

textbooks, there may be a larger market, but there are also additional problems. The book may have to be translated into several local languages (the example of India was quoted). Most school textbooks are written for a specific curriculum, which is far from standard from country to country.

4. Reprinting Material Locally

With the cooperation of the author and publisher of the original edition, certain books and journals could be reprinted locally, to take advantage of lower labor and shipping costs. These low-cost editions could then be used in other developing countries. Some projects of this kind have been undertaken by organizations such as UNESCO.

5. Reprinting Material Locally, with Modifications

One problem with acquiring or reprinting “foreign” material is that such material may not reflect the cultural and scientific environment of the developing country. This is particularly true for popularizations and for school textbooks. With present developments in electronic or “desktop” publishing, however, it may be possible for an author or publisher to provide the text and illustrations for a book in electronic form. These could then be modified to fit the local environment, and printed locally in order to take advantage of lower labor and shipping costs.

6. Local Authorship and Publication

As a developing country evolves into a developed country, the ultimate goal might be to produce all educational material locally. During the transitional phase, this is probably feasible only for standard textbooks. The few potential authors of such books are usually overloaded with the task of developing the local astronomy education system, and local publishers are reluctant to produce books for a limited market.

Discussion

C. Harper: *Modern astronomy is derived from the astronomy that developed in western Europe. It will be a great loss if the alternate astronomies that arose elsewhere round the globe disappear.*

The developing and the developed countries could do much more to recover and preserve the original native astronomies that emerged in their own regions. For instance, teachers of astronomy in New Zealand have opportunities to draw upon the rich heritage of the astronomical knowledge of the Maori. The cultural needs of individual countries can be served by incorporating regional native astronomies in introductory astronomy courses.

P.W. Hill: *Visiting lectures might be obtained at no cost by countries where stopovers are permitted on major air routes. For instance, British astronomers using the Anglo-Australian Telescope might be persuaded to visit Kuala Lumpur.*

J. Fierro: *It would be highly desirable for Paraguayan astronomy textbooks (at all levels) to circulate throughout Latin America.*

P. Sakimoto: *There is room for a two-way street here. Not only can the developed nations provide technical assistance for developing astronomy in other nations around the world, but also astronomers in those nations can assist us in gathering information about astronomy around the world. Many colleges and universities in the U.S. are struggling to diversify the cultural and intellectual content of their curricula beyond that of the Western world. Perhaps some body — the IAU or the Astronomical Society of the Pacific — could collect and produce an information packet on astronomy (past and present) around the world. This would be quite valuable to American educators.*

B.G. Sidharth: *The idea of centers of excellence in developing countries, catering to a wider group of neighboring countries, if necessary with international funding, makes good sense, a) logistically and b) because of the fact that these countries have comparable levels of expertise/training and similar problems. An example of this could be the Inter-University Centre at Poona (Pune), India.*

M. Gerbaldi: *Every 3 years, IAU Commission 46 publishes since 1970 the Astronomy Educational Material Part C, a list of most of the educational material (books, visual aids, etc.) published at any level, in all languages except the English language and the Slavic languages. In this booklet, published as a special issue of the Commission 46 Newsletter, you can find several books published in developing countries.*

G. Vicino: *I propose that the IAU should recommend to its member countries that astronomy should be taught in secondary school, and that the IAU should establish an Education Office on an experimental basis. Uruguay would be willing to host such an office.*

B.W. Jones: *Open-type⁴ learning institutions exist in several developing countries (India, Pakistan, Iran, Thailand, etc.) and are already teaching science subjects in a cost-effective way. I don't think that any are teaching astronomy. However, if astronomers in such countries could contact their local open-type institutions, then perhaps astronomy courses could be offered, in a cost-effective way. Contact me (Dr. Barrie W. Jones, Physics Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, United Kingdom) for details of your local open-type institution if you do not know whether such an institution exists and if it would be difficult for you to find out.*

J.V. Narlikar: *With reference to the comments of Dr. Okoye and Dr. Sidharth, the*

⁴Open-type: distance teaching; open entry; part-time; can be subdegree level; tends to be for adults.

Centre in Pune, India, does hope to play a regional role in Afro-Asian countries by promoting interchanges of teachers and students, conducting workshops and schools, organizing joint experimental projects, etc. These aims will be more focused in two to three years as the Centre develops its infrastructure. In the meantime, I am exploring the possibility of assistance from IAU, UNESCO, UNDP, etc., for such programs. The model of the International Centre for Theoretical Physics at Trieste comes to my mind in this context.

D. Brückner: *What I have to say touches on things said by A. Troche-Boggino (from Paraguay) and C. Harper (from New Zealand).*

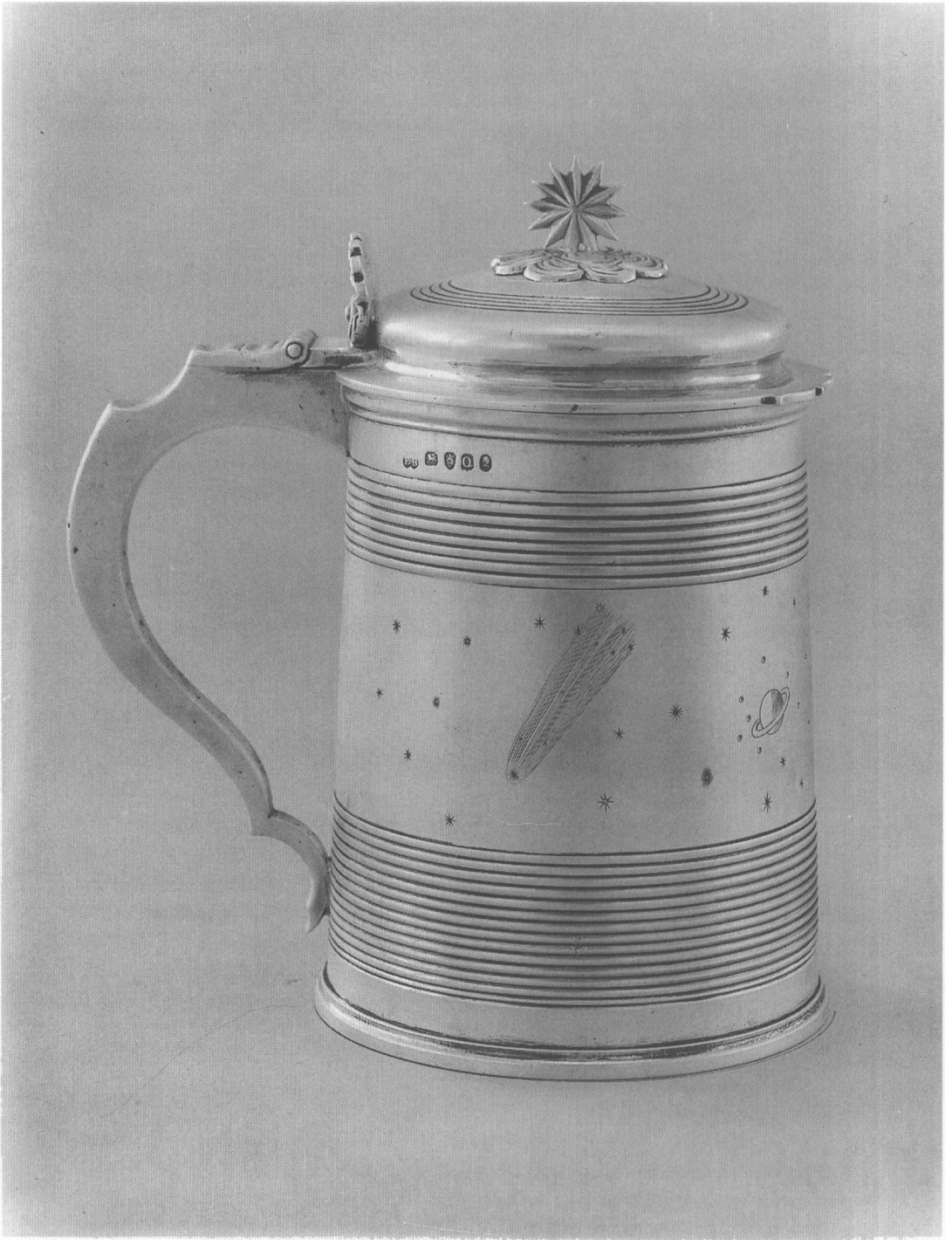
A while ago, my wife took me out and showed me the Milky Way, which I hadn't seen in a while, and pointed out where its center lay, the direction the sun is traveling in, and the direction away from the center. I was powerfully touched by this experience, and feel it is the type of experience we seldom communicate when we teach. I'd like to suggest that by paying attention to the communication of this aspect of astronomy, especially in the developed world, we may in a simple way lay seeds for profound shifts in the awareness of what it means to be a vulnerable human being on the face of our Earth, a situation we all share, no matter how well-off we are materially. I believe that facilitating such shifts in awareness may be a most effective way open to us for influencing the way human beings relate to their fellow human beings elsewhere, something that lies at the root of the problems we are discussing here.

M.L. Aguilar: *There are two problems:*

- 1. The international institutions have to learn how to teach isolated astronomers (in developing countries) to study their local problems and how they can organize and plan. There are always limitations in resources — money and instruments — but the situation of the low organizational capacity is also severe.*
- 2. Scientists from the developing countries sometimes obtain the highest level degrees (Ph.D., etc.) with funds from their countries, but then travel to the major countries and forget their origins. I think the international scientific institutions have to stress to them that they should help their own countries develop.*

C. Iwaniszewska: *There exists a group for a part of the world, the Working Group for Astronomy Education for South-East Asia. S. Isobe is the chairman, M. Othman is a member, and there are also delegates from Australia, Indonesia, etc. Would it not be a good idea to have such groups for the other parts of the world?*

S. Torres-Peimbert: *The needs of the developing countries are so great! Perhaps we could start in a small way by "twinning" institutions in the developing countries with willing institutions in more developed countries.*



Silver tankard, by Rebecca Emes and Edward Barnard I. Clark Art Institute, Williamstown. Further information on page 433.