

THE JOURNAL OF PHYSICAL OCEANOGRAPHY
AND ISI'S LIFE SCIENCE RESEARCH

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In the October 1994 issue of *Science Watch* and again in the Feb. 20, 1995 issue of *The Scientist*, the Institute for Scientific Information (ISI) published the results of a study on life science research in the U.S. The headline from *The Scientist* was "Citation Impact Reveals Top U.S. Universities in Life Science Research."

Using a 13-year period, 1981-1993, ISI determined the number of papers published by institutional researchers in specified journals, and the number of times those papers had been cited. This produced an average citation count/paper. The average citation count for an institution was compared against a world average that was determined by taking all of the citations to papers in a specified science field divided by the total number of papers.

Ten universities were ranked in the "Plant & Animal Science" field: 1) University of California, San Diego; 2) Yale University; 3) State University of New York, Stony Brook; 4) University of California, Santa Barbara; 5) University of Washington; 6) University of California, Los Angeles; 7) Florida State University; 8) University of North Carolina; 9) Indiana University; and 10) University of Colorado. A copy of the ISI results is given in Appendix I.

Of particular interest at the University of Florida (UF) was the ranking under the category of Plant & Animal Sciences that indicated Florida State University (FSU) was one of the top schools. A preliminary search of the Science Citation Index showed that between the years 1981-1993, UF published 35,665 articles and Florida State published 6,537 articles. While ISI indicated that their methodology eliminated bias in terms of total publishing effort, it was of interest to learn where Florida State researchers were publishing.

In trying to explain the results, the first question was how did ISI define a particular biological science field, e.g., "Plant & Animal Science." ISI representatives indicated that category codes from Current Contents were used. For the "Plant & Animal Science," the categories Animal Sciences, Aquatic Sciences, Entomology/Pest Control, Plant Sciences, and Veterinary Medicine/Animal Health were selected from Current Contents: Agriculture, Biology & Environmental Sciences; and Animal & Plant Sciences was selected from Current Contents: Life Sciences. Where journals were multidisciplinary, e.g., *Science*, *Nature*, an algorithm had been

constructed which examined what journals were cited within a paper and what journals cited a particular paper. The frequency of cites to and cites from a paper allowed it to be classified within a circle of journals that represented a particular subject field.

Because ISI used its proprietary database University Science Indicators on Diskette to run the statistical analysis, it was impossible to independently confirm the findings reported. The author requested a list of the papers published by Florida State University which lead to its 7th place ranking.

While the ISI study indicated that Florida State University had a total of 670 papers, the printout from ISI listed 647 papers with a total of 6,941 citations.

Table 1 below indicates the eight journal titles which contained papers that contributed 50%, or 3,471 citations, to the ISI analysis, the total number of papers in each journal, and the total number of citations to those papers. A complete listing of the 1981-1993 FSU publishing endeavor is given in Appendix II.

Table 1. CITATION DISTRIBUTION BY JOURNAL TITLE

Title	# of cites	% total cites	Papers
J Phys Ocean	1003	14.5	93
Phytochem	835	12	111
Mar Ecol-PR	374	5.4	20
J Exp Mar B	339	4.9	28
Limn Ocean	319	4.6	11
Deep-Sea A	289	4.2	23
Marine Biol	282	4.1	19
Fla Entomol	247	3.6	11

Critical to the outcome of this analysis was the inclusion of the 1003 citations from the 93 papers published in the Journal of Physical Oceanography . This journal is not covered by any of the primary life sciences indexes including Biological Abstracts, Life Sciences Collection, CAB Abstracts, MEDLINE, or Zoological Record. An additional 27 papers from Journal of Marine Research, Deep-Sea A, Deep Sea I, Deep Sea II, Marine Chemistry, and Estuarine, Coastal and Shelf Science representing 250 citations did not appear relevant to plant and animal sciences and were not covered in Biological Abstracts.

Titles counted in the ISI analysis included: "The Seasonal Variability in a Model of the Tropical Pacific" (84 citations) and "On the Beta-Induced Movement of Isolated Baroclinic Eddies" (64 citations) from the Journal of Physical Oceanography; "Too Cold Bottom Layers at the Base of the Scotian Rise (47 citations) and "On the Migration of Isolated Eddies with Application to Gulf Stream Rings (40 citations) from the Journal of Marine Research; and "The Translation of Isolated Cold Eddies on a Sloping Bottom" (20 citations) and "Observations on the Nearby Flow and a Model for Growth of Mudwaves" (9 citations) from Deep-Sea A.

Since only FSU papers were analyzed, it is impossible to predict which other of the ISI life science rankings included non-life science papers. Unfortunately, the flaws discovered in this one listing are probably not unique. Any ISI study that has used the journal clusters defined by Current Content category codes may contain either flaws of inclusion or omission, but what has been clarified is that these flaws remain hidden until the actual citations are studied.

Frequently, citation studies are interpreted as a reflection on the academic excellence of universities, departments, and individual researchers. Seldom has ISI methodology been questioned, but the lack of scientific rigor evidenced in the life sciences study indicates a need for much stronger vigilance in the future and a most cautious interpretation of past ISI studies.

Bibliography

"Citation Impact Reveals Top U.S. Universities in Life Science Research" *The Scientist*, Feb. 20, 1995.

"America's Best Research University? Stanford Soars in Top Ten Tournament." *ScienceWatch*, v.5, no.10, October 1994. pg.1-2.

Appendix I. Results reported in The Scientist, Feb. 20, 1995.

“Citation Impact Reveals Top U.S. Universities in Life Science Research”

PLANT & ANIMAL SCIENCE
(500+ papers)

Rank	Institution	# of papers impact	Relative impact
1	Univ. of CA, San Diego	1,380	+195
2	Yale U.	716	+133
3	SUNY, Stony Brook	700	+132
4	Univ. of CA, Santa Barbara	781	+130
5	University of Washington	2,284	+116
6	Univ. of CA, Los Angeles	1,112	+116
7	Florida State Univ.	670	+101
8	Univ. of N. Carolina	609	+100
9	Indiana Univ.	531	+94
10	University of Colorado	732	+93

Appendix II. JOURNAL ANALYSIS OF FSU PUBLISHING 1981-1993

Title	Articles	Times Cited	Title	Articles	Times Cited
Act Zool	1	2	J Crus Biol	18	231
Am Zool	5	45	J Exp Mar B	28	339
Anim Behav	4	29	J Exp Zool	9	150
Ann Ent S A	11	85	J Field Orn	1	1
Ann Sr Zool	1	3	J Herpetol	1	9
Ann Zoo Fen	2	85	J Marine Re	13	201
Aquaculture	1	4	J Mollus St	1	1
Aquatic Bot	1	2	J Nematol	1	4
Auk	8	124	J Phycology	3	24
B Marine Sci	19	213	J Phys Ocean	93	1003
Behav Eco S	2	0	J Protozool	1	4
Behav Ecol	6	90	J Zool	4	12
Behaviour	2	11	Limn Ocean	11	319
Biol B	16	163	Mar Behav P	5	20
Botan Marine	1	6	Mar Biol Let	1	5
Br Phycol J	2	9	Mar Chem	13	155
Can J Fish	1	4	Mar Ecol-PR	20	374
Can J Zool	3	78	Marine Biol	19	282
Coleopts B	1	1	Nature	3	142
Comp Bioc A	13	93	Nutr Rep In	4	6
Condor	4	3	Oceanol Acta	1	10
Cont Shelf	3	114	Oceanus	2	6
Contr Mar S	1	2	Ornis Fen	1	4
Copeia	15	76	Ornis Scand	1	4
Crustaceana	6	25	P Ent Soc Was	1	2
Deep-Sea A	23	289	Photosyn R	4	30
Deep-Sea I	2	2	Phycologia	8	12
Deep-Sea II	4	17	Physl Entom	3	36
Ecol Ent	11	159	Physl Plant	6	106
Env Biol F	5	23	Physl Zool	8	106
Env Entomol	2	27	Phytochem	111	835
Est Coast S	7	102	Pl Cell Env	1	3
Estuaries	4	27	Plant Physl	20	201
Ethology	1	2	Planta	2	47
Fish B	2	18	Prog Fish C	1	1
Fla Entomol	11	247	Science	1	93
Herpetologi	4	22	Syst Entom	1	11
Insect Soc	4	36	Syst Zool	3	52
Int J Insec	1	15	Veliger	2	9
J Anim Ecol	3	69	Wilson B	1	2
J Comp Ph B	2	8	Zbl Vet C	1	0