wildcard. The other criteria for search were 1963–2003 period and source *Toxicon*. Using all possibilities, a total of 171 documents dealing with plants were retrieved, of which 107 were articles, 12 reviews, 18 abstracts and 34 other types of papers. About 65% of the articles (70/107) and reviews (8/12) describe toxic effects or chemical structure of compounds derived from plants. Table 5 lists the 18 most cited papers with at least 20 citations in the 1963–2003 period or a citation index of 5.0 or higher. Fig. 3 shows these papers ranked by the number of citations (right panel) and by their citation index (left panel). Here again, the tendency of older papers to have more citations is not so evident as only 7 papers (39%) published more than 15 years appeared in the list (Table 3). However, newer publications in plants showed higher citation indexes similarly to what was seen for all subjects.

The 119 articles and reviews on plant topics correspond to ~3.3% of all full papers in *Toxicon* so far. This percentage contrasts with the much smaller proportion (0.04%) of papers dealing with toxic plants published within the 1963–2003 period in all journals indexed in the ISI Web-of-Sciences database. To retrieve these papers, the 'topic' field of the search page had consecutively the following arguments: 'toxic\*' AND 'seed\*'; 'toxic\*' AND 'root\*'; 'toxic\*' AND 'leaf\*'; 'toxic\*' AND 'flower\*'; 'toxic\*' AND 'bark\*'; 'toxic\*' AND 'fruit\*'. The sum of papers retrieved was 10,012, corresponding to 9614 articles and 398 reviews. This number is probably overestimated as one paper could be retrieved more than one time. If a broader concept of plant is applied in order to include lower

Table 2  
Citation index of the most cited articles and reviews published in *Toxicon* in each of the periods spanning 1963–2003

Period	Number of Articles and Reviews (R)	Author(s) (year)	Number <sup>a</sup> of citations	Citation <sup>b</sup> index	Subject
1963–1969	190	Denson (1969)	85	2.50	Snakes-hemotoxins
	1R	Endean et al. (1969)	62	1.82	Coelenterates
		Zlotkin and Shulov (1969) (R)	25	0.73	Scorpions
1970–1971	212	Kocholaty et al. (1971)	79	2.46	Snakes
	0R	Zlotkin et al. (1971)	59	1.84	Scorpions
1972–1976	293	Yang (1974)	131	4.72	Snakes
	0R	Karlsson et al. (1972)	116	3.74	Snakes-PLA2's-neurotoxins
1977–1981	265	Daly et al. (1978)	104	4.16	Frogs
	7R	Bagnis et al. (1980)	104	4.52	Cyanobacteria
		Condrea et al. (1981a)	90	4.09	Snakes-PLA2's
		Burnett and Calton (1977) (R)	88	3.38	Coelenterates
		McKinstry (1978) (R)	24	0.96	Snakes
1982–1984	254	Couraud et al. (1982)	178	8.47	Scorpions
	4R	Gutierrez et al. (1984)	105	5.52	Snakes-PLA2's-myotoxins
		Theakston (1983) (R)	40	2.00	Snakes-antivenoms
		Maretic (1983) (R)	30	1.50	Spiders
		Krishnamurthy et al. (1986)	134	7.88	Cyanobacteria
1985–1987	265	Vishwanath et al. (1987)	96	6.00	Snakes-PLA2's
	6R	Daly et al. (1987) (R)	135	8.43	Frogs
		Ho et al. (1986) (R)	96	5.64	Snakes
		Carmichael et al. (1988) (L)	159	10.60	Cyanobacteria
1988–1989	206	Takasaki et al. (1988)	156	10.40	Snakes-cardiotoxins
	8R	Lomonte and Gutierrez (1989)	103	7.37	Snakes-PLA2's-myotoxins
		Kini and Evans (1989) (R)	200	14.28	PLA2's-snakes
		Habermann (1989) (R)	95	6.78	Cyanobacteria
		Lewis et al. (1991)	85	7.08	Cyanobacteria
1990–1991	271	Yoshizumi et al. (1990)	73	5.61	Snakes-PLA2's
	9R	Norton (1991) (R)	92	7.66	Coelenterates
		Kini and Evans (1990) (R)	58	4.46	Snakes-hemotoxins
		Suganuma et al. (1992)	67	6.09	Cyanobacteria
		Theakston and Warrell (1991)	61	5.08	Antivenoms
1992–1993	230	Kini and Evans (1992) (R)	99	9.00	Snakes-hemotoxins
	8R	Chippaux et al. (1991) (R)	71	5.91	Snakes
		An and Carmichael (1994)	120	13.33	Cyanobacteria
		Honkanan et al. (1994)	90	10.00	Cyanobacteria
		Gutierrez and Lomonte (1995) (R)	126	15.75	Snakes-PLA2's-myotoxins
1994–1995	266	Ismail (1995) (R)	56	7.00	Scorpions
	13R	Arni and Ward (1996)	95	13.57	PLA2's-snakes
		Hawkins et al. (1997)	57	9.5	Cyanobacteria
		Kamiguti et al. (1996) (R)	49	7.00	Snakes-hemotoxins
		Becerril et al. (1997) (R)	40	6.66	Scorpions
1996–1997	275	Norton and Pallaghy (1998)	70	14.00	Cys knot proteins
	11R	Menez (1998)	35	7.00	Neurotoxins
		Markland (1998) (R)	81	16.20	Snakes-hemotoxins
		Dawson (1998) (R)	50	10.00	Cyanobacteria
		Craik et al. (2001)	51	25.50	Cys knot proteins
1998	206	Lagos et al. (1999)	45	11.25	Cyanobacteria
	7R	Ownby et al. (1999) (R)	34	8.50	Snakes-PLA2's-myotoxins
		Vetter (2000) (R)	25	8.33	Plants
		Harvey (2001) (R)	25	12.50	Snakes-neurotoxins
		Papini et al. (2001)	20	10.00	Bacteria
1999–2000	292	Brossier and Mock (2001)	19	9.50	Bacteria
	12R	Garcia et al. (2001) (R)	29	14.50	Scorpions
		Anderluh and Macek (2002) (R)	19	9.50	Coelenterates
		Harvey (2001) (R)	25	12.50	Snakes-neurotoxins
		Papini et al. (2001)	20	10.00	Bacteria
2001	171	Brossier and Mock (2001)	19	9.50	Bacteria
	14R	Garcia et al. (2001) (R)	29	14.50	Scorpions
		Anderluh and Macek (2002) (R)	19	9.50	Coelenterates
		Harvey (2001) (R)	25	12.50	Snakes-neurotoxins
		Papini et al. (2001)	20	10.00	Bacteria

(continued on next page)

Table 2 (continued)

Period	Number of Articles and Reviews (R)	Author(s) (year)	Number <sup>a</sup> of citations	Citation <sup>b</sup> index	Subject
2002	136	James et al. (2002)	9	9.00	Cyanobacteria-shellfishes
	11R	Plakas et al. (2002)	5	5.00	Cyanobacteria-shellfishes
		Graudins et al. (2002a)	5	5.00	Spiders
		Camey et al. (2002)	5	5.00	Snakes-antivenoms
		Graudins et al. (2002b)	5	5.00	Spider-antivenoms
		Rash and Hodgson (2002) (R)	20	20.00	Spiders
		Goudet et al. (2002) (R)	15	15.00	Scorpions
2003	203	James et al. (2003a)	7	7.00	Cyanobacteria-shellfishes
	9R	Inoue et al. (2003)	4	4.00	Cyanobacteria
		James et al. (2003b)	4	4.00	Cyanobacteria-shellfishes
		Nirthanan et al. (2003) (R)	2	2.00	Snakes
		Gordon and Gurevitz (2003) (R)	2	2.00	Scorpions

<sup>a</sup> Number of citations counted in the last week of February 2004.

<sup>b</sup> Citation index: number of citations divided by the number of years since publication up to 2003, except for publications dated 2003, for which the number of citations was arbitrarily divided by 1.0.

Table 3

Papers in *Toxicon* with citation index of 7.0 or higher, in February 2004

Most cited papers <sup>a</sup>	Number of citations	Citation index <sup>b</sup>	Subject
Craik et al. (2001)	51	25.50	Cys knot proteins
Rash and Hodgson (2002) (R)	20	20.00	Spiders
Markland (1998) (R)	81	16.20	Snakes-hemotoxins
Gutierrez and Lomonte (1995) (R)	126	15.75	Snakes-PLA2's-myotoxins
Goudet et al. (2002) (R)	15	15.00	Scorpions
Kini and Evans (1989) (R)	200	14.28	PLA2's-snakes
Norton and Pallaghy (1998)	70	14.00	Cys knot proteins
Garcia et al. (2001) (R)	29	14.00	scorpions
Arni and Ward (1996)	95	13.57	PLA2's-snakes
An and Carmichael (1994)	120	13.33	Cyanobacteria
Harvey (2001) (R)	25	12.50	Snakes-neurotoxins
Lagos et al. (1999)	45	11.00	Cyanobacteria-shellfishes
Carmichael et al. (1988) (L)	159	10.60	Cyanobacteria
Takasaki et al. (1988)	156	10.40	Snakes-cardiotoxins
Honkanan et al. (1994)	90	10.00	Cyanobacteria
Dawson (1998) (R)	50	10.00	Cyanobacteria
Papini et al. (2001)	20	10.00	Bacteria
Hawkins et al. (1997)	57	9.50	Cyanobacteria
Brossier and Mock (2001)	19	9.50	Bacteria
Anderluh and Macek (2002)	19	9.50	Coelenterates
Kini and Evans (1992) (R)	99	9.00	Snakes-hemotoxins
James et al. (2002)	9	9.00	Cyanobacteria-shellfishes
Ownby et al. (1999) (R)	34	8.50	Snakes-PLA2's-myotoxins
Couraud et al. (1982)	178	8.47	Scorpions
Vetter (2000) (R)	25	8.33	Plants
Daly et al. (1987) (R)	135	8.43	Frogs
Krishnamurthy et al. (1986)	134	7.88	Cyanobacteria
Harada et al. (1994)	71	7.88	Cyanobacteria
Norton (1991) (R)	92	7.66	Coelenterates
Lomonte and Gutierrez (1989)	103	7.37	Snakes-PLA2's-myotoxins
Ji et al. (1996)	51	7.28	Scorpions

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Table 3 (continued)

Most cited papers <sup>a</sup>	Number of citations	Citation index <sup>b</sup>	Subject
Lewis et al. (1991)	85	7.08	Cyanobacteria
Ismail (1995) (R)	56	7.00	Scorpions
Kamiguti et al. (1996) (R)	49	7.00	Snakes-hemotoxins
Menez (1998)	35	7.00	Neurotoxins
James et al. (2003a)	7	7.00	Cyanobacteria-shellfishes

<sup>a</sup> Includes articles, reviews (R) and letters (L).

<sup>b</sup> Citation index: total number of citations divided by the number of years since publication up to 2003, except for publications dated 2003, for which the number of citations was arbitrarily divided by 1.0.

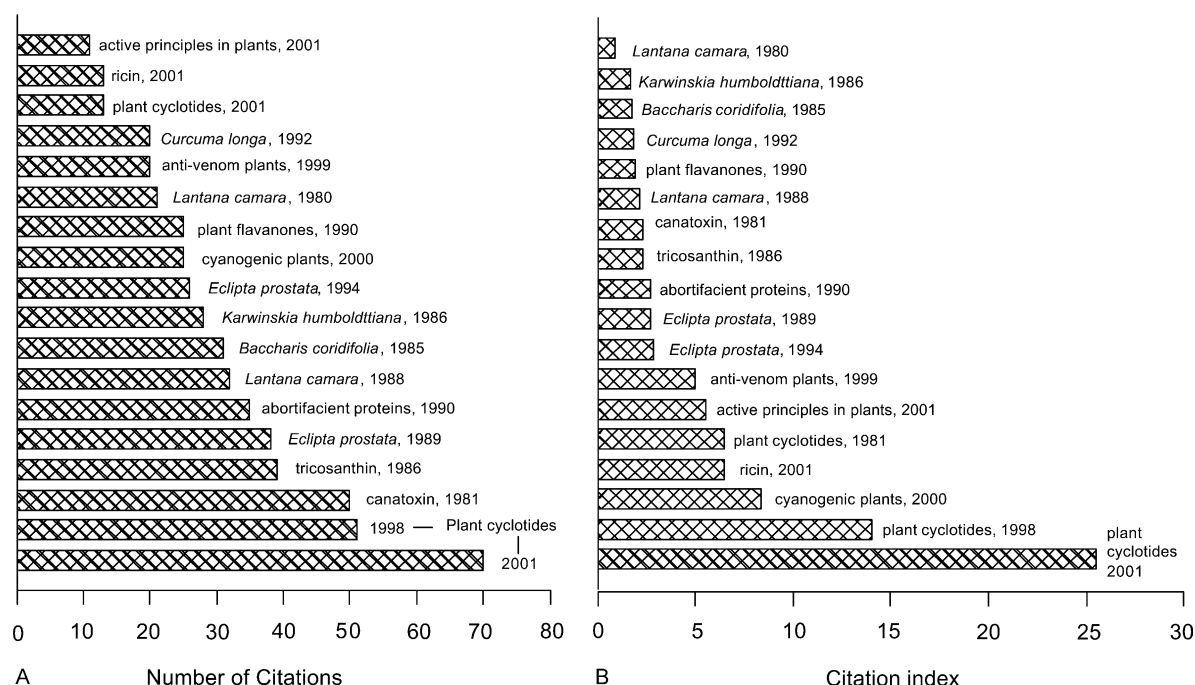


Fig. 3. Most cited papers on plant topics published in *Toxicon* in the 1963–2003 period. Articles and review papers dealing with plant topics published in *Toxicon* in the period 1963–2003 with at least 20 citations or with a citation index of 5.0 or higher are shown in the figure, ranked by the number of citations received (panel A) and by their citation index (panel B). The topic and year of publication of the 18 papers are also shown.

(cyanobacteria, fungi, algae) as well as higher plants, the number increases to 381 full articles (10.5%) for publications in *Toxicon*, while the proportion of papers with these topics in other journals corresponded to 0.40% (100,712 full articles in 25,173,883 in ISI Web-of-Sciences database as per December 31, 2003).

We conclude with the observation that research on plant toxins, although representing a small percentage of articles published, have increased visibility in *Toxicon*. Altogether, these numbers emphasize the acceptance and credibility of *Toxicon* as a vehicle for dissemination of scientific data on toxins from all sources.

Table 4

Papers on the subject 'snake' or 'phospholipase' published in *Toxicon* in three periods of time

Period	Number of Papers <sup>a</sup>	Word in the title snake or PLA2 <sup>b</sup>	Percentage
1963–1987	1327	285	21.5
1988–1998	1456	275	18.9
1999–2003	848	225	26.5
1963–2003	3631	785	21.6

<sup>a</sup> Includes articles and reviews in all languages.

<sup>b</sup> To retrieve papers, the 'topic' field of the ISI Web-of-Science search page had the argument 'snake\*' OR 'phospholipase\*', with asterisk ( \* ) used as wildcard. Only papers with these words in the title were counted.

Table 5

Most cited papers published in *Toxicon* on plants in the period 1963–2003

Most cited articles	Number <sup>a</sup> of citations	Citation <sup>b</sup> index	Subject
Norton and Pallaghy (1998)	70	14.00	Plant cyclotides
Craik et al. (2001)	51	25.50	Plant cyclotides
Carlini and Guimarães (1981)	50	2.27	Canatoxin
Tsao et al. (1986)	39	2.29	Tricosanthin
Mors et al. (1989)	38	2.71	<i>Eclipta prostrata</i> —antivenom plants
Tsao et al. (1990)	35	2.69	Abortifacient proteins
Sharma et al. (1988)	32	2.13	<i>Lantana camara</i>
Habermehl et al. (1985)	31	1.72	<i>Baccharis coridifolia</i>
Bermudez et al. (1986)	28	1.64	<i>Karwinskia humboldtiana</i>
Melo et al. (1994)	26	2.88	<i>Eclipta prostrata</i> —antivenom plants
Vetter (2000)	25	8.33	Cyanogenic plants
Biyiti et al. (1990)	25	1.92	Plant flavanones
Sharma et al. (1980)	21	0.91	<i>Lantana camara</i>
Martz (1992)	20	1.82	Anti-snake venom plants
Ferreira et al. (1992)	20	1.82	<i>Curcuma longa</i> —antivenom plants
Craik (2001)	13	6.5	Plant cyclotides
Olsnes and Kozlov (2001)	13	6.5	Ricin
Rates (2001)	11	5.5	Active principles in plants

<sup>a</sup> Number of citations counted in the last week of December 2003.<sup>b</sup> Citation index: number of citations divided by the number of years since publication up to 2003.

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