EDITORIAL

Editorial on PBZ's Ninetieth Year and Top 90 Papers in PBZ, 1927–2017

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"With great power there must also come—great responsibility!" (Lee 1962). I have kept this in mind during my editorship of *Physiological and Biochemical Zoology* (PBZ), and I have tried to shepherd the journal into the beginning decades of the twenty-first century by increasing online supplements, adding new sections that will expand our readership, and selecting only the best and most fitting papers for publication (Garland 2014). PBZ is entering its ninetieth year of publication, and I am proud to count myself among the editors who have led the journal to its current status as a respected international publication that presents the best and most responsible research into animal physiology with an ecological and evolutionary perspective (see table 1). Many of our editors have been eminent scientists, such as Thomas Park, whose *New York Times* obituary (published April 4, 1992) credits him with being "instrumental in transforming the field of ecology into a science with quantification and controlled experiments." Or consider Warder Clyde Allee, who Wikipedia recognizes as "one of the great pioneers of American ecology." And then we have Clifford Ladd Prosser, referred to in his obituary by the American Physiological Society as "among the few giants of comparative physiology in the second half of the twentieth century" (also see Hazel and Sidell 2002).

To celebrate the ninetieth year of PBZ, we have collaborated to bring you a list of the 90 most cited papers ever published in PBZ (including papers in its precursor, *Physiological Zoology* [PZ]) and to make the 90 most cited papers available with open access throughout 2017 (tables 2a, 2b). As we found a total of 4,500 indexed papers at the time of the analysis in May of 2016, this amounts to the top 2% of indexed papers (see supplement 1; supplements 1 and 2, available online).

Examination of the 4,500 papers reveals that only 8.4% of them ($N = 377$) have never been cited. Some of these are from the most recent year or years and so have had little or no opportunity to be cited. Others, however, span almost all years of our journal. Although we do not have directly comparable statistics available for journals that are similar to PBZ, our zero-citation rate appears to be lower than typical for natural sciences and engineering or medical fields (Larivière and Gingras 2009).

The other papers published in PBZ have been cited from 1 to 541 times. At the simplest level, older papers have had more opportunity to be cited. As expected from this perspective, across all 4,500 papers, the Spearman correlation between the number of citations and publication year was negative and highly statistically significant ($P = 0.000011$) but quite weak in magnitude ($\rho = -0.065$).

Of course, the opportunity to be cited depends not only on how long a paper has been published but also on the general activity in the field of scientific endeavor, including the number of publications that could be citing such a paper, the number of papers that are being published, and so forth. Scientific activity has increased greatly since 1927 (Bornmann and Mutz 2015), including in the fields covered by PZ and PBZ. Accordingly, the number of citations per year is positively correlated with publication year (fig. 1; Spearman's $\rho = 0.458$, $P \ll 0.0001$). The range of citations per year is 0 to 19.0, with a mean of 1.1, and the distribution is strongly positively skewed (coefficient of skewness = 3.86; see fig. 1).

Examination of the list of 90 most cited papers (actually, 91 papers, due to a tie in the ninetieth spot; see tables 2a, 2b) is an interesting exercise. The most cited paper, from 1950 (Swift 1950), focuses on methods of absorption spectrophotometry as applied to individual Feulgen-stained nuclei and quantifies the DNA content of animal cells. This paper precedes by 3 years the famous paper by Watson and Crick (1953) that concluded that the DNA molecule exists in the form of a three-dimensional double helix (Pray 2008). The 541 citations of Swift's paper equate to 8.07 citations per year. (Note that Hewson Swift served as an Acting Editor of PBZ 25 years later; table 1.) Number 3 on the list (Flax and Himes 1952) is another paper on nucleic acids, with 435 citations (6.69 a year), which further demonstrates the staying power of timely methodological papers (Van Noorden et al. 2014).

Number 2 on the list, from 1994 (Garland and Adolph 1994), explains why not to do two-species comparative studies and provided, to our knowledge, the first worked example of Joe Felsen-

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Table 1: Editors of *Physiological Zoology* and then *Physiological and Biochemical Zoology* from its first issue in 1928 to 2017

Theodore Garland Jr.	Editor in Chief	2015–present
Patricia M. Schulte/Kathleen M. Gilmour	Coeditors	2009–2015
James W. Hicks	Editor	2001–2009
Gregory Snyder	Editor	1998–2001
Charlotte Magnum	Editor	1995–1998
Warren W. Burggren	Editor	1988–1995
C. Ladd Prosser/James E. Heath	Coeditors	1976–1988
Hewson Swift	Acting Editor	1975
Thomas Park	Editor	1956–1975
Warder Clyde Allee	Managing Editor	1937–1955
Charles Manning Child/Warder Clyde Allee	Joint Managing Editors	1930–1936
Charles Manning Child	Managing Editor	1928–1930

stein's (1985) now-famous method of phylogenetically independent contrasts. Although the title mentions only inferential limitations related to the study of adaptation, the final section of the paper also cautions against using comparisons of only two species (or two populations) for inferring physiological mechanisms. Its 436 citations came at a rate of 18.96 per year.

A paper on climatic adaptation in arctic and tropical poikilotherms, by Scholander and colleagues, comes in at number 4 (Scholander et al. 1953), with 378 citations since 1953 (5.91 a year). The paper provides new data on oxygen consumption in relation to temperature for a variety of arctic and tropical species, including fishes, crustaceans, mollusks, insects, and spiders. The authors conclude (p. 90) that "in no case has it been shown that organisms are adapted to seasonal or other fluctuations in temperature by having a low respiratory Q_{10}, i.e., by being metabolically insensitive to temperature changes." We now have data for many more organisms, but, as a sweeping generality, this statement has largely withstood the test of time (e.g., see Clarke and Fraser 2004; Pörtner 2010).

Paper 5 (Packard and Boardman 1988) warns against the use of ratios in ecophysiological research, accumulating 342 citations at a clip of 11.79 a year. In addition to generating impressive citations, this paper also produced multiple responses (see Magnusson 1989; Packard and Boardman 1989; Tracy and Sugar 1989).

In the first part of supplement 1, we have presented analyses of all published and indexed PZ/PBZ papers, which are listed in the second part of supplement 1. Similar analyses would be possible using the database in supplement 2, which lists the papers in a spreadsheet format. For example, it appears that the citation rate for our papers reached a nadir in the early 1970s. Does this pattern survive statistical scrutiny, and might it be related to any factors in the history of PBZ? Other interesting analyses would require more information than is available in the database, such as how taxa and topics have changed over time or the relative influence of particular countries or even individual universities.

The outstanding selection of articles in the issues of PBZ could not have been compiled, reviewed, revised, and published without the hard work of the editors who have led the publication to success and esteem in the field of comparative, ecological, and evolutionary physiology. Two past editors, Patricia M. Schulte and Kathleen M. Gilmour, have remained on the Editorial Board, and James W. Hicks and Warren W. Burggren are active referees of PBZ papers. The level of personal commitment of those on our editorial team to achieving excellence has had a tremendous positive impact on PBZ's trajectory, keeping the journal relevant, insightful, and of interest to a broad general audience for these 90 years.

Join me in our celebration of PBZ's ninetieth year by reading some historic papers that have helped to focus research on important topics and to move the field forward (see links in the online version of table 2a; supplement 1). I have no doubt that this trend of excellence will continue in PBZ, with our rigorous double-blind peer review system and dedicated experts who take time from their own studies to provide constructive input to aid PBZ authors in publishing the best manuscripts they can.

Table 2a: List of 90 most cited papers in *Physiological Zoology/Physiological and Biochemical Zoology*

Author(s)	Title	Journal	Volume	Start page	End page	Print year	Citations	Link
Swift, H.H.	The desoxyribose nucleic acid content of animal nuclei	Physiol Zool	23	169	198	1950	541	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.23.3.30152074
Garland, T., Jr.; Adolph, S.C.	Why not to do two-species comparative studies: limitations on inferring adaptation	Physiol Zool	67	797	828	1994	436	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.67.4.30163866
Flax, M.H.; Himes, M.H.	Microspectrophotometric analysis of metachromatic staining of nucleic acids	Physiol Zool	25	297	311	1952	435	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.25.4.30152126
Scholander, P.F.; Flagg, W.; Walters, V.; Irving, L.	Climatic adaptation in arctic and tropical poikilotherms	Physiol Zool	26	67	92	1953	378	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.26.1.30152151
Packard, G.C.; Boardman, T.J.	The misuse of ratios, indexes, and percentages in ecophysiological research	Physiol Zool	61	1	9	1988	342	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.61.1.30163730
Rawles, M.E.	Origin of pigment cells from the neural crest in the mouse embryo	Physiol Zool	20	248	265	1947	336	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.20.3.30151958
Scott, J.P.; Fredericson, E.	The causes of fighting in mice and rats	Physiol Zool	24	273	309	1951	328	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.24.4.30152137
Geiser, F.; Ruf, T.	Hibernation versus daily torpor in mammals and birds: physiological variables and classification of torpor patterns	Physiol Zool	68	935	966	1995	327	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.68.6.30163788
Park, T.	Experimental studies of interspecies competition. II. Temperature, humidity, and competition in two species of *Tribolium*	Physiol Zool	27	177	238	1954	294	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.27.3.30152164
Bearhop, S.; Waldron, S.; Votier, S.C.; Furness, R.W.	Factors that influence assimilation rates and fractionation of nitrogen and carbon stable isotopes in avian blood and feathers	Physiol Biochem Zool	75	451	458	2002	281	http://www.journals.uchicago.edu/doi/abs/10.1086/342800
Pardi, L.	Dominance order in *Polistes* wasps	Physiol Zool	21	1	13	1948	278	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.21.1.30151976
Vleck, D.	The energy cost of burrowing by the pocket gopher *Thomomys bottae*	Physiol Zool	52	122	136	1979	277	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.52.2.30152558
Krehbiel, R.H.	Cytological studies of the decidual reaction in the rat during early pregnancy and in the production of deciduomata	Physiol Zool	10	212	234	1937	274	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.10.2.30160901

Table 2a (*Continued*)

Author(s)	Title	Journal	Volume	Start page	End page	Print year	Citations	Link
Ginsburg, B.; Allee, W.C.	Some effects of conditioning on social dominance and subordination in inbred strains of mice	Physiol Zool	15	485	506	1942	267	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.15.4.30151662
McNab, B.K.	On estimating thermal conductance in endotherms	Physiol Zool	53	145	156	1980	266	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.53.2.30152577
Wingfield, J.C.; Farner, D.S.	The endocrinology of a natural breeding population of white-crowned sparrow (*Zonotrichia leucophrys pugetensis*)	Physiol Zool	51	188	205	1978	260	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.51.2.30157866
Bartholomew, G.A.; Tucker, V.A.	Control of changes in body temperature, metabolism, and circulation by the agamid lizard, *Amphibolurus barbatus*	Physiol Zool	36	199	218	1963	255	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.36.3.30152307
Beeman, E.A.	The effect of male hormone on aggressive behavior in mice	Physiol Zool	20	373	405	1947	252	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.20.4.30151969
Lasiewski, R.C.	Oxygen consumption of torpid, resting, active, and flying hummingbirds	Physiol Zool	36	122	140	1963	252	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.36.2.30155436
Bartholomew, G.A.; Tucker, V.A.	Size, body temperature, thermal conductance, oxygen consumption, and heart rate in Australian varanid lizards	Physiol Zool	37	341	354	1964	249	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.37.4.30152753
Somero, G.N.; Childress, J.J.	A violation of the metabolism-size scaling paradigm: activities of glycolytic enzymes in muscle increase in larger-size fish	Physiol Zool	53	322	337	1980	227	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.53.3.30155794
Chase, H.B.; Rauch, H.; Smith, V.W.	Critical stages of hair development and pigmentation in the mouse	Physiol Zool	24	1	7	1951	224	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.24.1.30152098
Dunham, A.E.; Grant, B.W.; Overall, K.L.	Interfaces between biophysical and physiological ecology and the population ecology of terrestrial vertebrate ectotherms	Physiol Zool	62	335	355	1989	220	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.2.30156174
Service, P.M.; Hutchinson, E.W.; Mackinley, M.D.; Rose, M.R.	Resistance to environmental stress in *Drosophila melanogaster* selected for postponed senescence	Physiol Zool	58	380	389	1985	218	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.58.4.30156013

Stevenson, R.D.; Peterson, C.R.; Tsuji, J.S.	The thermal dependence of locomotion, tongue flicking, digestion, and oxygen consumption in the wandering garter snake	Physiol Zool	58	46	57	1985	212	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.58.1.30161219
Blazka, P.	The anaerobic metabolism of fish	Physiol Zool	31	117	128	1958	211	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.31.2.30155385
Andrews, R.M.; Pough, F.H.	Metabolism of squamate reptiles: allometric and ecological relationships	Physiol Zool	58	214	231	1985	200	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.58.2.30158569
Yeager, D.P.; Ultsch, G.R.	Physiological regulation and conformation: a BASIC program for the determination of critical points	Physiol Zool	62	888	907	1989	197	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.4.30157935
Hammond, K.A.; Diamond, J.	An experimental test for a ceiling on sustained metabolic rate in lactating mice	Physiol Zool	65	952	977	1992	196	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.65.5.30158552
Kurta, A.; Bell, G.P.; Nagy, K.A.; Kunz, T.H.	Energetics of pregnancy and lactation in free-ranging little brown bats (*Myotis lucifugus*)	Physiol Zool	62	804	818	1989	196	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.3.30157928
Lindstrom, A.; Visser, G.H.; Daan, S.	The energetic cost of feather synthesis is proportional to basal metabolic rate	Physiol Zool	66	490	510	1993	196	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.66.4.30163805
Gessaman, J.A.; Nagy, K.A.	Energy metabolism: errors in gas-exchange conversion factors	Physiol Zool	61	507	513	1988	192	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.61.6.30156159
Ball, G.F.; Wingfield, J.C.	Changes in plasma levels of luteinizing hormone and sex steroid hormones in relation to multiple-broodedness and nest-site density in male starlings	Physiol Zool	60	191	199	1987	188	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.60.2.30158643
Bovbjerg, R.V.	Some factors affecting aggressive behavior in crayfish	Physiol Zool	29	127	136	1956	188	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.29.2.30152201
Ortiz, C.L.; Costa, D.; Leboeuf, B.J.	Water and energy flux in elephant seal pups fasting under natural conditions	Physiol Zool	51	166	178	1978	184	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.51.2.30157864
Herbert, C.V.; Jackson, D.C.	Temperature effects on the responses to prolonged submergence in the turtle *Chrysemys picta bellii*. II. Metabolic rate, blood acid-base and ionic changes, and cardiovascular function in aerated and anoxic water	Physiol Zool	58	670	681	1985	181	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.58.6.30156071

Table 2a (*Continued*)

Author(s)	Title	Journal	Volume	Start page	End page	Print year	Citations	Link
Piersma, T.; Gudmundsson, G.A.; Lilliendahl, K.	Rapid changes in the size of different functional organ and muscle groups during refueling in a long-distance migrating shorebird	Physiol Biochem Zool	72	405	415	1999	181	http://www.journals.uchicago.edu/doi/abs/10.1086/316680
Stillman, J.H.; Somero, G.N.	A comparative analysis of the upper thermal tolerance limits of eastern Pacific porcelain crabs, genus *Petrolisthes*: influences of latitude, vertical zonation, acclimation, and phylogeny	Physiol Biochem Zool	73	200	208	2000	179	http://www.journals.uchicago.edu/doi/abs/10.1086/316738
Hutchison, V.H.; Whitford, W.G.; Kohl, M.	Relation of body size and surface area to gas exchange in anurans	Physiol Zool	41	65	85	1968	178	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.41.1.30158485
Kinne, O.	Growth, food intake, and food conversion in a euryplastic fish exposed to different temperatures and salinities	Physiol Zool	33	288	317	1960	175	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.33.4.30152673
Farrell, A.P.	From hagfish to tuna: a perspective on cardiac function in fish	Physiol Zool	64	1137	1164	1991	174	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.64.5.30156237
DeWitt, C.B.	Precision of thermoregulation and its relation to environmental factors in the desert iguana, *Dipsosaurus dorsalis*	Physiol Zool	40	49	66	1967	171	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.40.1.30152438
Rawles, M.E.	The heart-forming areas of the early chick blastoderm	Physiol Zool	16	22	43	1943	167	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.16.1.30151667
Lavin, S.R.; Karasov, W.H.; Ives, A.R.; Middleton, K.M.; Garland, T., Jr.	Morphometrics of the avian small intestine compared with that of nonflying mammals: a phylogenetic approach	Physiol Biochem Zool	81	526	550	2008	166	http://www.journals.uchicago.edu/doi/abs/10.1086/590395
Hammond, K.A.; Konarzewski, M.; Torres, R.M.; Diamond, J.	Metabolic ceilings under a combination of peak energy demands	Physiol Zool	67	1479	1506	1994	165	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.67.6.30163908
Marden, J.H.	Bodybuilding dragonflies: costs and benefits of maximizing flight muscle	Physiol Zool	62	505	521	1989	165	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.2.30156182

Bovbjerg, R.V.	Dominance order in the crayfish *Orconectes virilis* (Hagen)	Physiol Zool	26	173	178	1953	164	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.26.2.30154514
Greenberg, B.; Noble, G.K.	Social behavior of the American chameleon (*Anolis carolinensis* Voigt)	Physiol Zool	17	392	439	1944	164	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.17.4.30151738
Morrison, P.; Ryser, F.A.; Dawe, A.R.	Studies on the physiology of the masked shrew *Sorex cinereus*	Physiol Zool	32	256	271	1959	164	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.32.4.30155403
Service, P.M.	Physiological mechanisms of increased stress resistance in *Drosophila melanogaster* selected for postponed senescence	Physiol Zool	60	321	326	1987	164	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.60.3.30162285
Holeton, G.F.	Metabolic cold adaptation of polar fish: fact or artefact?	Physiol Zool	47	137	152	1974	161	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.47.3.30157851
Collias, N.E.	Aggressive behavior among vertebrate animals	Physiol Zool	17	83	123	1944	160	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.17.1.30151832
Irving, L.; Krog, H.; Monson, M.	The metabolism of some Alaskan animals in winter and summer	Physiol Zool	28	173	185	1955	159	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.28.3.30159915
Congdon, J.D.	Proximate and evolutionary constraints on energy relations of reptiles	Physiol Zool	62	356	373	1989	158	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.2.30156175
Speakman, J.R.; Mcqueenie, J.	Limits to sustained metabolic rate: the link between food intake, basal metabolic rate, and morphology in reproducing mice, *Mus musculus*	Physiol Zool	69	746	769	1996	158	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.69.4.30164228
Chen, C.P.; Denlinger, D.L.; Lee, R.E.	Cold-shock injury and rapid cold hardening in the flesh fly *Sarcophaga crassipalpis*	Physiol Zool	60	297	304	1987	156	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.60.3.30162282
Hart, J.S.	Seasonal acclimatization in four species of small wild birds	Physiol Zool	35	224	236	1962	156	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.35.3.30152807
Newman, M.A.	Social behavior and interspecific competition in two trout species	Physiol Zool	29	64	81	1956	154	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.29.1.30152381
Humphries, M.M.; Thomas, D.W.; Kramer, D.L.	The role of energy availability in mammalian hibernation: a cost-benefit approach	Physiol Biochem Zool	76	165	179	2003	151	http://www.journals.uchicago.edu/doi/abs/10.1086/367950
McNab, B.K.	On the utility of uniformity in the definition of basal rate of metabolism	Physiol Zool	70	718	720	1997	149	http://www.journals.uchicago.edu/doi/abs/10.1086/515881
Piersma, T.; Bruinzeel, L.; Drent, R.; Kersten, M.; Vandermeer, J.; Wiersma, P.	Variability in basal metabolic rate of a long-distance migrant shorebird (red knot, *Calidris canutus*) reflects shifts in organ sizes	Physiol Zool	69	191	217	1996	149	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.69.1.30164207

Table 2a (*Continued*)

Author(s)	Title	Journal	Volume	Start page	End page	Print year	Citations	Link
Portner, H.O.; Bennett, A.F.; Bozinovic, F.; Clarke, A.; Lardies, M.A.; Lucassen, M.; Pelster, B.; Schiemer, F.; Stillman, J.H.	Trade-offs in thermal adaptation: the need for a molecular to ecological integration	Physiol Biochem Zool	79	295	313	2006	149	http://www.journals.uchicago.edu/doi/abs/10.1086/499986
Ruibal, R.	The adaptive value of bladder water in the toad, *Bufo cognatus*	Physiol Zool	35	218	223	1962	147	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.35.3.30152806
Farrell, A.P.; Hinch, S.G.; Cooke, S.J.; Patterson, D.A.; Crossin, G.T.; Lapointe, M.; Mathes, M.T.	Pacific salmon in hot water: applying aerobic scope models and biotelemetry to predict the success of spawning migrations	Physiol Biochem Zool	81	697	708	2008	145	http://www.journals.uchicago.edu/doi/abs/10.1086/592057
Harper, J.M.; Austad, S.N.	Fecal glucocorticoids: a noninvasive method of measuring adrenal activity in wild and captive rodents	Physiol Biochem Zool	73	12	22	2000	145	http://www.journals.uchicago.edu/doi/abs/10.1086/316721
Costlow, J.D.; Bookhout, C.G.; Monroe, R.J.	Studies on the larval development of the crab, *Rhithropanopeus harrisii* (Gould). I. Effect of salinity and temperature on larval development	Physiol Zool	39	81	100	1966	144	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.39.2.30152421
Hammond, K.A.; Wunder, B.A.	The role of diet quality and energy need in the nutritional ecology of a small herbivore, *Microtus ochrogaster*	Physiol Zool	64	541	567	1991	144	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.64.2.30158190
Walsberg, G.E.	Evaluation of a nondestructive method for determining fat stores in small birds and mammals	Physiol Zool	61	153	159	1988	144	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.61.2.30156146
Graves, J.L.; Toolson, E.C.; Jeong, C; Vu, L.N.; Rose, M.R.	Desiccation, flight, glycogen, and postponed senescence in *Drosophila melanogaster*	Physiol Zool	65	268	286	1992	143	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.65.2.30158253
Graham, M.S.; Farrell, A.P.	The effect of temperature acclimation and adrenaline on the performance of a perfused trout heart	Physiol Zool	62	38	61	1989	142	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.1.30159997

Mckechnie, A.E.; Wolf, B.O.	The allometry of avian basal metabolic rate: good predictions need good data	Physiol Biochem Zool	77	502	521	2004	141	http://www.journals.uchicago.edu/doi/abs/10.1086/383511
Huey, R.B.; Dunham, A.E.; Overall, K.L.; Newman, R.A.	Variation in locomotor performance in demographically known populations of the lizard *Sceloporus merriami*	Physiol Zool	63	845	872	1990	140	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.63.5.30152617
Bucher, T.L.; Ryan, M.J.; Bartholomew, G.A.	Oxygen consumption during resting, calling, and nest building in the frog *Physalaemus pustulosus*	Physiol Zool	55	10	22	1982	138	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.55.1.30158439
Gregory, T.R.; Wood, C.M.	The effects of chronic plasma cortisol elevation on the feeding behaviour, growth, competitive ability, and swimming performance of juvenile rainbow trout	Physiol Biochem Zool	72	286	295	1999	137	http://www.journals.uchicago.edu/doi/abs/10.1086/316673
Hudson, J.W.; Scott, I.M.	Daily torpor in the laboratory mouse, *Mus musculus* var. albino	Physiol Zool	52	205	218	1979	137	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.52.2.30152564
Iverson, S.J.; Bowen, W.D.; Boness, D.J.; Oftedal, O.T.	The effect of maternal size and milk energy output on pup growth in gray seals (*Halichoerus grypus*)	Physiol Zool	66	61	88	1993	137	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.66.1.30158287
Nickerson, D.M.; Facey, D.E.; Grossman, G.D.	Estimating physiological thresholds with continuous two-phase regression	Physiol Zool	62	866	887	1989	135	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.62.4.30157934
Park, T.; Mertz, D.B.; Grodzins, W.; Prus, T.	Cannibalistic predation in populations of flour beetles	Physiol Zool	38	289	321	1965	134	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.38.3.30152840
Welty, J.C.	Experiments in group behaviour of fishes	Physiol Zool	7	85	128	1934	134	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.7.1.30151215
Carrier, D.R.	Ontogenetic limits on locomotor performance	Physiol Zool	69	467	488	1996	132	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.69.3.30164211
Cherel, Y.; Hobson, K.A.; Hassani, S.	Isotopic discrimination between food and blood and feathers of captive penguins: implications for dietary studies in the wild	Physiol Biochem Zool	78	106	115	2005	132	http://www.journals.uchicago.edu/doi/abs/10.1086/425202
Djawdan, M.; Chippindale, A.K.; Rose, M.R.; Bradley, T.J.	Metabolic reserves and evolved stress resistance in *Drosophila melanogaster*	Physiol Zool	71	584	594	1998	131	http://www.journals.uchicago.edu/doi/abs/10.1086/515963
Secor, S.M.; Diamond, J.	Determinants of the postfeeding metabolic response of Burmese pythons, *Python molurus*	Physiol Zool	70	202	212	1997	131	http://www.journals.uchicago.edu/doi/abs/10.1086/639578

Table 2a (*Continued*)

Author(s)	Title	Journal	Volume	Start page	End page	Print year	Citations	Link
Watkins, T.B.	Predator-mediated selection on burst swimming performance in tadpoles of the Pacific tree frog, *Pseudacris regilla*	Physiol Zool	69	154	167	1996	131	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.69.1.30164205
Park, T.; Leslie, P.H.; Mertz, D.B.	Genetic strains and competition in populations of *Tribolium*	Physiol Zool	37	97	162	1964	130	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.37.2.30152328
Sidell, B.D.; Driedzic, W.R.; Stowe, D.B.; Johnston, I.A.	Biochemical correlations of power development and metabolic fuel preferenda in fish hearts	Physiol Zool	60	221	232	1987	127	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.60.2.30158646
Lighton, J.R.B.; Bartholomew, G.A.; Feener, D.H.	Energetics of locomotion and load carriage and a model of the energy cost of foraging in the leaf-cutting ant *Atta colombica* Guer	Physiol Zool	60	524	537	1987	126	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.60.5.30156127
Secor, S.M.; Diamond, J.M.	Evolution of regulatory responses to feeding in snakes	Physiol Biochem Zool	73	123	141	2000	126	http://www.journals.uchicago.edu/doi/abs/10.1086/316734
Vleck, C.M.; Hoyt, D.F.; Vleck, D.	Metabolism of avian embryos: patterns in altricial and precocial birds	Physiol Zool	52	363	377	1979	126	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.52.3.30155757
Crockett, E.L.; Sidell, B.D.	Some pathways of energy metabolism are cold adapted in Antarctic fishes	Physiol Zool	63	472	488	1990	125	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.63.3.30156223
del Rio, C.M.	Dietary, phylogenetic, and ecological correlates of intestinal sucrase and maltase activity in birds	Physiol Zool	63	987	1011	1990	125	http://www.journals.uchicago.edu/doi/abs/10.1086/physzool.63.5.30152625

Note. This table is also available online as an Excel file.

Table 2b: Alphabetical list of 90 most cited *Physiological Zoology/Physiological and Biochemical Zoology* papers (91, due to a tie) as of 2016

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Bartholomew G.A. and V.A. Tucker. 1964. Size, body temperature, thermal conductance, oxygen consumption, and heart rate in Australian varanid lizards. Physiol Zool 37:341–354.

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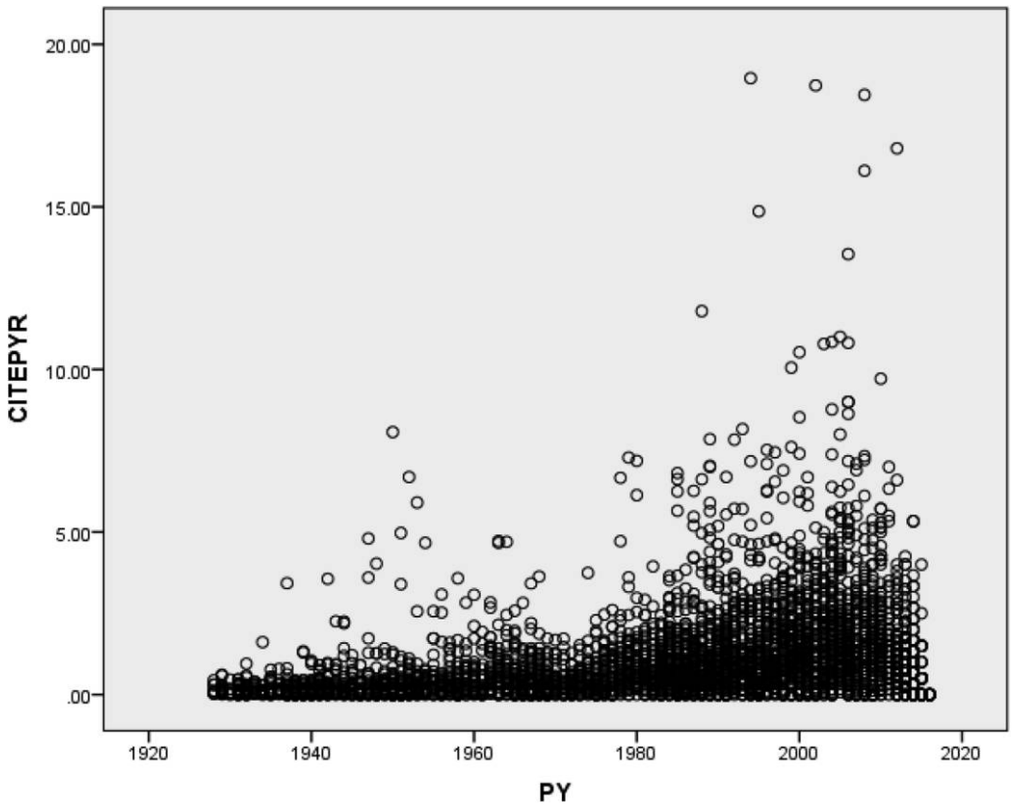

Figure 1. For the 4,500 indexed papers from *Physiological Zoology* or *Physiological and Biochemical Zoology*, the number of citations per year tends to increase with year (Spearman's $\rho = 0.458$, $P \ll 0.0001$).

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