

## PREFACE: COMMEMORATING THE LIFE AND TIMES OF ART BERGLES (1935 – 2014): HE PEDALED FAR AND WIDE, MADE A DIFFERENCE ... AND THE TRAIL IS AN ENRICHING LEGACY

अनेकसंशयोच्छेदि, परोक्षार्थस्य दर्शकम् ।  
सर्वस्य लोचनं शास्त्रं, यस्य नास्ति अन्धैव सः ॥

aneka-saṁshayo\_chchhedi, paroksh\_ārthasya darshakam ।  
sarvasya lochanam shāstram, yasya nāsti andhaiva saha ॥

– *Hitopadesh*, 1:10<sup>1</sup>

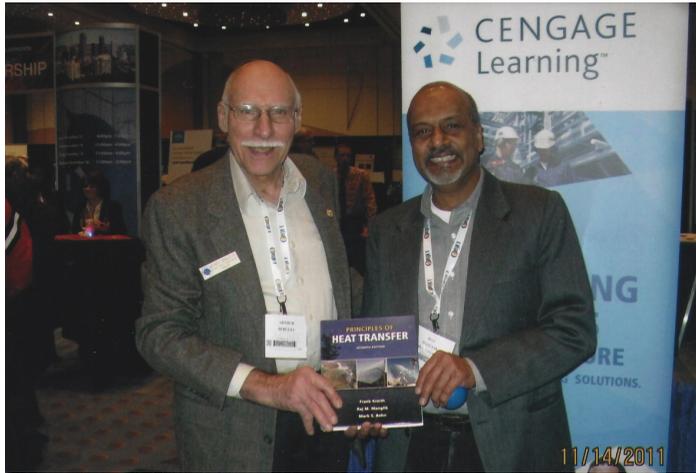
This verse in Sanskrit from the opening chapter of the *Hitopadesh* translates as follows: the resolver of many doubts and misgivings, the revealer of things, ideas, and understandings that are not obvious or are invisible, is the eye of knowledge gained from learnings of sciences from the shāstra<sup>2</sup> (or a compendium of knowledge), without which one is blind or ignorant. From very ancient times it was acknowledged that scientific inquiry, whether through “mental explorations” (theoretical and analytical constructs) or careful and extensive laboratory experimentations, is the true “eye” through which to see things through and to bring sustainable order in the affairs of mankind. We celebrate the spirit of this opadesh in the published pages of this special issue of the *Journal of Enhanced Heat Transfer*. These papers are not just contributions dedicated to the memory of the late Professor Arthur E. Bergles (1935 – 2014); they are current and state-of-the-art research reports on a variety of topics that have wide-reaching impacts in the field of enhanced heat and mass transfer. Some of these

<sup>1</sup>*Hitopadeśa*, a collection of fables and tales written in Sanskrit in both verse and prose, is considered to have been written by Narayan Pandit (~8th century), perhaps under the patronage of a king named Dhavalachandra, and is considered to be both an independent treatment of and influenced by another ancient collection of stories and fables from India (or Bhārat), *The Panchatantra* (~600 BCE or much earlier, since the fables have roots in long-lost oral history traditions). The word hitopadesh or hitopadeśa, is a combination of two root words, hitah and opadesh, and it literally means: words and verses (opadesh or opadeśa) that are beneficial (hit or hitah) to mankind.

<sup>2</sup>A shāstra is a collection of findings of and inquiries in a field of study (science, arts, philosophy, etc.). For example, rasāyana shāstra refers to chemistry, gaṇita shāstra refers to mathematics, khagola shāstra refers to astronomy, artha shāstra refers to economics and/or political science, chhanda shāstra refers to study of poetry and its structure, and nāTya shāstra refers to the art and science of theater, among others.

papers are reviews and others are new investigations, and it is hoped that the readers will find the presentations and results of different inquiries to be both insightful and pointers to new directions and quests of hitherto unanswered questions.

Widely disseminating scientific information (of course, with the implied assumption that written work will be read and assimilated), connecting community members in order to create intellectual synergy, and guiding others have been passionate lifelong endeavors for Art Bergles. On a very personal note, he was instrumental in connecting me with Professor Frank Kreith, which led me on another journey of learning. This collaboration resulted in the co-authorship of the 7th edition of his classical (and perhaps the first) heat transfer textbook, *Principles of Heat Transfer* (Cengage Learning, Stamford, CT, 2011). A particularly happy reunion event was a photo-op celebration (Fig. 1) during the promotion of this book at the American Society of Mechanical Engineers (ASME) International Mechanical Engineering Congress and Exposition (IMECE) in November 2011.



**FIG. 1:** Art Bergles with the author, holding a copy of the *Principles of Heat Transfer*, at the promotional exhibit of the book's publisher (Cengage Learning) during ASME IMECE 2011, Denver, CO.

It is believed, as has been succinctly and poetically articulated in the following verse in Sanskrit (which is also taken from one of the many ancient Hindu texts, or shāstras) that knowledge acquisition or learning is made up of four synergistic parts:

आचार्यात् पादमादत्ते पादं शिष्यः स्वमेधया ।

सब्रह्मचारिभ्यः पादं पादं कालक्रमेण च ॥

āchāryāt pādamadatte, pādām shishyah swamedhayā ।  
sa-brahmachāribhyah pādām, pādām kālakramena cha ॥

In essence, one-fourth is acquired from the āchārya (guru or teacher), one-fourth from the inquiring application of one's own intellect, one-fourth from assimilation and interaction with peers, and one-fourth from passage of time and experience. And who is an āchārya? One whose values and conduct (ācharana) are worth emulating, and thus we imbibe learning from the role model of an āchārya. For me, and I believe for many others in our community, Art Bergles embodied and eminently exemplified all this; he was indeed a selfless mentor, sage, both a teacher and a peer, and a friend. It is ardently wished that Art's legacy will be celebrated by not only the readings of the published work in these multiple issues of the memorial volume of the *Journal of Enhanced Heat Transfer*, but also that they will invigorate future advancements in the field of enhanced heat and mass transfer.

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