Journal of Nematology 43(2):63–68. 2011.

Trends in the *Journal of Nematology*, 1969-2009: Authors, States, Nematodes, and Subject Matter

R. McSorley[1]

Abstract: Issues of the *Journal of Nematology* from 1969-2009 were examined to determine trends in authorship and subject matter. Data were collected on authors, affiliations, locations, funding, nematodes, and nematological subject matter, and then compared among the 4 decades involved. Some of the more prominent changes noted included: a decrease ($P < 0.05$) in the number of papers published in the *Journal of Nematology* in the 1990s and 2000s from a peak in the 1980s; an increase ($P < 0.05$) in number of authors per paper in each decade; an increased ($P < 0.05$) percentage of international authors in the 1990s and 2000s compared to 1970s; and changing roles of the United States Department of Agriculture (USDA) and different states over a period of 4 decades. Plant-parasitic nematodes were the main organisms studied in 73.4% of all papers published the *Journal of Nematology* from 1969-2009. The greatest changes in subject matter were increases in papers on biological control and resistance in the 1990s and 2000s compared to the 1970s and 1980s. Additional trends and subjects are discussed, and data are provided comparing differences among the 4 decades for various aspects of nematology.

Key words: biological control, ecology, grant funding, nematode management, nematology research, plant-parasitic nematodes, resistance, taxonomy.

The *Journal of Nematology* began publication in 1969, 8 years after the founding of the Society of Nematologists, and entered its 42nd year of publication in 2011. Over that time period, a great variety of nematological studies have appeared in this journal, which serves as a convenient record of direction and progress in nematology, especially in the United States. From this record, it may be possible to identify trends in nematological research and researchers, and to determine areas of similarity and difference between early work and that of recent years.

The objective of the current review is to examine trends in the *Journal of Nematology* over a 40-year period in terms of authorship and affiliations, funding, nematodes and subject matter. Specific objectives were to identify differences in these areas among the four decades during that period.

Changes in research trends may have been influenced by many factors, including suggestions and direction provided by prominent nematologists. For example, ten years after the *Journal of Nematology* began publication, Van Gundy (1980) called for changes in direction and outlined perspectives and needs in nematology in the coming decades. Several authors (e.g., Sasser and Freckman, 1987; Van Gundy, 1987) offered perspectives for nematology on the occasion of the 25th anniversary of the Society of Nematologists. Barker et al. (1994) updated educational, societal, and research needs in the 1990s. More recently, Webster (2004) focused on issues, needs, and direction for the 21st century. Examination of recent work in nematology can reveal whether the changes and trends suggested by these authors were reflected in the research published in the journal.

Received for publication May 11, 2011.
[1]Department of Entomology and Nematology, University of Florida, PO Box 110620, Gainesville, FL 32611-0620.
Email: mcsorley@ufl.edu
This paper was edited by Kris Lambert.

Materials and Methods

Articles in all issues of the Journal of Nematology from 1969-2009 were examined for data on authorship and affiliations, funding, nematodes, and subject matter. Articles from *Annals of Applied Nematology* and *Supplement to Journal of Nematology* were not included in the data sets. The number of authors was recorded for each paper, as was the location where the major portion of the work was conducted. Often the location was the same as the laboratory of the first author, but this was not always the case. The original location of the work was used when former graduate students, visiting scientists, or sabbatical visitors had moved on to other locations. Taxonomic studies were assigned to the laboratory where the taxonomic description was made (e.g, United States Department of Agriculture (USDA) laboratory at Beltsville, MD), and not to locations where specimens were originally collected. In a few instances, the exact location of the work conducted could not be determined from the information provided in the paper; such papers were assigned to the location of the first author.

Data were recorded on whether the author location was international, USDA, US state institutions (usually universities), or other (e.g., US companies, Smithsonian Institution). For papers originating from institutions supported by US states (not USDA), additional data were recorded on grant funding for the work, based on information provided in the acknowledgements on the first page. The numbers of papers with external grant funding were recorded, as well as information about agencies that provided the funding. Analysis of funding from government sources was restricted to grants available through US government national agencies, such as USDA or National Science Foundation (NSF). Papers receiving funding only through Hatch projects, state projects, or other local government programs were not included because even if these funds originated from the Federal Government, they are usually given to states for distribution internally, and not subject to nationwide

competition. Funding from non-government sources, such as commodity groups or private companies, was tabulated separately. A few studies were funded by multiple grants, such as the paper by Hirschmann (1980) which was supported by both US Agency for International Development (USAID) and NSF. This was counted as one paper that received grant funding from the US government; however when tabulating the contributions of individual government agencies, it was credited as a work supported by USAID and as a work supported by NSF.

Papers were also classified into types of experiments, based on whether work was conducted in the field, greenhouse, or laboratory. A few papers, primarily symposia, were not included since they did not fit into any of these categories. Field studies included experiments in agricultural fields and natural areas, as well as microplot experiments and surveys. If a paper included both field and greenhouse experiments, it was counted as a field study.

The subject matter in each paper was arbitrarily classified into a number of different categories: biological control, ecology, interactions, host-parasite relationships, management, methods, morphology, physiology, resistance, taxonomy and systematics, and toxicology. The nematodes studied in the papers were classified as plant parasites, free-living, associates of insects or other invertebrates (EPN), marine, vertebrate parasites, or communities. The term "assemblage" is probably more preferable for studies that involve all of the plant-parasitic and free-living nematodes in an ecosystem or study area (Yeates, 2003), but the term "community" is used here because that is the term appearing in most *Journal of Nematology* papers in the time period examined. A paper that involved a mixture of different categories of nematodes (other than community studies) was simply classified as a mix (e.g., Chitwood et al., 1986; Huettel, 1986). Data were also recorded on several common nematode genera that appeared in many papers (*Meloidogyne, Globodera, Heterodera, Pratylenchus*).

Data analysis: Data from all 41 years from 1969 to 2009 were included in overall summaries for the entire journal during this time period. Within this time period, four different decades were defined as: 1970s = 1970-1979; 1980s = 1980-1989; 1990s = 1990-1999; 2000s = 2000-2009. Using years within decades as observations (n = 10), differences among decades were examined using one-way analysis of variance (ANOVA) through the general linear model (GLM) procedure of the Statistical Analysis System (SAS Institute, Cary, NC). When a significant ($P \leq 0.05$) effect was obtained, means for the four decades were separated using the Waller-Duncan k ratio test with $k = 100$.

Results and Discussion

Overall numbers of papers: The numbers of papers in the *Journal of Nematology* increased to a peak of 84.5 per volume in the 1980s, but has declined in each of the subsequent decades (Table 1). Some of the decline between the 1980s and 1990s may be due to publication of *Annals of Applied Nematology*, which likely included papers that otherwise may have appeared in the *Journal of Nematology*. In addition, short research notes were common in earlier issues of the Journal of Nematology (total of 108 in 1970s and 119 in 1980s), but these have nearly disappeared from later issues (total of 23 in 1990s and 2 in 2000s). Some short papers of this type were suitable for *Annals of Applied Nematology* and were published there. However, a significant ($P < 0.05$) drop of 20 papers per year between the 1990s and 2000s cannot be explained by diverting of papers from one Society of Nematologists publication to another, since the last issue of *Annals of Applied Nematology* was published in 2001. Of course, other journals such as *Nematropica*, *Nematology*, *Revue de Nematologie*, and *Plant Disease* competed with the *Journal of Nematology* for papers during the 1990s and 2000s as well.

Table 1. Authors, affiliations, funding, and experiment type for papers published in the *Journal of Nematology*, 1969- 2009.

Variable	Overall	1970s	1980s	1990s	2000s
Papers per year	66.3	61.3 bc	84.5 a	71.0 b	50.1 c
Authors per paper	2.63	2.03 d	2.21 c	2.73 b	3.62 a
No. states per year	16.1	15.2 a	17.5 a	17.5 a	15.0 a
International (%)	21.3	15.6 b	20.9 ab	25.2 a	26.2 a
USDA (%)	17.9	21.6 a	19.0 a	16.0 ab	13.0 b
State papers w grants (%)	41.0	31.7 c	38.5 bc	44.7 ab	52.0 a
Papers w gov't grant (%)	27.3	26.6 a	27.4 a	27.2 a	27.5 a
		Experiment type			
Field (%)	22.5	17.1 b	22.4 b	21.8 b	30.6 a
Greenhouse (%)	27.6	30.6 a	27.4 a	28.0 a	24.8 a
Laboratory (%)	43.8	48.4 a	42.9 ab	42.4 ab	38.8 b

Data are means of 41 (overall) or 10 (decades) observations. Among decades, means in rows followed by the same letter do not differ ($P \leq 0.05$) according to the Waller-Duncan k-ratio test.

Authorship of papers: The number of authors per paper of published articles has increased steadily during the

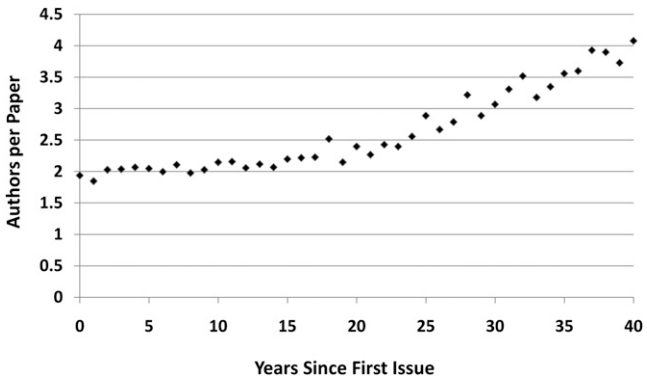

Fig. 1. Average number of authors per paper published in the *Journal of Nematology* over a 41-year period, beginning with the first issue in 1969 (year 0).

41-year period examined (Fig. 1). The number of authors per paper increased significantly ($P < 0.05$) in each of the 4 decades (Table 1). While a paper with 14 authors was unusual in 1994 (Barker et al., 1994), papers with ≥ 6 authors became more frequent in the 2000s, with an average of 4.08 authors per paper in 2009. Reasons for the increase in number of authors were not investigated further, although it appears that collaboration among authors from multiple locations, affiliations, and disciplines is more common now than in earlier years.

International authorship increased since the 1970s and has remained at around 25-26% of all papers during the last 2 decades (Table 1). Studies conducted in about 50 different countries have been published in the *Journal of Nematology*. Of course, data from many more countries and locations are included in other articles in the *Journal of Nematology*, especially from sites where taxonomic specimens were collected. Among the 10 countries that contributed the most papers (Fig. 2), Canada was the most frequent, accounting for 25.7% of all international papers. Authors from these 10 countries were frequent contributors of papers in most decades. However, in the 2000s, Belgium and Portugal (tied for 7th-8th) as well as China (9th) were among the 10 most frequent countries. Only 2 countries besides the US contributed more than 10 papers in the 2000s, Canada (14) and Spain (11).

Many of the early nematologists in the United States worked in or were trained in USDA laboratories, and much of the early work in nematology in this country was conducted by USDA scientists (Barker, 2004). Authors from USDA are still very active and have accounted for 17.9% of the papers published in the *Journal of Nematology* (Table 1). However, the percentage of papers contributed from USDA scientists declined ($P < 0.05$) in the 2000s compared to the 1970s and 1980s. A lower number of papers from USDA in the 2000s is consistent with the lower number of papers in the journal overall in that decade. The reason for the lower percentage of USDA papers in the 2000s is not known, but the percentages of international papers and USDA papers show opposite trends in the 1970s and 2000s. One contributing factor might be the retirement of several highly productive USDA nematologists in the 1990s up to 2000 (e.g., G. D. Griffin, A. W. Johnson, N. A. Minton). During the 15-year period from 1993-2007, the numbers of papers from USDA scientists reached their lowest levels in 1999-2001, with ≤ 4 papers per year during those 3 years. Those may have been transitional years following the refilling of some of the positions vacated by retirements (Timper and Davis, 2002).

Role of US states: Many papers from the US are published by authors from institutions (mainly universities) supported by individual US states. These papers originating from US states made up a majority (59.7%) of all papers published in the *Journal of Nematology* from 1969-2009. On average, articles from 16.1 different states were published each year, a figure that did not vary much across the decades (Table 1). California contributed the largest number of articles (Table 2), and accounted for 12.9% of the total number of papers published in the *Journal of Nematology*. Of the 352 papers published by state organizations in California, 192 (54.5%) were by authors from the University of California at Riverside, while 132 (37.5%) originated from the University of California at Davis. Florida and North Carolina, each with about 200 papers, also rank among the 10 states that have published the most articles (Table 2). The rankings of the individual states show a number of differences when examined by decades (Table 2). For example, more papers were published from California than from Florida in the 1980s, but the opposite trend occurred in the 2000s. Numbers of papers from states such as Arkansas and Missouri increased sharply in the 1980s due to increased attention to soybean cyst nematode (*Heterodera glycines*) and pinewood nematode (*Bursaphelenchus xylophilus*) in these areas. They have remained among the most productive state programs since that time. The ranking of Texas among states has increased each decade due to a steady increase in publications over time. Other states ranking among the top ten during the 2000s include Virginia (tied for 5th-6th), Connecticut (8th), and Hawaii and Oregon (both tied for 10th-11th).

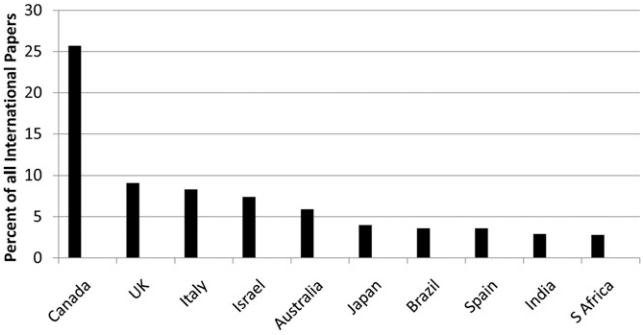

FIG. 2. Ten countries with the highest frequency of international papers published in the *Journal of Nematology*.

TABLE 2. Number of papers published in the *Journal of Nematology* (1969- 2009) by authors from various states and ranks among states.

State	Total Papers	Rank among States				
		Overall	1970s	1980s	1990s	2000s
California	352	1	1	1	2	2
Florida	200	2	7	3	1	1
North Carolina	196	3	2	2	3	5-6
Arkansas	68	4	–[a]	6-7	5	3
Missouri	64	5	–	4	4	7
Georgia	61	6	6	5	6	–
New York	55	7	3	6-7	–	9
Texas	48	8	–	10-11	7-8	4
Indiana	40	9-10	4-5	–	–	–
Iowa	40	9-10	4-5	–	9-10	–

[a]Dashes (–) indicate state ranked >10 in that decade.

Grant funding to US states: Among the papers by authors from institutions in various US states, 41.0% were funded at least in part by external grants (Table 1). The proportion of papers funded by grants increased from 31.7% in the 1970s to 52.0% in the 2000s. Much of the increase in funded work over this period was due to grants from commodity groups (especially for crops like soybean and cotton), and to some extent from other private companies. About 27% of studies were supported by US government agencies, a rate that remained relatively level from the 1970s through 2000s (Table 1). Of these papers from 1969-2009 supported by US government grants, 54.6% were funded at least in part by the US Department of Agriculture (USDA), 24.8% by the National Science Foundation (NSF), 10.5% by the US Agency for International Development (AID), 8.1% by the National Institute of Health (NIH), and 1.9% by the US Environmental Protection Agency (EPA). The level reported for NIH includes a few earlier publications (e.g., Castillo and Krusberg, 1971) funded by the US Public Health Service. Comparable figures for the 2000s are 64.8% funded by USDA, 23.1% by NSF, 9.9% by NIH, and 2.2% by AID (data not shown). Of course it is possible that some of these numbers may be lower than the actual numbers of grants received, if some authors neglected to acknowledge funding sources in their publications. Nevertheless, these data may provide some quantifiable evidence for relative levels of support by different agencies. More detailed results could be obtained by in-depth examination of funding records from specific agencies.

Experiment types: Many of the papers in the *Journal of Nematology* were laboratory studies (43.8% of total papers, Table 1). The proportion of laboratory studies decreased ($P < 0.05$) in the 2000s compared to the 1970s (Table 1). In 1969, 64.0% of the papers published were laboratory studies (data not shown). A number of older volumes contained research notes about various laboratory techniques (e.g., Evans, 1970; Thistlethwayte and Riedel, 1969) as well as experiments or observations conducted in various sorts of custom-made laboratory arenas (e.g., Caveness and Caveness, 1970; Chin and Taylor, 1969). It is possible that the number of these types of studies may have contributed to higher percentages of laboratory studies in earlier volumes. In addition, some of the decline in percentage of laboratory studies in the 2000s came at the expense of an increase in field studies, which increased ($P < 0.05$) in the 2000s compared to other decades (Table 1). In the 2000s, nearly a third of all papers included a field or microplot component.

Nematodes: The majority of papers published in the *Journal of Nematology* focused on plant-parasitic nematodes (73.4%), a figure that was relatively consistent over time ranging from 72.2% in the 2000s to 75.0% in the 1980s (data not shown). Entomopathogenic nematodes and other nematodes associated with invertebrates (EPN) were the subjects of 9.4% of all papers, ranging from 5.4% in the 1970s to 12.0% in the 1990s. Among all papers published, 5.8% focused on free-living nematodes and 1.6% were community studies. More than a quarter of all papers (29.3%) involved root-knot nematodes (*Meloidogyne* spp.), and more than half of all papers (53.0%) included root-knot, cyst (*Heterodera* spp., *Globodera* spp.) or lesion nematodes (*Pratylenchus* spp.). In contrast, only 2.0% of papers included *Caenorhabditis* spp. as subject matter. Van Gundy (1980) recognized the importance of *C. elegans* as a biological model over 30 years ago and called for more inclusion in the Society of Nematologists. Since then, a voluminous literature has been published on this nematode. One review of developmental biology of *C. elegans* (Felix, 2004) included over 350 citations, but none were from the *Journal of Nematology*. Other nematodes that were infrequent or under-represented in the journal included marine nematodes (1.0%) and vertebrate parasites (0.6%).

The emphasis of the *Journal of Nematology* on plant-parasitic nematodes has been noted previously (Mai and Motsinger, 1987). Most of the organizers of the Society of Nematologists were plant nematologists and members of the American Phytopathological Society (Mai and Motsinger, 1987), so the focus on plant parasites is not surprising. In addition, many of the institutions that have supported nematological work in the various US states are Land Grant universities, which have a strong agricultural focus and had maintained programs in plant nematology during this time.

Subject matter: Ecology, host-parasite relationships, management, and taxonomy/systematics were frequent subjects of articles in the *Journal of Nematology*, each accounting for > 10% of total papers published (Table 3). In the 1990s and 2000s, both biological control and resistance have each been the subjects of > 10% of papers published. Frequencies of these two subject areas in the 2000s are more than double those of the 1970s (Table 3). Earlier perspectives on the future of nematology (Barker et al., 1994; Webster, 2004) emphasized the need and priority for advances in host-plant resistance and biological control of nematodes.

TABLE 3. Subject matter of papers published in the *Journal of Nematology*, 1969- 2009.

	Percent of papers				
Subject	Overall	1970s	1980s	1990s	2000s
Biological control	7.0	1.7 c	6.2 b	10.0 a	12.4 a
Ecology	18.1	22.5 a	17.9 b	16.6 b	15.8 b
Interactions	6.5	7.4 a	6.4 a	6.0 a	5.2 a
Host-parasite	15.2	16.6 ab	19.2 a	13.3 b	9.1 c
Management	10.1	10.7 a	9.4 a	8.8 a	12.1 a
Methods	5.9	7.8 a	5.5 a	5.7 a	3.1 b
Morphology	4.1	7.4 a	3.3 bc	3.7 b	1.4 c
Physiology	3.9	1.8 a	4.8 a	4.9 a	3.5 a
Resistance	8.2	5.0 b	6.9 b	10.7 a	11.3 a
Taxonomy	17.7	15.0 b	16.3 b	18.3 ab	22.7 a
Toxicology	2.5	3.5 a	2.8 a	1.6 a	2.5 a

Data are means of 41 (overall) or 10 (decades) observations. Among decades, means in rows followed by the same letter do not differ ($P \leq 0.05$) according to the Waller-Duncan *k*-ratio test.

The increased levels of work in these two areas are probably the most striking changes in subject matter over the decades (Table 3) and are a favorable response to the needs expressed in those earlier perspectives.

In contrast, emphasis on host-parasite relationships has declined from its peak in the 1980s (Table 3). Host-parasite relationships and host range studies (included here with host-parasite relationships) were popular subject areas in the 1970s as well (Van Gundy, 1980). The decline in emphasis on host-parasite relationships may simply be due to arbitrary reclassification of these studies, as research in these areas becomes more advanced and focused. For example, work in host-plant resistance could result as a future development of early host-parasite studies. If the percentages of papers on resistance and on host-parasite relationships are added together, the totals for the 1970s and 2000s are fairly similar. Other subject areas that showed significant ($P < 0.05$) decline when comparing the 1970s and 2000s are methods and morphology (Table 3). A number of papers from the 1970s (e.g., Chen and Wen, 1972; Smart et al., 1972) present electron microscopy of various nematode structures in detail. It is possible that in subsequent decades, information on anatomical structures is not presented on its own, but instead is incorporated into other areas, such as taxonomic or physiological studies.

Of the papers on nematode ecology, 15.7% included population dynamics, 8.8% included nematode assemblages or communities, and 7.7% focused on sampling. However, topics in nematode ecology varied widely and also included temperature studies, nematode movement and migration, behavior, anabiosis, energetics, surveys, and a variety of other topics. In the 2000s, 21.2% of ecological studies involved nematode assemblages or communities. The increased frequency of such studies is consistent with several perspectives (Van Gundy, 1980; Webster, 2004; Yeates, 2003) that recognized the need to examine the roles and contributions of nematodes in soil ecosystems. A series of symposia on precision agriculture (e.g., Melakeberhan, 2002) contributed to a relatively high frequency (17.5% of ecology studies) of sampling papers in the 2000s.

Of all the studies that involved interactions, 33.7% examined interactions between nematodes and pathogenic fungi, 28.1% involved nematode-nematode interactions, 11.2% involved viruses, 10.1% with insects, and 6.7% with pathogenic bacteria. Other than these groups, the remaining 10.7% of interaction studies examined nematode interactions with mycorrhizae, weeds, or nitrogen-fixing bacteria.

Of the papers on nematode management, 56.2% emphasized nematicides, with 22.3% focusing mainly on rotation, and 8.0% on amendments. Of all the papers from 1969-2009, 5.7% covered nematode management with nematicides. Frequency of nematicide papers declined ($P < 0.05$) from high levels of 8.2% in the 1970s and 6.8% in the 1980s to only 3.0% in the 1990s. This decrease may be related to the regular publication of *Annals of Applied Nematology* in the 1990s, since those issues included many nematicide studies.

Taxonomy and systematics has always been an important subject area within nematology, and the frequency of papers on taxonomy increased ($P < 0.05$) in the 2000s compared to the 1970s or 1980s (Table 3). Most of the papers in this area present morphological and/or molecular data for nematode identification, although a few papers cover very different material, such as lists of nematodes in various collections (e.g., Noffsinger, 1982; Tarjan, 1985). Papers on nematode identification usually presented only morphological data in the 1970s, but use of molecular methods increased rapidly over the last two decades, so that more taxonomic studies in the 2000s utilized molecular methods (Fig. 3). Although a few earlier papers such as Friedman et al. (1977) presented both morphological and molecular data, this approach did not become not common until the 2000s.

A few toxicology studies were published throughout all four decades. Initially these experiments tested exposure of nematodes to commonly used nematicides and related synthetic compounds, but shifted more toward evaluation of natural and botanical compounds in later years (e.g., Kong et al., 2007). Some physiological studies were published in every decade and may show shifts within this subject area, possibly toward more use of molecular techniques in later decades (e.g., Hartman et al., 2003).

Overview and summary: The classification of papers by subject matter is arbitrary, as illustrated by the discussion above about potential overlap of resistance vs. host-parasite relationships. Certainly other classifications are possible, as well as subdivision of existing categories. Changing trends in subject matter within taxonomy (e.g., morphological vs. molecular), ecology, or management did not become apparent until topics within each of these areas were examined. It is possible to subdivide and examine trends in other subject areas as well, or to address different types of demographic questions about authors and locations. Most importantly, the results here are

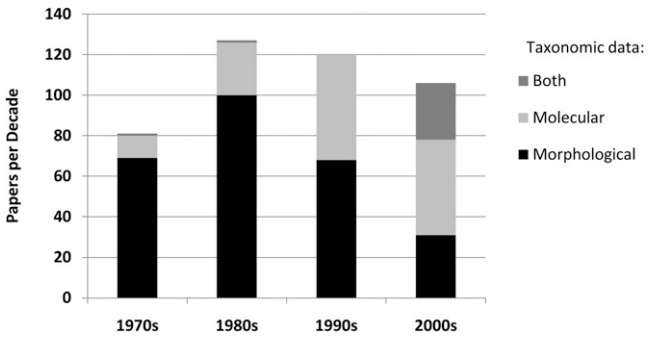

FIG. 3. Numbers of taxonomic papers presenting morphological data, molecular data, or both kinds of data, over 4 decades.

limited to and biased toward publications in the *Journal of Nematology*. Examination of data from other key nematology journals such as *Nematropica* and *Nematology* would reveal additional trends and add to this picture of trends in nematology, although a comprehensive evaluation would require examination of a large number of journals and other publications as well.

In any case, the categories examined did reveal some interesting trends and provided some data for comparing differences in various aspects of nematology among the 4 decades. Some of the more prominent changes noted included a decrease in the number of papers published in the *Journal of Nematology* from a peak in the 1980s, an increased number of authors per paper in each decade, increased percentage of international authors in the 1990s and 2000s compared to 1970s, and changing roles of the USDA and different state agencies over a period of 4 decades. The greatest changes in subject matter were increases in papers on biological control and resistance in the 1990s and 2000s compared to the 1970s and 1980s.

Literature Cited

Barker, K. R. 2004. A century of plant nematology. Pp. 1–51 *in* Z.X. Chen, S.Y. Chen, and D.W. Dickson, eds. Nematology Advances and Perspectives. Beijing: Tsinghua University Press.

Barker, K. R., Hussey, R. S., Krusberg, L. R., Bird, G. W., Dunn, R. A., Ferris, H., Ferris, V. R., Freckman, D. W., Gabriel, C. J., Grewal, P. S., MacGuidwin, A. E., Riddle, D. L., Roberts, P. A., and Schmitt, D. P. 1994. Plant and soil nematodes: Societal impact and focus for the future. Journal of Nematology 26:127–137.

Castillo, J. M., and Krusberg, L. R. 1971. Organic acids of *Ditylenchus triformis* and *Turbatrix aceti*. Journal of Nematology 3:284–288.

Caveness, F. E., and Caveness, C. E. 1970. Nematode electrocution. Journal of Nematology 2:298–304.

Chen, T. A., and Wen, G.-Y. 1972. Ultrastructure of the feeding apparatus of *Pratylenchus penetrans*. Journal of Nematology 4: 155–161.

Chin, D. A., and Taylor, D. P. 1969. Sexual attraction and mating patterns in *Cylindrocorpus longistoma* and *C. curzii* (Nematoda: Cylindrocorporidae). Journal of Nematology 1:313–317.

Chitwood, D. J., Lozano, R., and Lusby, W. R. 1986. Recent developments in nematode steroid biochemistry. Journal of Nematology 18:9–17.

Evans, A. A. F. 1970. Production of large numbers of mycophagous nematodes. Journal of Nematology 2:99–100.

Felix, M.-A. 2004. Developmental biology of nematodes – what we learn from *Caenorhabditis elegans*. Pp. 71–174 *in* Z. X. Chen, S. Y. Chen, and D. W. Dickson, eds. Nematology Advances and Perspectives. Beijing: Tsinghua University Press.

Friedman, P. A., Platzer, E. G., and Eby, J. E. 1977. Species differentiation in *Caenorhabditis briggsae* and *Caenorhabditis elegans*. Journal of Nemtology 9:197–203.

Hartman, P., Belmont, P., Zuber, S., Ishii, N., and Anderson, J. 2003. Relationship between catalase and life span in recombinant inbred strains of *Caenorhabditis elegans*. Journal of Nematology 35:314–319.

Hirschmann, H. 1982. *Meloidogyne platani* n. sp. (Meloidogynidae), a root-knot nematode parasitizing American sycamore. Journal of Nematology 14:84–95.

Huettel, R. N. 1986. Chemical communicators in nematodes. Journal of Nematology 18:3–8.

Kong, J.-O., Park, I.-K., Choi, K.-S., Shin, S.-C., and Ahn, Y.-J. 2007. Nematicidal and propagation activities of thyme red and white oil compounds toward *Bursaphelenchus xylophilus* (Nematode: Parasitaphelenchidae). Journal of Nematology 39:237–242.

Mai, W. F., and Motsinger, R. E. 1987. History of the Society of Nematologists. Pp. 1–6 *in* J. A. Veech and D. W. Dickson, eds. Vistas on Nematology: A commemoration of the Twenty-fifth Anniversary of the Society of Nematologists. Hyattsville, MD: Society of Nematologists, Inc.

Melakeberhan, H. 2002. Embracing the emerging precision agriculture technologies for site-specific management of yield-limiting factors. Journal of Nematology 34:185–188.

Noffsinger, E. M. 1982. Type specimens on deposit at University of California Davis Nematode Collection. Journal of Nematology 14:131–141.

Sasser, J. N., and Freckman, D. W. 1987. A world perspective on nematology: The role of the society. Pp. 7–14 *in* J. A. Veech and D. W. Dickson, eds. Vistas on Nematology: A commemoration of the Twenty-fifth Anniversary of the Society of Nematologists. Hyattsville, MD: Society of Nematologists, Inc.

Smart, G. C., Jr., Hartman, R. D., and Carlysle, T. C. 1972. Labial morphology of *Belonolaimus longicaudatus* as revealed by the scanning electron microscope. Journal of Nematology 4:216–218.

Tarjan, A. C. 1985. Transfer of type specimens. Journal of Nematology 17:374–380.

Thistlethwayte, B., and Riedel, R. M. 1969. Expressing sucrose concentration in solutions used for extracting nematodes. Journal of Nematology 1:387–388.

Timper, P., and Davis, R. 2002. A history of nematology in Tifton, Georgia. Nematology Newsletter 48(3):7–9.

Van Gundy, S. D. 1980. Nematology – status and prospects: Let's take off our blinders and broaden our horizons. Journal of Nematology 12:158–163.

Van Gundy, S. D. 1987. Perspectives on nematology research. Pp. 28–31 *in* J. A. Veech and D. W. Dickson, eds. Vistas on Nematology: A commemoration of the Twenty-fifth Anniversary of the Society of Nematologists. Hyattsville, MD: Society of Nematologists, Inc.

Webster, J. M. 2004. Perspectives on nematology for the 21st century. Pp. 52–70 *in* Z. X. Chen, S. Y. Chen, and D. W. Dickson, eds. Nematology Advances and Perspectives. Beijing: Tsinghua University Press.

Yeates, G. W. 2003. Nematodes as soil indicators: functional and biodiversity aspects. Biology and Fertility of Soils 37:199–210.