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Trends in the discovery of new minerals over the last century

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Abstract

Patterns in the discovery and description of new minerals over the last century emerge from a new database of 4046 mineral discovery reports (roughly ¾ of all known minerals). The number of new minerals discovered per year was steady over time from 1917 to the early 1950s, when it began a rapid increase punctuated by spikes in 1962–1969, 1978–1982, and 2008–2016, the last of which is probably still ongoing. A detailed breakdown of the technological, geographic, institutional, and other characteristics of mineral discovery in this data set elucidates factors leading to increases in mineral discovery. (1) The availability of instrumentation for a particular analytical technique has a far larger impact on the rate of its uptake in mineral discovery than the technique's invention or computer automation. (2) Samples from mines, quarries, and resource exploration have produced around ⅔ of all new mineral discoveries due to geochemical peculiarity and good exposure; lunar and meteoritic samples have contributed relatively few new minerals. (3) Peralkaline intrusions and volcanic fumaroles are the next most productive sites of new mineral discovery. (4) Which countries host mineralogists who discover large numbers of new minerals have varied over time but is always a relatively small number (<20), and mineral discovery is highly concentrated in specific laboratories or workgroups. (5) Involvement of governmental organizations in new mineral discovery peaked in the aftermath of World War II and has since declined to almost nil, with new mineral discoveries now coming primarily from universities and similar academic institutions (75%) and from museums (25%). (6) The average number of authors on mineral discovery papers has risen from <1.5 in 1950 to >6 now and follows an exponential trend. (7) The average number of methods used to characterize new minerals has not changed significantly since 1960, and about half of new mineral descriptions are made using roughly the minimum of analyses required for a new mineral to be recognized. (8) A partial study of discredited or redefined minerals identified changes to nomenclature and classification as the primary causes for discreditation; failure to replicate analytical results is a distant second. Only five cases of fraudulent mineral discovery are known. This article presents the data underlying these analyses and discusses some possible reasons for the observed trends in the rate of new mineral discovery, as well as the implications for the history (and future) of mineralogy.

Keywords: Analytical mineralogy, history of mineralogy, new mineral, mineral discovery, X-ray diffractometry, electron microprobe