DICTIONARY OF SCIENTIFIC PRINCIPLES

STEPHEN MARVIN

WILEY

DICTIONARY OF SCIENTIFIC PRINCIPLES

DICTIONARY OF SCIENTIFIC PRINCIPLES

Stephen Marvin
West Chester University

WILEY
JOHN WILEY & SONS, INC., PUBLICATION

Published by John Wiley & Sons, Inc., Hoboken, New Jersey
Published simultaneously in Canada

Library of Congress Cataloging-in-Publication Data:

Dictionary of scientific principles / by Stephen Marvin.
p. cm.
Includes bibliographical references.
ISBN 978-0-470-14680-4 (cloth)
1. Science–Dictionaries. I. Marvin, Stephen.
Q123.D537 2010
503–dc22

2010003426

Printed in Singapore

10 9 8 7 6 5 4 3 2 1

To E. E. Barnes,
with long overdue thanks
for
sharing ideas, concepts, and challenges
in the way we seek and organize information

CONTENTS

PREFACE

The *Dictionary of Scientific Principles* is an attempt to compile the language of art used for various known rules or laws applied to a broad category of topics, including mathematics, medicine, sciences, psychology, management, and even philosophy and art. This project has taken over 6 years to develop to this point. I have consulted with scientists and colleagues on the development of this dictionary and had some help in organizing the files from an MS Excel spreadsheet. There are approximately 2000 + principles that form the language of art. Some are rewording of the same principle; For instance, the *principle of maximum entropy* is also listed as the *maximum entropy principle*. I exerted a great deal of effort to have this work prepared in time for the new millennium and to call it *Millennial Principles*. However, the myriad new discoveries in scientific and other disciplines necessitated the continual addition of new entries and cross-references to similar-context or related entries already listed in this volume. In creating this dictionary, I consulted many encyclopedias, dictionaries, books, indexes, and journal articles. There is no single source containing the breadth of coverage of all principles listed in this work. The references listed in footnotes are some of the many resources that I consulted. I hope that this will be an ongoing project, in order that new principles may be added in future editions or enhancements can be made in the applications listed. Many of the entries in this dictionary are excerpts from journal articles, summaries from other literature sources, or information obtained from unique Internet sources or available content definitions from patent files.

The *Dictionary of Scientific Principles* was prepared to provide information about basic fundamental properties, systems, activities, or phenomena that have become terms in common use, including eponyms, among various fields of study. It provides a brief description of the individual principle, a variety of definitions applied to the principle, and alternate names used to describe the principle in "see also" attachments to the name, with definitions of over 2000 terms, both current and historical. About 85% of these terms cannot be found in any other source such as dictionaries, encyclopedias, or other collected printed (hardcopy) or electronic works. The footnoted references are included to help the reader find further in-depth information as needed. The *Dictionary of Scientific Principles* neither attempts nor intends to exhaust the entire spectrum of meaning and potential intention with historical connections for each principle.

The principles included may be factual, historical, fictitious, or comical. Abbreviations are included [e.g., TNSTAAFL principle]. Some surname-based eponyms containing the term *law*, (e.g., *Newton's law*), are also described as *Newton's principle* and thus are included.

Principles have been included regardless of their frequency of use or the manner in which they were created. The polyuronid principle, for example, was found in only one single reference. Occasionally, names are in formative or transitional stages of

development, which legitimately justifies the compiler's reasons for assigning different names to the same or very similar principles. The inclusion of a name as part of a term in no way depends on how well the person is or was known at the time, nor does it mean that this person will become well known in the future because of the principle with which she or he may be affiliated or associated. Many of the principles include names of famous persons, while a very large number include the names of people who were modest practitioners of their trades and who lived and died in anonymity. Such people could not be included in professional and membership directories, biographical listings, or national newspaper obituaries. Biographical information, as explained earlier, for many of the principles, is incomplete. Selection was made to include and focus on the principle, not the individual for whom it was named. Literary, historical, and mythological names are included. Many of the biographical resources on these names can be found in commonly available biographical sources.

A surname-based eponym contains both a proper noun (the name of the person after whom something is named) and a generic term. The eponym need not contain the person's real name (e.g., the Dilbert principle); a pseudonym can become an eponym, such as the *Tinkerbell principle*. Names may appear in multiple forms and they are included with cross-reference's to alternate forms including spelling variations. Associating names with specific individuals is often difficult since the names are coined not by the persons who first described the concept but by someone else, often many years later.

The entries in this *Dictionary of Scientific Principles* are arranged in alphabetic order with cross-references to alternate terms applied. The listing depends on the manner in which the principle was described. For a hypothetical example, the term *principle of XYZ* and its variation, *XYZ principle*, are both listed. Only usage dictates whether the name includes a possessive "s" (e.g., Einstein's theory of relativity). Principles containing more than one personal (e.g., *Borwein–Price principle*) name are followed by brief biographic notes regarding the people in the order to in which their names appear in the term.

ACKNOWLEDGMENTS

I want to thank my wife for being so supportive in encouraging me to continue. I want to thank my children for their interest and of apparent understanding my need to sacrifice some of our time together while this work was being completed. I wish to also thank Samantha Richardson for many patient days of editing and correcting spelling errors. Tracie Meloy helped with with organizing many text records into a single standard format. I must thank many members of the Philadelphia Chapter of the Special Library Association for their encouragement. I have to thank Barbara and Bruce, who thought I was crazy but persistent. I must thank the various companies who provided additional support, including the Dialog Corporation, NewsNet, MNIS and Telebase. I would like to express special appreciation for support and encouragement from friends at Penn State University Great Valley campus and West Chester University.

A very special note of thanks to those who contributed their subject expertise as collaborators to this work. With deep thanks for her dedication and effort despite her terminal illness, Jennifer Papin-Ramcharan, Librarian III, Engineering & Physical Sciences Division, The University of the West Indies, St. Augustine Campus, St. Augustine. Trinidad and Tobago, West Indies provided a very comprehensive review of mathematics and developed mathematical formulas to be included. She passed away September 9, 2009 and was a delightful tenacious supporter. She leaves to mourn, apart from her library family, her husband Oliver and four children, her mother and two sisters. A qualified engineer, University of Hong Kong and holder of B.Sc Math/Physics from the University of the West Indies, and Fulbright—LASPAU scholar, she served as the subject specialist for the Engineering and Physicial Sciences Division. She received her M.L.S. from the University at Buffalo, State University of New York and continued to serve the UWI and the Library with distinction. Her memorial service was held at the St. Stephen's Anglican Church, High Street Princes with burial at the St. Nicholas Churchyard Cemetery.

I envy Gregory D. Mahlon, Science and Technology librarian, Penn State Mont Alto, Mont Alto, PA 17237-9799 and his steady, consistent, and well organized deliberations, comments, and humor regarding this project. There were many others who sent additions to be included and provided editing or content advise. Finally, I would like to personally thank the contributions from Eleanor Brown, Ph.D., Clinical Psychology, Assistant Professor, West Chester University of Pennsylvania and her student research assistant, Andrea Knorr. Ellie collaborated with colleagues and contributed several new entries from the field of psychology and medical related practice.

Very special thanks to E. E. Barnes for offering definitions and suggestions to the list.

NOTES TO THE READER

The Dictionary of Scientific Principles is an exercise in acquiring all known rules or laws commonly called *principles* and describing the language of art corresponding to usage. These principles cover all subjects ranging from science, to business, literature, philosophy, medicine, and society. Cross-references to other principles are listed with the definition. In addition to principle definitions, [denoted (D)], you will find applications [denotd (A)], which cover an equally broad field of multiple subject disciplines aiding in a search for principles as they relate to a certain subject.