

Living Indiana Scientists, A Statistical Study

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The seventh, 1944, edition of "American Men of Science" contains sketches of 655 scientists living in Indiana, 1,288 scientists who were born in Indiana and 1,215 collegiate alumni of Indiana colleges and universities. Indiana universities conferred the doctorate upon 334 scientists and the Masters or Engineering degree upon 172 who have not received a doctorate. These several groups, subtracting duplicates, total 2,304 living Indiana scientists. An additional 349 scientists now living elsewhere were faculty members in Indiana.

Of the 655 scientists living in Indiana in 1943, slightly more than two-thirds are connected with universities and colleges; one-fifth are with industrial firms.

Purdue University with 198 sketched scientists has nearly one-third of the scientists in the state, and nearly one-half of those connected with educational institutions. Indiana University has 97, Notre Dame 39, DePauw 18, Butler 13, Rose Polytechnic 9, Valparaiso 9, Ball State 8, Earlham 7 and Wabash 7. Four colleges have 5 each: Goshen, Hanover, Manchester and Indiana State Teachers. Taylor and Franklin each have 4, Indiana Central and Evansville 3 and Marion 2. Seven colleges have one each (Huntington, Kokomo Jr., Oakland City, St. Francis, St. Joseph, St. Mary-of-the-Woods, and Tristate).

The industrial concerns with most sketched scientists are Eli Lilly 30, Standard Oil of Indiana 29, Commercial Solvents 16, Mead Johnson 9, Servel 7, Pittman-Moore 5, Reilly Tar and Chemical 3.

Indiana has a larger percentage of its sketched scientists employed by industrial concerns than is true for most states, because Indiana is more highly industrialized than are most states.

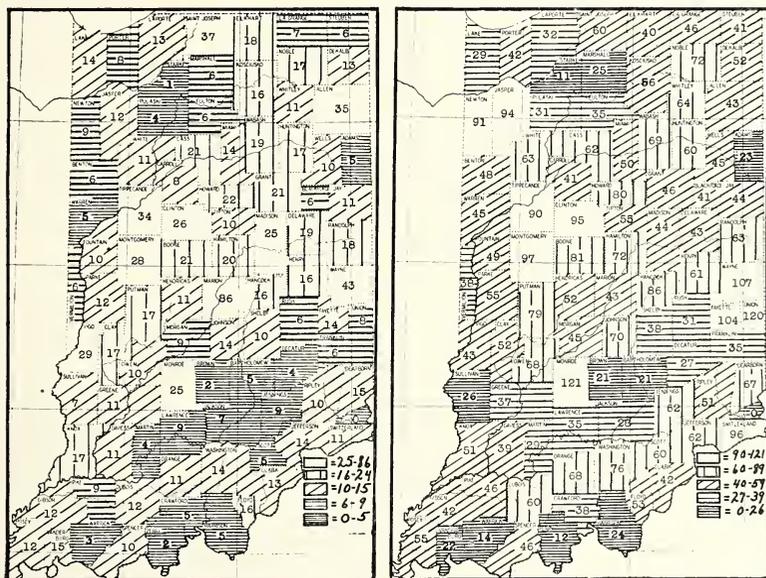
Birthplace of Scientists Born in Indiana

Indiana is given as their native state by 1,288 scientists sketched in the 1944 edition of "American Men of Science." Only six states yielded more, New York, Pennsylvania, Ohio, Illinois, Massachusetts, and Iowa. All but Iowa of these six states have notably larger populations than does Indiana. The states which rank eighth and ninth in the number of native scientists are Michigan and Wisconsin, both of which have about 200 fewer native scientists than Indiana.

Between the 1938 and 1944 editions of "American Men of Science," Indiana increased its contribution of scientists by 15 per cent, a greater increase than that of the total population. At about the average date of birth of the 1938 group, Indiana yielded 473 scientists per million population. For the 1944 group, the yield had increased to 494 per

million. Both of these yield figures are relatively high as compared with the larger sections of the country, except New England. The yield of the South was 173 per million, of the North Atlantic States 400, of the North Central States 448, of the Rocky Mountain and Pacific States 470. Indiana's relatively high yield reflects several conditions, including the presence of relatively few negroes or other colored people, very few of whom have been recognized as scientists.

The birthplace by counties of the 1,265 scientists who gave their birthplace adequately to permit county location is shown on Map 1. The 22 counties which yielded most are Marion with 86, Wayne 43, St. Joseph 37, Allen 35, Tippecanoe 34, Vigo 29, Montgomery 28, Clinton 26, Madison 25, Monroe 25, Howard 22, Cass 21, Grant 21, Hamilton 20, Delaware 19, Wabash 19, Elkhart 18, Randolph 18, Clay 17, Knox 17, Noble 17, Putnam 17.



Map 1. Number of scientists sketched in American Men of Science 1944, born in each county.

Map 2. Yield of living scientists per 100,000 population in 1900 by counties.

Map 1 shows that none of the counties which produced 16 or more living scientists are in the southern part of the state, except Monroe, Knox and Floyd. Conversely most of the counties which yielded fewer than 10 scientists are in southern Indiana, but 10 such counties are in the northwestern part of the state and three in northeastern. Only the smallest county in the state (Ohio) yielded no scientist, and only one other (Starke) yielded only one. Brown and Perry each yielded 2.

In proportion to population at about the average date of birth of these scientists, which was about 1900, the rank of the counties is appreciably different. The 20 highest, in decreasing order, are Monroe, Union, Wayne, Fayette, Montgomery, Switzerland, Clinton, Jasper, Newton, Tippecanoe, Hancock, Boone, Howard, Putnam, Washington, Hamilton, Noble, Johnson, Wabash and Owen.

When mapped (Map 2), it is apparent that the high ranking counties are situated neither near the northern or southern margins of the state, except that Switzerland County ranks high. Three counties that produced more than one scientist per 1,000 of population at about the time of their birth are in the east, Wayne (Richmond) and its southern neighbors. Three other high counties, which produced one scientist to little more than 1,000 people, are Tippecanoe (Lafayette) and two neighbors. Other high counties are Monroe (Bloomington) and Newton, Jasper and Hancock. Most of the counties which produced 69-89 scientists per 100,000 people are close to the most productive counties. Exceptions are Washington (with Salem and Paoli) and Noble, whose noble name may possibly have helped some of its native sons to high achievement.

Five of the ten counties which yielded fewest scientists in proportion to population border the Ohio river. Three others are also in southern Indiana. Northwestern Indiana has, however, two counties which rank low and three others which rank relatively low. The central third of the state, north and south, contains no county which ranks very low and only one (Rush) which ranks relatively low.

These data on the yield of scientists in proportion to population when they were born indicates that the presence of a college where science is valued played an appreciable role. The counties where colleges were conspicuous in 1900 all rank high. Thus, Wayne, Montgomery, Monroe, Tippecanoe counties with Earlham and Wabash colleges, Indiana and Purdue universities, all rank in the upper tenth of the counties in yield. Putnam, with DePauw, also ranks in the upper one-sixth of the counties. Three other high counties are close to Purdue University (Clinton, Jasper, Newton). Another high county (Hancock) although it has no college, is situated not far from several colleges. Switzerland and Noble counties are the most conspicuous exceptions to the rule that the high counties either have a college or are relatively close to one.

Although most of the college influence in increasing the yield of scientists in proportion to population is due to educational stimulation, mention may be made of the fact that quite a number of scientists born in college towns are the children of professors.

Collegiate Alumni of Indiana

The A.B. degree or its counterpart was received by 1,215 persons sketched in "American Men of Science," 1944. Only seven states have more such alumni than has Indiana, namely New York, Massachusetts, Ohio, Pennsylvania, Illinois, California and Michigan. These states all

have considerably larger college populations than does Indiana. It may be noted that Iowa, which was the birthplace of 4 more scientists than Indiana, falls behind Indiana in the number of scientific collegiate alumni. Conversely, Michigan and California, which were the birth-states of fewer scientists than was Indiana, have more alumni scientists.

The fact that Indiana was the birthplace of 1,288 scientists but conferred college training on 1,215 shows that 73 more embryo scientists went elsewhere for their college training than the number that came to Indiana colleges from other states. A comparable situation occurs in several other states, notably New York, Pennsylvania, Iowa, Missouri, New Jersey, Illinois and Kentucky. This shows that Indiana has failed somewhat to afford adequate educational facilities for future scientists, but Indiana has failed less badly than several other states have done. States that have afforded collegiate training to many more than their own native scientists are Massachusetts, California, Michigan, Connecticut and Washington.

The leading Indiana institutions in the collegiate training of these scientists are Indiana University with 331 such alumni, Purdue 253, DePauw 138, Wabash 95, Earlham 71, Valparaiso 64, Butler 54, Notre Dame 42, State Teachers 36, Manchester 22, Rose Polytech 22, Hanover 20, Franklin 14, Indiana Central 11, Goshen 9, Evansville (Moore's Hill) 9, Oakland City 8, Taylor 5, Marion 5, Tristate 4, St. Joseph 2, Huntington 2, Rochester 1.

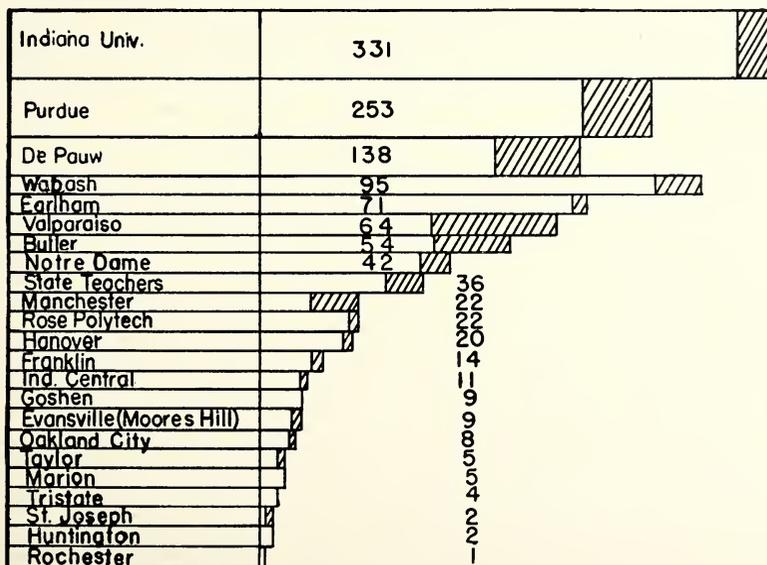


FIG. 3 NUMBER OF COLLEGIATE ALUMNI SKETCHED IN AMERICAN MEN OF SCIENCE 1944

SHADED PART SHOWS THE INCREASE OF 1944 OVER 1938 EDITIONS

In proportion to the number of their alumni, several of the smaller schools, notably DePauw, Wabash, Earlham and Valparaiso, have started more scientists than have either Indiana University or Purdue. This is partly because many Purdue alumni became engineers or farmers, and many Indiana University alumni became lawyers, physicians or high school teachers, a few members of which groups win recognition as scientists.

The increase in the number of alumni sketched in the 1944 edition over the number sketched in the 1938 edition is of interest. Purdue's increase was 44, DePauw's was 35, Valparaiso's 27, Indiana University's 24, Butler's 15, Manchester's 11, Wabash's 10, Notre Dame's 8, State Teacher's 8, and Earlham's 3. (Fig. 3.)

As compared with universities and colleges in other states, five Indiana institutions rank among the nation's leading 100 in the number of college alumni sketched in "American Men of Science" 1944. Indiana University holds 20th place in the nation, Purdue 25th, DePauw 46th, Wabash 66th, Earlham 97th. This is despite the fact that five of the eight universities which rank highest in scientific alumni are situated close to Indiana and are relatively accessible to Indiana students. These five are the Universities of Michigan, Wisconsin, Illinois, Chicago and Ohio with the following numbers of collegiate alumni sketched in "American Men of Science" 1944: 849, 832, 786, 661, 640. Other relatively high ranking schools near Indiana, with the number of their living alumni recognized as scientists, are Michigan State 241, Oberlin 233, Northwestern 186, Cincinnati 133, Ohio Wesleyan 119, Miami 115, Western Reserve 81, Ohio U. 79, Denison 75, Wooster 75 and Case 75.

Specialties of Indiana Scientists

Chemistry has attracted far more Indiana scientists than any other field. About one-fourth of the scientists born in Indiana became chemists, as did slightly more than a fourth of the collegiate alumni; nearly half of those who received doctorates in science in Indiana majored in chemistry. About 30 per cent of the scientists in Indiana in 1943 were chemists.

Physics ranks second to chemistry as a scientific choice, with somewhat more than a third as many devotees. Next comes botany, followed by mathematics, zoology and geology. The numbers in each of these and various other sciences are given in Table I.

Table I reveals that for several sciences, Indiana schools trained more future specialists than were born in Indiana. This was true for botany, plant pathology, pharmacy, anatomy and civil and mechanical engineering. Conversely Indiana has sent to other states for their college training more future specialists than have trained in Indiana in agronomy, geology, mathematics, entomology, plant physiology, forestry, pathology, medicine, astronomy and chemical engineering. Since considerable numbers of men have been trained in Indiana in these fields without later winning recognition as scientists, it appears that the training was less stimulating in these sciences than in some others.

Among the 334 doctorates received in Indiana by subsequently recognized scientists, there are, in addition to the 151 in chemistry already mentioned, 58 in physics, 19 in zoology, 15 in botany, 15 in geology, 14 in mathematics, 13 in psychology, 13 in pharmacy and 7 in physiology.

The percentages of the scientists sketched in "American Men of Science" 1944 who specialized in each of the more popular sciences has

	Native	A.B. Alumni	Ph. D.	Other Final Degree	Tempor.	Now in Indiana
Chemistry	188	194	71	16	78	105
Phys. Chem.	34	31	22	1	11	22
Organic Chem.	52	54	50	3	15	41
Bio. Chem.	25	24	7	2	3	17
Physiol. Chem.	12	8	1		3	4
Agric.	12	7		1	5	4
Agronomy	18	11	1		3	7
Animal Husb.	19	17	1	4	5	11
Physiology	28	27	7	1	3	11
Physics	119	117	58	13	43	55
Mathematics	74	66	14	8	40	54
Geology	52	32	15	4	10	16
Metallurgy	12	13	2	5	5	6
Psychology	57	57	13	2	18	33
Zoology	71	66	15	4	21	28
Entomology	18	13	2	1	9	14
Parasitology	6	5	2			4
Ecology	8	6	1		1	3
Biology	21	17	3	3	7	11
Botany	71	79	14	4	25	31
Plant. Physiol.	20	11			4	5
Plant Path.	27	33	4	3	8	11
Horticulture	16	16	1	7	14	7
Forestry	6	3		1	3	3
Anatomy	18	20	1	2	4	7
Pharmacology	16	21	13	5	11	14
Pathology	11	3		1	5	6
Bacteriology	33	31	3	8	10	21
Medicine	32	16		10	3	10
Surgery	9	8		1		1
Med. Miscel.	19	15	1	3	3	5
Genetics	5	4	2		1	7
Soils	5	6	1	1	5	3
Nutrition	10	8		1	7	4
Astronomy	16	13	1	3	3	3
Geography	8	7	1		2	4
Eng. Misc.	29	32	1	14	16	19
Eng. Chem.	24	13	3	4	14	11
Civil	9	13		3	8	4
Elect.	16	15	1	11	7	7
Mech.	16	20	1	17	5	16
Miscellaneous	40	66	1	2	9	10
	1280	1218	334	172	445	655

TABLE 1 INDIANA SCIENTISTS CLASSIFIED BY SCIENCE AND OTHERWISE

been calculated for four other states as well as for Indiana. Some comparisons are of interest. Indiana with 27 per cent who are chemists exceeds Iowa, Minnesota, Massachusetts and Kansas, where from 24 to 19 per cent are chemists. In physics also Indiana, with 9.7 per cent leads.

	Industry	Colleges and Univs.	Government	Foundations and Museums	Private	Retired
Chemistry	205	164	39	4	9	4
Phys. Chem.	45	32	2			
Organic	89	49	7	2		
Bio. Chem.	17	26	6	1		
Physical Chem	6	9		1	2	
Agrl.	3	14	2		1	
Aeronomy		20	9			
Animal Husb.	5	31	3			
Physiology	1	41	1	1	1	
Physics	40	191	18	3	4	1
Mathematics	5	154	1	2	3	2
Geology	16	35	21	1	8	
Metallurgy	12	10	1	3	1	
Psychology	5	105	12		4	1
Zoology	2	108	10	4	5	1
Entomology	3	22	13		1	
Parasitology	1	5	3			
Ecology		9	3			
Biology	1	33	2		1	1
Botany	8	106	15	2	1	1
Plant Physiol	3	20	4			
Plant Path.	4	34	12		1	1
Horticulture	2	27	8		1	1
Forestry		5	6			1
Anatomy		35				
Pharmacology	14	36	4			
Pathology	3	12	1	2	1	
Bacteriology	21	36	5	5	1	1
Medicine	4	26	5	1	5	3
Surgery		8	1		2	
Med. Miscel.	5	24	2			1
Genetics	1	13			1	
Soils	3	10	5			
Nutrition	3	13	2			
Astronomy		15	2	3	1	
Geography		13	1		2	
Eng. Misc.	20	40	10		7	1
Eng. Chem.	30	13	7	1	1	
Civil	1	21	3			
Elect.	13	22			2	1
Mech.	5	38				
Miscellaneous	4	41	9	1	5	1
	600	1669	254	37	71	22

TABLE 2 INDIANA SCIENTISTS CLASSIFIED BY EMPLOYMENT BY SCIENCES

Each of the other four states have about 6.4 per cent of their scientists in physics. Indiana also leads in botany (7.9), in which science Minnesota, Iowa and Kansas have about 6.5 per cent of their scientists botanists, and Massachusetts 5 per cent. In medicine, Indiana with 3.4 ranks close to Iowa and Kansas but far behind Massachusetts and Minnesota, each of which have 8 per cent of their scientists in medicine. Indiana also is behind in agriculture, zoology and geology. It is about average in engineering and slightly above average in mathematics and bacteriology.

Institutional Connections of Indiana Scientists

Of the 2,653 Indiana scientists here considered, 1,669 or 63.3 per cent were employed in 1943 by colleges and universities, 600 or 22.5 per cent were employed by industry, 254 or nearly 10 per cent worked for the government, 71 were privately employed, 37 were employed by foundations and museums, and 22 were retired. Of the 717 employed chemists, industry took 364, educational institutions 280, the government 54. Of the 256 employed physicists, colleges and universities took 191, industry 40, government 18. Only 5 of the 165 mathematicians were employed by industry in 1943, in contrast to 154 as teachers. Indeed, aside from chemists, physicists, engineers (68), bacteriologists (21), pharmacologists (14) and geologists (16), industry employed few of these scientists. Nevertheless, of the younger scientists, ever increasing percentage are employed by industry. (Table II.)

The 600 Indiana scientists employed by industry are connected with a total of 293 distinct firms of which 221 employed only one each, 32 employed 2 each, 13 employed 3, 7 employed 4, 4 employed 5, 5 employed 6, 6 employed 7-10. Only six firms outside of Indiana employed more than 6 Indiana scientists. These are Dupont 40, Standard Oil Research Co. 14, Dow Chemical 10, American Cyanamide 10, Montsanto 8, Abbott Laboratories 7; companies employing 6 are U. S. Rubber, R.C.A., Bell, Eastman, Alcoa. Only about one-tenth of Indiana's scientists are employed by one of the 13 large corporations which are especially conspicuous for their research activity (recently characterized by Secretary Henry A. Wallace as "dominating industrial research"). Why are not more Indiana scientists employed by these 13?

Age Distribution of Indiana Scientists

The median age of the Indiana scientists sketched in "American Men of Science" 1944 was 47 years in 1944. The oldest 29 were born before 1865, 316 or 12 per cent were 65 or older in 1944 and 7 per cent were 60-64. At the other extreme, 88 were born since 1914. Thus relatively few win the recognition of being sketched in "American Men of Science" before reaching 30. The Indiana botanists are older, on the average, than the chemists, mathematicians, physicists, bacteriologists, pharmacologists or geologists. Conspicuously young as groups are the organic chemists, physicists and geneticists.

Conclusion

Indiana has reared and trained relatively many recognized scientists, and has done conspicuously well with respect to some of the basic sciences. Although Indiana has done better in employing scientists than have many other states, more than half of the scientists reared or trained in Indiana are unable to find suitable employment in this state. This is especially true of the higher types of scientists, those

starred by secret vote of their fellow scientists as especially distinguished. Of this distinguished group, Indiana employs less than one-fifth as many as were born here. (Sixty-one living in 1943 were born in Indiana, only eleven resident here, and of these eleven, five had retired.) Also regrettable is the fact that in several of the sciences, Indiana lags badly behind other progressive states. Such a factual presentation as here presented will assist, it is hoped, to correct these conditions.