carbon laboratories. The samples are numbered in stratigraphic order, oldest (M-288a) to youngest (M-291).

Several conclusions may be safely drawn from this study: (i) The time lapse between the Algonquin and Nipissing stages in the Lake Michigan basin was 4000 yr (M-288 to M-291), with Lake Algonquin ending about 8000 yr ago (M-288) when the North Bay outlet became ice free. (ii) Lake Chippewa intervened between the Algonquin and Nipissing stages in the Lake Michigan basin about 5000 yr ago (M-290) and was coincident with the oak-pine period in southwest Michigan. (iii) The Xerothermic period reached a maximum some time after 4000 yr ago and is coincident in time with the Nipissing stage in the Lake Michigan basin.

JAMES H. ZUMBERGE
Department of Geology,
University of Michigan, Ann Arbor
J. E. POTZGER
Department of Botany,
Butler University, Indianapolis, Indiana

References

1. J H. Bretz, *Am. J. Sci.* **249**, 427 (1951).
2. J. Hough, Final report, ONR contract N6051-07133 (1953), p. 27.

4 January 1955.

Unusual Reagent

The authors of an article in the *Journal of Biological Chemistry* [211, 168 (1954)] acknowledge a gift of a sample of "standard human brain inhibitor." Presumably this is the basis for man's chronic difficulties in meeting the test. Who will discover the antidote?

DAVID E. GREEN
University of Wisconsin, Madison

6 January 1955.

Bacitracin

Experiments in this laboratory on the stability of bacitracin have uncovered the interesting fact that bacitracin will form an irreversible gel with certain chemicals.

Two grams of bacitracin dissolved in 5 ml of water, alcohol, or acetone, or mixtures thereof, will form a gel in the presence of 200 mg or less of anethole, anisole, cinnamic aldehyde, and isosafrol. The time for gel formation varies with the chemical and concentration. No gel is formed in the presence of menthol, isopropyl benzene, benzocaine, ascorbic acid, oleic acid, eugenol, isoeugenol or safrol. In the presence of isopropenyl benzene (insoluble in the system) or morpholine, no gel is formed. Using morpholine as a solvent a gel is formed with the bacitracin and isopropenyl benzene. The presence of a conjugated ring system seemed necessary to gel formation except for the anomalous behavior of isoeugenol.

The gelling phenomenon occurred incidental to certain of our pharmaceutical development work and was expanded to the extent described. It is reported here as isolated behavior of bacitracin in the hope that it may be correlated with more direct investigations on the composition of the antibiotic.

E. T. MARTIN
R. E. MULLIGAN
Sharp and Dohme Division of Merck & Co.
Philadelphia 1, Pennsylvania

6 January 1955.

The Individual in Chemical Research

It is a fairly general belief that the individual researcher in chemistry has been supplanted in modern times by the research team. Numerical data to support this generalization apparently have not been collected.

Information on this point can be obtained by counting the number of papers in chemical journals that are written by a single author rather than by groups. There are some obvious flaws in this procedure as a measure of individual scientific endeavor, but the results are, at least, interesting. The percentage of papers written by only one author in the *Journal of the American Chemical Society* (Table 1) has indeed decreased since 1918, indicating a probable decline in individual research.

A further indication that few lone-wolf chemists exist in modern research is offered by the fact that not more than 15 authors in any one year (for the years given in Table 1) published more than two papers without coauthors.

Since the *Journal of the American Chemical Society* is sometimes accused of being primarily for organic chemists (in 1940, for example, five organic chemists were senior authors of about 10 percent of the published papers; since then the percentage from these individuals has declined), a check was also made of the *Journal of Chemical Physics* where organic chemists probably would not be represented. In both 1940 and 1950 this journal had approximately 40

Table 1. Individual papers in the *Journal of the American Chemical Society.*

Year	Total papers*	No. by single author	Percentage
1918	220	100	45
1920	302	131	43
1928	487	169	35
1930	838	244	29
1938	937	183	20
1940	1084	180	17
1948	1557	256	16
1950	2022	282	14

* Taken from reports by the editor published in the *Journal* itself or in *Chemical and Engineering News*; it does not include book reviews.

percent of its contributions written by a single author. Of course, most of the writers for this journal probably classify themselves as physicists rather than as chemists.

The real frontier for the individual in science, however, would appear to be in mathematics. In 1950, 98 percent of the papers in the *American Mathematical Monthly* were written by individuals.

J. P. Phillips

Department of Chemistry,
University of Louisville, Kentucky

17 December 1954.

Soda Fe-Mn Pegmatite Phosphates

The crystallography and thermal relations of alluaudite, dickinsonite, and fillowite, the last three minerals for which data are given in Table 1, are here discussed; no new data have been obtained for natrophilite (Table 1) or the little-known varulites. Each of these five soda-phosphate minerals consists of a solid solution Fe-Mn series. The first two minerals listed, chondrodite and fayalite, are silicates; they are included to make clear the orientation used, which is that of chondrodite with $c < a$. The olivines (represented in Table 1 by fayalite) are isotypous with the pegmatite phosphate triphylite. The latter has a crystal structure similar to but not identical with that of natrophilite (*1*). The new unit-cell data for the last three minerals of the table were obtained from Chanteloube alluaudite and Branchville dickinsonite and fillowite. For Black Hills ferrodickinsonite or arrojadite (*2*), $a = 24.78$, $b = 10.05$, and $c = 16.51$ A.

In a series of thermal experiments it was found that the Black Hills ferrodickinsonite, when heated for a day in air, alters to alluaudite between 485 and 555°C. On the other hand, Chanteloube alluaudite may be heated for a day in air to 990°C without change in its x-ray powder diffraction pattern; it melts close to 1000°C. Ferrodickinsonite, when heated for a day in a platinum envelope in a sealed and evacuated capsule made of Vycor glass tubing, inverts to ferrofillowite at 850°C. The Branchville fillowite when similarly heated to 960° does not show an appreciable change in x-ray powder diffraction pattern. Some cristobalite, presumably developed by the action of Na on the Vycor glass, forms at temperatures of 800°C and above. Unless this involves a significant change in composition, it seems probable that heating to 850°C causes dickinsonite to undergo a reconstructive transformation yielding fillowite.

Heated in air for 46 hr at 885°C, fillowite yields a diffraction pattern rather similar to but far from identical with that of alluaudite. This material is being further investigated. Some of the diffraction patterns from the ferrodickinsonite heated in air above 550°C are not quite identical with that from alluaudite; the small differences will be discussed in a detailed paper to be published elsewhere. The heating experiments were conducted originally to find out at what temperature water assumed to be present was lost; the results indicate that water does not play an essential role in any of these structures (*3*).

D. Jerome Fisher

Department of Geology, University of Chicago

References and Notes

1. A. Byström, "The structure of natrophilite," *Arkiv Kemi.* **17B**, No. 4 (1943).
2. D. J. Fisher, "Arrojadite is a ferro-dickinsonite," *Am. Mineralogist* **39**, 676 (1954).
3. The ferrodickinsonite came from the Headden collection of Harvard through the courtesy of Clifford Frondel, who also supplied the fillowite. The Chanteloube alluaudite was furnished by F. A. Bannister of the British Museum, Kensington.

22 December 1954.

Table 1. Silicate-phosphate crystal data. *a*, *b*, and *c*, lengths of the *a*, *b*, and *c* edges of the unit cell; *d*, spacing.

Cations	Mineral	Crystal system	a (A)	$d_{(100)} = a \sin \beta$ (A)	b (A)	c (A)	$d_{(001)} = c \sin \beta$ (A)	β	Unit cell vol. (A^3)	Specific gravity
Mg Mg	Chondrodite	Monoclinic	10.29	9.73	4.74	7.89	$7.45 = 5 \times 1.49$	109° 02′	364	3.20
$\mathrm{Fe^{II}\ Fe^{II}}$	Fayalite	Orthorhombic	10.61	10.61	4.81	6.17	$6.17 = 4 \times 1.54$	90° 00′	315	4.14
$\mathrm{Li\ Fe^{II}}$	Triphylite	Orthorhombic	10.36	10.36	4.68	6.01	$6.01 = 4 \times 1.50$	90° 00′	291	3.58
Na Mn	Natrophilite	Orthorhombic	10.54	10.54	4.98	6.33	$6.33 = 4 \times 1.58$	90° 00′	332	3.47
$\mathrm{Na\ Fe^{III}}$	Alluaudite	Monoclinic	11.99	10.93	2(6.22)	6.38	$5.81 = 4 \times 1.45$	114° 20′	867	3.58
NaMn	Dickinsonite	Monoclinic	2(12.44)	2(11.98)	2(5.05)	16.68	$15.98 = 10 \times 1.60$	105° 41′	4041	3.41
NaMn	Fillowite*	Rhombohedral	15.25			43.32			8730	3.43

* The optic axial angle (2V) is 30° +. The lattice symmetry lacks a mirror (*m*), as kindly pointed out by J. D. H. Donnay, but has a 3-fold axis.