

πάντα ῥεῖ: EVERYTHING FLOWS

ANTONY N. BERIS¹, A. JEFFREY GIACOMIN^{2*}

¹Department of Chemical and Biomolecular Engineering, University of Delaware, Newark, DE 19716, USA

²Chemical Engineering Department, Polymers Research Group, Queen's University, Kingston,
ON K7L 3N6, Canada

* Corresponding author: giacomina@queensu.ca

Received: 12.3.2014, Final version: 27.4.2014

ABSTRACT:

This historical study deepens the rheologist's understanding of the motto of The Society of Rheology, of its history, and of its many typographies. The motto "παντα ῥεῖ" is not verbatim something written or said by the ancient Greek Ionian philosopher Heraclitus, ca. 540–480 BCE. Rather it is first encountered much later, in the writings of the Roman Simplicius ca. 490–560 CE. Thus, although it is uniformly agreed by Greek scholars that it correctly and concisely distills Heraclitian philosophy, that of constant change, and although this is appropriately used as the motto of The Society of Rheology, there is little point in trying to rewrite it into another form (for example to capitalize it) in an effort to be more faithful to an ancient prototype. Rather, we suggest simply reinstating the two missing diacritical marks, and thus, to express it as "πάντα ῥεῖ" which is the form in which the motto was introduced in 1929. This is also consistent with current typography of ancient Greek writings, in use since the ninth century CE, following the byzantine scholars. We provide Table 1 to facilitate accurate typesetting of the motto.

ZUSAMMENFASSUNG:

Diese historische Studie liefert dem Rheologen ein vertieftes Verständnis des Leitspruchs der Rheologischen Gesellschaft, seiner Geschichte, und seinen unterschiedlichen Schreibweisen. Der Leitspruch "παντα ῥεῖ" ist kein Verbatim, das vom frühantiken griechischen Philosophen Heraklit (ca. 540–480 v. Chr.) aufgeschrieben oder mündlich überliefert wurde. Im Gegenteil, man trifft auf den Leitspruch zu einem erst viel späteren Zeitpunkt, nämlich in den Schriften des spätantiken griechischen Philosophen Simplicios (ca. 490–560 n. Chr.). Obwohl es wissenschaftlich erwiesen ist, dass der Leitspruch die heraklitische Philosophie, nämlich die der konstanten Veränderung, in korrekter und prägnanter Weise zusammenfasst, und obwohl dessen Verwendung durch die Rheologische Gesellschaft angemessen ist, gibt es wenig Anlass, dessen Schreibweise zu verändern (z. B. alle griechischen Buchstaben groß zu schreiben), aus der Bestrebung heraus, getreuer an der antiken Urform zu sein. Stattdessen schlagen wir vor, nur die zwei fehlenden diakritischen Zeichen wieder einzusetzen. Der Leitspruch würde dann die Form "πάντα ῥεῖ" annehmen, welche genau diejenige Form ist, die bei der Einführung im Jahr 1929 verwendet wurde. Das wäre dann auch im Einklang mit der aktuellen Schreibweise, die seit dem neunten Jahrhundert n. Chr., im Anschluss an die byzantinischen Gelehrten, in der antiken griechischen Literatur eingesetzt wird. Wir stellen die Tabelle I bereit, um eine getreue Schreibweise des Leitspruchs der Rheologischen Gesellschaft zu ermöglichen.

RÉSUMÉ:

Cette étude historique approfondit la compréhension pour le rhéologue de la devise de The Society of Rheology, de son histoire et de ses diverses typographies. La devise "παντα ῥεῖ" n'est pas un verbatim, écrit ou dit par l'ancien philosophe grec Ionien Heraclitus, ca. 540–480 après Jésus Christ. En revanche, on la trouve pour la première fois plus récemment, dans les écritures du Romain Simplicius ca. 490–560 après Jésus Christ. Ainsi, bien qu'il soit uniformément convenu par les disciples grecs que cette devise distille correctement la philosophie héraclitienne, c'est à dire, la philosophie du changement constant, et bien que celle-ci soit convenablement utilisée comme devise de The Society of Rheology, il n'y a aucune raison de réécrire la devise sous une autre forme (par exemple, en la réécrivant en lettres grecques majuscules) en essayant d'être plus fidèle à l'ancien prototype. En revanche, nous proposons un simple rétablissement des deux marques diacritiques absentes et, ainsi, que la devise soit exprimée sous la forme "πάντα ῥεῖ", c'est à dire, sous la même forme que celle introduite en 1929. Ceci sera également compatible avec la typographie actuelle des écritures grecques anciennes, employée depuis le neuvième siècle, suivant les disciples byzantins. Nous fournissons la Table I pour faciliter la composition typographique précise de la devise de la Société.

KEY WORDS:

Confucius, Greek accents, Greek breathings, Greek typography, everything flows, Heraclitus, panta rhei, rheology motto

This is an extract of the complete reprint-pdf, available at the Applied Rheology website
<http://www.appliedrheology.org>

Manfred Wagner, Hiroshi Watanabe (渡辺 宏), Rhodri Williams, Hyun Wook Jung (정현욱), Martin Zatloukal, and Drs. Katie Pitts, Osman Polat and Chia Yen Tseng (曾家彦), and Mssrs. Hyung Min Baek (백형민), Tiong-Boon Seet (薛忠文), Zhanibek Yessimbekov (Жанибек Есимбеков) and Haibin Zhao (赵海滨), and Mss. Patricia Lacroix, Aryn Lesage, Li-Ping Lin (林莉婷), Samaneh Khanlari and Burcu Ugur for their contributions to Table 3.

We are also grateful to Professor Bruno Vergnes of École des Mines de Paris (Sophia Antipolis) for translating the abstract into French, and to Professor Natalie Germann of the Technical University of Munich for translating the abstract into German.

DEDICATION

This paper is dedicated to Professor Emeritus R. Byron Bird of the Rheology Research Center, and of the Department of Chemical and Biological Engineering of the University of Wisconsin-Madison in celebration of his 90th birthday, February 5, 2014.

FOOTNOTES

¹ In this paper, we distinguish “modern Greek” from “Modern Greek” by capitalizing the “M”. Whereas “modern Greek” refers to contemporary Greek usage, “Modern Greek” refers to usage common to most of the modern period, and by modern period, we mean most of the 19th and 20th centuries. Thus, Modern Greek and modern Greek intersect, but neither is a subset of the other.

² In English, it is customary to use the Latin transcription of scholars’s names (Confucius, Demetrius, Democritus, Diogenes Laërtius, Epicurus, Heraclitus, Kratylos, Leucippus, Plato, Seneca). We follow this custom throughout, except when quoting others, and then, when the custom is disobeyed, we use “(sic)”.

³ Before Common Era: The current convention for what the West once called BC.

REFERENCES

- [1] Beris AN, Giacomini AJ: πάντα ῥεῖ: Everything Flows,” RRC Report No. 207, Rheology Research Center, University of Wisconsin, Madison (July, 2013).
- [2] Beris AN, Giacomini AJ: πάντα ῥεῖ (Everything Flows): Motto for Rheology,” PRG Report No. 003, QU-CHEE-PRG-TR--2014-3, Polymers Research Group, Chemical Engineering Dept., Queen’s University, Kingston, Canada (April, 2014).
- [3] Clyde J: Greek Syntax with a Rationale of the Constructions, Edinburgh, Sutherland 1857. Also available online at the Internet Archives of the University of Toronto libraries in: <http://archive.org/details/greeksyntaxwithrooclyduoft>

- [4] Babiniotis G: http://www.babiniotis.gr/wmt/userfiles/File/synoptikh_istoria_ell_glws_tonoi_pneumata.pdf
- [5] Heraclitos: Complete Works (Απαντα), Series on Ancient Authors (Αρχαίοι Συγγραφείς) Volume 8, Falcos-Arvanitakis T (translator), Zitros Publishing, Thessaloniki, Greece (1999, in Greek).
- [6] Zeller E, Nestle W: History of Greek Philosophy, translated from original German into modern Greek by Ch. Theodoridis, 13th Edition, 1997 printing, Estia Publishing House, Athens, Greece (1980).
- [7] Mouraviev SN: Heraclitea II.A.2, TRADITIO (A), Academia Verlag, Sankt Augustin, Germany (2000).
- [8] Peters FE: Greek Philosophical Terms, A Historical Lexicon, New York University Press, New York (1967).
- [9] Barnes J: The Presocratic Philosophers, Volume 1, Routledge and Kegan Paul Publishers, London (1979).
- [10] Graham DW: The Texts of Early Greek Philosophy, Part 1, translated (and edited) from Ancient Greek into English by author, Cambridge University Press, Cambridge UK (2010).
- [11] Mouraviev SN: Heraclitea III.3.B/i, Recencio: FRAGMENTA, Academia Verlag, Sankt Augustin, Germany (2006).
- [12] Mouraviev SN: Heraclitea II.A.3, TRADITIO (A), Academia Verlag, Sankt Augustin, Germany (2002).
- [13] Anon, <http://www.perseus.tufts.edu/cgi-bin/ptext?lookup=Plat.+Crat.+402a> This text is based on the following book: Plato, Plato in Twelve Volumes, translated from Ancient Greek into English by Fowler HN, Harvard University Press, Cambridge, MA; William Heinemann Ltd., London (1921) Vol. 12.
- [14] Diogenes Laërtius: The Lives and Opinions of Eminent Philosophers (Διογένης Λαέρτιος. Βίοι και γνώμαι των εν φιλοσοφία ευδοκιμησάντων), Long HS, ed., Oxford (1964), from Μικρός Απόπλους, <http://www.mikros-apoplous.gr/> (2012f)
- [15] Markovitz H: Rheology: In the Beginning, J. Rheol. 29 (1985) 777–798.
- [16] Becker HA: Dimensionless Parameters: Theory and Methodology, Applied Science Publishers, London (1976).
- [17] Leys S: The Analects of Confucius: Translation and Notes, W.W. Norton & Co., New York (1997).
- [18] Legge J: Confucius: Confucian Analects, The Great Learning and The Doctrine of the Mean, translated from traditional Chinese into English, Dover Publications, Inc., New York (1971).
- [19] Legge J: The Chinese Classics: A Translation, Critical and Exegetical Notes Prolegomena, and Copious Indexes, Vol. I: Confucian Analects, The Great Learning, and the Doctrine of the Mean, 2nd ed., Revised, Clarendon Press, Oxford (1893).
- [20] Van Norden BW ed.: Confucius and the Analects: New Essays, Oxford University Press, Oxford (2002).
- [21] Anon: http://en.wikipedia.org/wiki/Greek_alphabet (2012)
- [22] Cook BF: Greek Inscriptions, University of California Press (1987).
- [23] Leigh DF: <http://www.cratchit.org/dleigh/alpha/greek/greek.htm>
- [24] Babiniotis G: http://www.babiniotis.gr/wmt/userfiles/File/synoptikh_istoria_ell_glws_tonoi_pneumata.pdf

This is an extract of the complete reprint-pdf, available at the Applied Rheology website <http://www.appliedrheology.org>

- [25] Anon: <http://el.wikipedia.org/wiki/Δασεία> (2012)
- [26] Anon: <http://el.wikipedia.org/wiki/Ψιλίη> (2012)
- [27] Anon: http://en.wikipedia.org/wiki/Aristophanes_of_Byzantium (2012)
- [28] Anon: The new International Encyclopedia, 1917, Volume 10, The Greek Alphabet, pages 314–319 (Google) (2012)
- [29] Reiner M: The Deborah Number, *Physics Today* (January 1964) 62.
- [30] McKelvey SC: A Reporter At Large: Everything Flows, *The New Yorker*, 82–87 (November 23, 1935). Erratum: “St. Clair McKelvey” should be “St. Clair McKelway”.
- [31] Bingham EC: The History of The Society of Rheology from 1924–1944, unpublished, Executed By Directive From The Society, Original archived in the Niels Bohr Library and Archives, American Institute of Physics, College Park, MD (circa 1945), Errata to p. 7, second full paragraph: “Eighth” should be “Seventh”, “(New Yorker, November 23, 1936, p 61–71)” should be “(The New Yorker, November 23, 1935, pp. 82–87)” see Ref. [30].
- [32] Bingham EC: Plasticity, *J. Phys. Chem.* 29 (1925) 1201–1204.
- [33] Bingham EC: *Fluidity and Plasticity*, McGraw-Hill, New York (1922).
- [34] Bingham EC: Some Fundamental Definitions of Rheology, *J. Rheol.* 1 (1930) 507.
- [35] Scott Blair GW: The Rheology of Soil Pastes, *J. Rheol.* 1 (1930) 127–138.
- [36] Kunkel BW: Tributes: Lafayette College Memorial Address 17 (1) 6–8 (May, 1946).
- [37] Giacomini AJ: Minutes of the ExCom Meeting, *Rheology Bulletin* 75 (January 2006) 22–24.
- [38] Giacomini AJ: Minutes of the Business Meeting, *Rheology Bulletin* 75 (January 2006) 24.
- [39] Beris AN, Giacomini AJ: Panta rhei, in Book of Abstracts, The Society of Rheology, 83rd Annual Meeting, Cleveland, OH (October 9–13, 2011) 97.
- [40] Bingham Memorial Award, *Rheology Bulletin* 18 (June, 1947) 6.
- [41] International Standard ISO 843:1997(E): Information and documentation – Conversion of Greek characters into Latin characters, 1 ed., (January 15, 1997) corrected and reprinted (May 1, 1999).
- [42] Mouraviev SN: The Position of the Accent in Greek Words: A New Statement, *The Classical Quarterly*, New Series, 22 (May 1972) 113–120.
- [43] <http://www.drg.bam.de/index.htm>
- [44] <http://scitation.aip.org/content/sor/journal/jor2/info/about> (April 26, 2014).
- [45] Bingham EC: The Journal of Rheology Now Combined with Physics, *Physics* 4 (March 1933) 87.
- [46] Tate JT: Editorial, *Physics* 7 (1936) 433.
- [47] Hutchisson E: Let us go forward ..., *J. Appl. Phys.* 8 (1937) 1.
- [48] The Society of Rheology: Constitution and By-Laws (Fully Amended as of October 1, 1941), *Rheology Bulletin* 17 (May 1946) 15–16.
- [49] Bingham EC: A Note on The Volume and Distribution of Rheological Literature Reviewed in Twelve Numbers of Chemical Abstracts, *Rheology Leaflet*, XII (August 1941) 21–23.
- [50] Revision of the Constitution and By-Laws of the Society of Rheology, *Rheology Bulletin* 18 (June 1947) 6.
- [51] Markwood WH Jr.: The Society of Rheology, *J. Colloid Sci.* V–VI, 2 (February 1947).
- [52] Traxler RN, Spencer RS, Bondi AA, Markwood WH Jr., Dienes GJ, Fair WF: The Society of Rheology, *Phys. Today* 4 (October 1951) 24.

