

American, or 157 papers. For 1892, 7.1% of 4,932; for 1900, 11.5% of 3,540; 1907, 10% of 7,570. Patents are omitted in all our counts. Continuing by a slightly different method, we reckoned authorships (not papers) from all nations, 1902-6, 4,331 *per year*; 1907-11, 7,300; 1912-16, 7,320; 1917-21, 8,180; 1922-4, 19,200; 1925-9, 22,160; 1930-4, 40,600; 1951, 25,350; 1954, 48,800. Authorships in *Indus. & Engg. Chem.* went up from 1.29 per paper in 1921, to 1.77 in 1936, to 2.11 in 1951, according to G. P. Bush & Hattery, eds.: *Teamwork in Research*, 1953, pp. 173,5. Cf. our N 68.

From 1907 on we could get better prepared data from the corresponding American international journal, *Chemical Abstracts*, supplied by their office and in articles by the editor, E. J. Crane, with graphs: Scientists Share and Serve, 29:4250-3; Growth of Chem. Lit. 22:1478-82; and Chem. Abstracting Measures a Nation's Research, 36: Aug. 4, 1958, pp. 64-6, all in *Chem. & Engg. News*; also in *Chem. Abstracts* 33:2636-9, 1955. We have applied hence the stated changing American proportion, to the yearly world total, using straight line interpolation. The American share, given in Crane: Chem. Ab., rose from 20.1% in 1909, to 1913, 20.7%, 1917, 43.9%, 1923, 32.1%, 1929, 27.7%, 1939, 27.7%, 1943, 30.6%, 1947, 41.8%, 1951, 36.6% and 1956, 28.4%. By 1961 it had fallen to 19.8% by our own sampling. Amer. papers of 1961, 21,900.

68. *Physical Abstracts*, of papers of apparent Amer. authorship, practically those first pub. in Amer. journals, counted by a brief random sampling method, with a Probable Error of several percent, say $\pm 4\%$. The Amer. and all papers were counted on enough randomly selected pages to yield never less than 14 and usually 30-40 Amer. papers. Then the Amer./foreign proportion was applied to the total papers of the year as in table 3 following.

Using what comprehensive abstracts have been published in English, the years 1894-7 come from *Abstracts of Physical Papers* from Foreign Sources, pub. by the Physical Soc. of London. The percentages American in the table below were corrected for the unlisted British contribution, from Fussler, cited below, his table 17 Physics. Sarell, N 107, adds much other data and explanation. Our 1894 figure is 91 Amer. papers. The years 1898-1902 are from *Science Abstracts, Physics & Elec. Engg.*, pub. in England. From 1903 on our chief international source is *Science Abstracts, Physics*, its continuation for that science. In table 3 we have added for comparison the percentage of Amer. authors, calculated from H. H. Fussler: Characteristics of the Research Literature Used by Chemists and Physicists in the U.S.: *Library Qly.* 19:19-35 and 119-43, 1949. This study is based on authorships, through subsequent citations rather than on original publication of papers, hence includes a valuational selective factor not found in our other abstracts data, and also an Amer. bias, vs. a probable British bias in our own data, and some rise from a growth of joint authorships. His varying time lags between writing, citing and abstracting have been adjusted for. Our 1961 figure plotted is 6,422 Amer. papers.

TABLE 3.—Abstracts of physics papers, with percentages American, 1894-1961, explained above

Abstracting year	1894	1896	1897	1898	1902	1904	1911
Total abstracts.....	793	-----	787	1,443	2,244	3,669	1,785
American papers.....	91	-----	123	352	476	540	297
Amer. percentage.....	8	-----	15.6	24	28	15	17
Amer. percentage from Fussler.....	-----	17.4	-----	-----	-----	29.4	39.9

Abstracting year	1915	1920	1929	1939	1946	1949	1954	1961
Total abstracts.....	1,933	1,700	3,860	5,000	2,389	10,965	10,085	21,400
American papers.....	637	385	889	1,033	1,371	-----	3,051	6,420
Amer. percentage.....	33	23	23	20	48.3	-----	30.3	30
Amer. percentage from Fussler.....	44.7	46.4	49.6	55.9	-----	41.5	-----	-----

69. Electrical Engineering Abstracts, from *Science Abstracts, E. E.* Our own count of Amer. papers, as we have told for Phys. papers. Those for all countries in 1903 were 1,120; in 1904, 2,725, 40% Amer.; 1913, 1,380, 36% Amer.; 1922, 1,155, 47.4% Amer.; 1931, 2,565, 32% Amer.; 1938, 7,203, 20.4% Amer.; 1949, 3,764, 31% Amer.; 1955, 5,046, 33% Amer.; 1960, 8,537, 29.1% Amer., viz. 2,485 Amer. papers.