Iowa Science Teachers Journal

Volume 8 | Number 3 Article 4

1971

# Vertebrate Comparative Anatomy in Undergraduate Curricula 1969-70

Karl E. Goellner
*Coe College*

# Vertebrate Comparative Anatomy in Undergraduate Curricula 1969-70

KARL E. GOELLNER
*Coe College*
*Cedar Rapids, Iowa*

In 1966 I presented a short paper describing some impressions of the status of vertebrate comparative anatomy (and embryology) in European universities (Goellner, 1968). Discussions which followed seemed to suggest that the status of these courses in the United States may be changing, and that a survey might elicit information on this matter. A basic assumption was implied, namely, that comparative anatomy had, indeed, been a traditional course in college offerings, particularly for zoology majors and for pre-medical and pre-dental students. This paper presents results of a modest survey conducted during the winter of 1969-70.

## Survey Procedure

A simple set of ten questions was sent out to 126 colleges and universities, addressed either to the chairman of the biology or zoology department, or to the instructor of comparative anatomy if his name was known. From these, 115 returns (91 per cent) were received; another came in too late to be used; another was unidentifiable as to source and too incomplete to use. The full list of respondent institutions appears in the appendix. For somewhat arbitrary reasons, the returns were sorted into groups as follows: Associated Colleges of the Midwest, designated A.C.M. (12); Iowa colleges other than the three A.C.M. members (16); "Big Ten" universities (9); larger private universities (16); state universities other than Big Ten (25); and other small colleges (39) of which two were not used.

The data were tabulated, in part, by these groupings, as accurately as possible, but unexpected internal variations and omissions in the answers made exact cross-checking and summarizing difficult. Nevertheless the data are thought to provide a reasonable sampling from private and public institutions of different sizes and characters. No statistical tests were attempted.

## Results

*Question 1.* "It (is) (is not) taught as such at (your institution: .....)." Table 1 presents the summary data. Vertebrate comparative anatomy is being taught in 83 per cent of the responding institutions, but is not being taught in 19 of those surveyed. In the A.C.M., four of the 12 schools do not offer it; four of the 16 private universities, and eight of the 37 smaller colleges do not have it. On the other hand, all of the 16 Iowa colleges answered in the af-

firmative. (The expression "as such" may have caused some confusion, but other answers in the sheet tended to clear this up.) Those who answered "No" to this question were asked to indicate briefly WHY in a line or two below. A sample of the answers is included in the discussion section.

Table 1
Numbers of Institutions Offering Vertebrate Comparative Anatomy, 1969-70, Among the Groups Surveyed (Numbers of Respondents in Parentheses)

| | *A.C.M.* (12) | *Iowa Colleges* (16) | *Big Ten* (9) | *Larger private universities* (16) | *Other state universities* (25) | *Other small colleges* (37) | *Totals* |
|---|---|---|---|---|---|---|---|
| Taught | 8 | 16 | 7 | 12 | 24 | 29 | 96 |
| Not Taught | 4 | 0 | 2 | 4 | 1 | 8 | 19 |

*Question 2.* "It is being taught (as a separate course) (integrated with vertebrate embryology) (as part of another course, namely: .....)." About three-fourths (72) of the respondent schools have retained comparative anatomy as a separate course; about one-fourth (22) have integrated it with embryology, and nine have it only as some part of another course. Only one A.C.M. school has an integrated course, but five of the 16 Iowa colleges, two in the Big Ten, two of the larger private universities, and eight of the other smaller colleges have also merged anatomy with embryology (Table 2).

Other courses mentioned into which comparative anatomy has been incorporated to some degree are: vertebrate zoology, structural biology including higher plants, vertebrate evolution and natural history, evolutionary biology, and organismal biology.

Table 2
Form of Course Offerings in Vertebrate Comparative Anatomy

| | *A.C.M.* | *Iowa colleges* | *Big Ten* | *Larger private universities* | *Other state universities* | *Other small colleges* | *Totals* |
|---|---|---|---|---|---|---|---|
| Separate course | 6 | 11 | 5 | 8 | 20 | 22 | 72 |
| Integrated with embryology | 1 | 5 | 2 | 2 | 4 | 8 | 22 |
| Part of another course | 1 | – | 2 | 2 | – | 4 | 9 |

*Question 3.* "It is (required) (recommended) (elective) for department majors."

*Question 4.* "It is (required) (recommended) (elective) for pre-medics and pre-dents." Although more than half (49) of the respondents marked this "elective" for majors, about one-fourth (24) do *require* comparative anatomy

of their majors, including four Iowa colleges, three in the Big Ten, and nine of the other state universities. For pre-professional students, nearly half of the answers indicated "recommended", but the number *requiring* it (23) was lower than for those requiring it for their major students (Table 3).

Table 3
Status of Comparative Anatomy in Preparation of Majors and Preprofessional Students

| *For majors* | *A.C.M.* | *Iowa colleges* | *Big Ten* | *Larger private universities* | *Other state universities* | *Other small colleges* | *Totals* |
|---|---|---|---|---|---|---|---|
| required | – | 4 | 3 | 1 | 9 | 7 | 24 |
| recommended | – | 6 | 1 | 3 | 3 | 9 | 22 |
| elective | 7 | 6 | 3 | 8 | 11 | 14 | 49 |
| *For preprofessional students* | | | | | | | |
| required | – | 1 | 2 | 1 | 10 | 9 | 23 |
| recommended | 4 | 10 | 1 | 3 | 18 | 11 | 47 |
| elective | 4 | 4 | 2 | 8 | 6 | 6 | 30 |

*Question 5.* "It is taught (annually) (alternate years) (other: .....)." As may be expected, the data from this question indicate that comparative anatomy is generally given annually or more often. Of 99 answers, 84 had circled "annually"; only four marked "alternate years". Among 11 others, eight offer the course twice a year, one has it three times a year, another four times a year. But one small college listed only every third year.

*Question 6.* "It runs (....) semesters, (....) terms, for (....) weeks total, meeting (....) times per week for lectures, (....) times per week for labs of approximately (....) minutes." (Table 4, and Figs. 1, 2.) There were many variations and irregularities in these answers, but most schools give the separate course for one semester (51) or for one term (20); only six give it for two terms or semesters. The integrated courses, encompassing both anatomy and embryology, are divided equally between one semester or term (8) and two semesters or terms (8). Among other answers, one Big Ten institution listed only one-half term integrated course, but three other universities offer it for three full terms.

Total hours of lecture time (Fig. 1) vary widely, from as few as 20 to as many as 105 for the separate courses, and from only 10 up to 112 for the integrated courses. Most of the data cluster between 26 and 48 hours of lecture time for both kinds of courses. Three of the integrated courses have 90 hours of lecture.

Total hours of laboratory also vary widely (Fig. 2), but the mode of distribution is about 50 to 60 hours for the single courses, and a little higher than that for the integrated courses. Among the extremes are integrated courses with 160, 180, and 200 laboratory hours, and separate courses with 160 and 176 hours of laboratory.

Table 4
Calendar Units (Semesters or Terms) Offered in Comparative Anatomy

| *Separate course* | *A.C.M.* | *Iowa colleges* | *Big Ten* | *Larger private universities* | *Other state universities* | *Other small colleges* | *Totals* |
|---|---|---|---|---|---|---|---|
| 1 semester | 6 | 9 | 2 | 6 | 14 | 14 | 51 |
| 2 semesters | – | 1 | 1 | – | – | – | 2 |
| 1 term | – | 1 | 2 | 4 | 6 | 7 | 20 |
| 2 terms | 1 | – | – | – | – | 3 | 4 |
| *Integrated course* | | | | | | | |
| 1 semester | – | 4 | 1 | – | 1 | 1 | 7 |
| 2 semesters | – | – | – | 2 | – | 4 | 6 |
| 1 term | – | – | – | – | – | 1 | 1 |
| 2 terms | 1 | – | – | – | 1 | – | 2 |
| other | | | 1 (½ term) | | 2 (3 terms) | 1 (3 terms) | 4 |

Figure 1
Total Hours of Lecture Reported

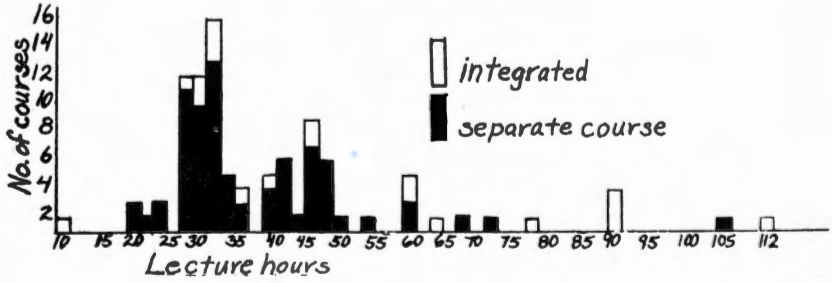
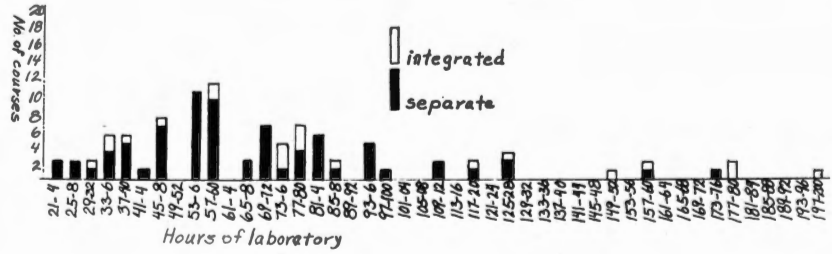



Figure 2
Total Hours of Laboratory Reported



*Question 7.* "Usual enrollment is (1 - 15) (16 - 25) (26 - 35) (more:....) out of an enrollment of undergraduates of approximately (....)" (Table 5). The latter query, regarding undergraduate enrollment, was intended simply to give some indication of the sizes of the colleges. But the answers for this were mixed and confused, and were not tabulated. The numbers of schools reporting the three smaller class sizes were about the same (21, 24, and 22), but these are in contrast with the large class sizes reported by the colleges and universities reporting "more". Among the latter, classes of 40 to 160 to 300 were reported, primarily, of course, among the large universities.

Table 5
Enrollment by Approximate Class Size, and Trend in Numbers

| *Class size* | *A.C.M.* | *Iowa colleges* | *Big Ten* | *Larger private universities* | *Other state universities* | *Other small colleges* | *Totals* |
|---|---|---|---|---|---|---|---|
| 1-15 | 3 | 7 | – | 1 | 2 | 8 | 21 |
| 16-25 | 2 | 6 | – | 1 | 2 | 13 | 24 |
| 26-35 | 3 | 3 | – | 3 | 6 | 7 | 22 |
| more | – | – | 7 | 7 | 15 | 3 | 32 |
| | | (average 165) (range 60-300) | | (86) (45-160) | (84) (40-300) | (42) (40-50) | |
| *Trend in numbers* | | | | | | | |
| up | 1 | 5 | 5 | 3 | 13 | 14 | 41 |
| down | 3 | 1 | – | 3 | 3 | 3 | 13 |
| no change | 4 | 9 | 11 | 6 | 9 | 13 | 52 |

*Question 8.* "The trend in enrollment in this class is (up) (down) (no apparent change)." Almost half (52) of the reporting schools indicated no change, but nearly as many (41) reported that their enrollment trend was up, and only 13 claimed a drop in class size. These data seem fairly consistent among the several groups of schools (Table 5).

*Question 9.* "Animals studied and/or dissected in lab include: Amphioxus, Ammocoetes, Hemichordates, Urochordates, shark, perch, mudpuppy, cat, fetal pig, bird, other: ....." The shark, cat, Amphioxus, mudpuppy, and larval lamprey seem to be the most popular animals, but the protochordates still get attention, and several animals not on the suggested list were reported in use (Table 6).

*Question 10.* "Text(s) used, if you care to state it: Ballard, Hyman, Jolley, Kent, Romer-Vert. Body, long version, Romer-short version, Torrey, Weichert, Yapp, others: ....." Most respondents answered this question, and the data were tabulated. But since some of the listed authors cooperated in the survey, the data are considered confidential and are not published here. It may be said that three anatomy texts seem most popular in both separate and integrated courses. But some integrated texts are used not only

Table 6
Animals Studied and/or Dissected in Laboratory in Decreasing Order of Frequency Reported

| | | | |
|---|---|---|---|
| shark | 95 | pig | 11 |
| cat | 86 | lamprey | 7 |
| Amphioxus | 69 | rat | 6 |
| mudpuppy | 66 | rabbit | 4 |
| Ammocoetes | 45 | lizard | 4 |
| Urochordates | 38 | turtle | 4 |
| Hemichordates | 36 | frog | 4 |
| bird | 21 | hamster | 1 |
| perch | 16 | alligator | 1 |

in integrated courses but also in separate anatomy courses. A few authors were reported in addition to the list above. It may not be amiss to state that the well-known manual by the late Libbie Hyman, published nearly 30 years ago, is still widely used. No effort was made to tabulate the numerous reports on a variety of lab manuals.

## Discussion

Several respondents who reported that this course is no longer taught gave brief reasons to explain why. A sampling of these statements follows: "absolutely no student interest"; "the emphasis [in our course] is to a significant extent on the process of evolution and not merely on the evolution of the vertebrates"; "evolutionary concepts involved were covered in other courses"; "decrease in medical schools requiring such a course"; "staffing efficiency"; "anatomy, as such, is an anachronistic subject. It should be combined with physiology or evolution, which is the way we treat the subject now"; "because it was felt it was too narrow a field for a whole course, [and] hopefully most of the important material would be covered in other courses! I question whether the latter is being met . . ."; "comparative anatomy considered too specialized for undergraduates"; "much of the lecture tended to be rote and much of the lab tended towards busy work, so we phased it out . . . keeping more meaningful aspects in other . . . course offerings . . . there have been few tears shed over the course's demise."

On the other hand, at least one major institution reported that the course will be reinstated in 1970-71. Another may open a graduate course in vertebrate morphology to undergraduates next year. But a few others who now offer the course indicated that they would be dropping it in a year or two.

The dropping of comparative anatomy as a prerequisite for medical schools has probably weakened the status of the course in undergraduate preparation. Table 1.1 in the 1969-70 Medical School Admission Requirements book lists comparative anatomy as required by three out of 102 medical schools, but my hasty search to identify them disclosed only two, one being in Canada.

There is also a trend felt widely today away from rigid requirements for graduation and for major concentrations. But, despite such adverse factors, enrollment in many institutions was reported as *unchanged* or actually *up* in comparative anatomy.

If the students are enjoying more options in course selection now, it is also true that those who plan the courses have wide individual prerogative; witness the great variations in lecture and laboratory hours scheduled. At some schools students presumably spend five to ten or more times as many hours in comparative anatomy class as they would in other institutions.

## Conclusions

Vertebrate comparative anatomy is still taught at most of the institutions surveyed, with enrollments holding up well, but it is undergoing scrutiny and change toward combination with other courses in evolution and morphology. A number of schools have already dropped it and more undoubtedly will soon follow. Perhaps these changes reflect the widespread restlessness with everything traditional on college campuses today.

I wish to express thanks to the many teaching colleagues who contributed useful data for this survey, and to Miss Linda Boots who helped in the compilation.

## REFERENCES

Goellner, Karl E. 1966 (1968) Proc. Iowa Acad. Sci. 73:361-373.

Medical School Admission Requirements U.S.A. and Canada, 1969-70, Assoc. Amer. Med. Coll., Washington, D.C.

## APPENDIX

Institutions from which questionnaires were received:
A.C.M.: Beloit, Carleton, Coe, Colorado College, Cornell College, Grinnell, Knox, Lawrence, Macalester, Monmouth, Ripon, St. Olaf. "Big Ten" universities: Illinois, Indiana, Iowa, Michigan State, Michigan, Minnesota, Northwestern, Ohio State, Wisconsin. Iowa colleges: Buena Vista, Central, Dubuque, Graceland, Iowa Wesleyan, Loras, Luther, Morningside, Mt. Mercy, Parsons, St. Ambrose, Simpson, Upper Iowa, Wartburg, Westmar, Wm. Penn. Larger private universities: Bradley, Chicago, Cornell University, Creighton, Dartmouth, Drake, Harvard, Northeastern, Notre Dame, Princeton, Rochester, Valparaiso, Washington (St. Louis), Yale. Other state universities: Northern Illinois, Western Illinois, Eastern Illinois, Iowa State, Northern Iowa, Kansas State, Kansas, Kentucky State, Maine, Massachusetts, Minnesota-Duluth, N.E. Missouri State, N.W. Missouri State, St. Louis, Missouri, Montana State, Nebraska, Buffalo, North Dakota State, North Dakota, Bowling Green, Oregon State, Oregon, South Dakota State, South Dakota, Wisconsin State at Whitewater. Other smaller colleges: Adrian, Albion, Albright, Allegheny, Alma, Amherst, Antioch, Bowdoin, Central-Kentucky, Central Methodist-Missouri, Denison, Elmhurst, Eureka, Gustavus Adolphus, Hamline, Hanover, Hastings, Illinois College, Illinois Wesleyan, Lake Forest, Lakeland, Lewis and Clark, McPherson, Middlebury, Millikin, Oberlin, Otterbein, College of the Ozarks, Principia, Quincy, Reed, St. Mary's of Minnesota, Washburn, Wesleyan, Westminster of Missouri, Wheaton, Williams, Wittenberg, Wooster, Yankton, (one unidentifiable).