

leans on somewhat more than 600 citations for its theoretical and empirical support, about two-thirds of them from the 1970s. About 10% of the sources are unpublished. (One passage of importance is even based upon an unpublished study as reported in a second unpublished study [page 194].) At one point in the book it is noted that doctoral dissertations 'fade quickly into a deserved obscurity' (pages 29–30); would that this insight could have been heeded!

In conclusion, this book contains much good and otherwise well-meaning hortatory (although often unsubstantiated) advice. The models and suggestions presented may well—as the Authors hope—stimulate valuable research into environmental attitudes and behaviours, and such research would have both practical and theoretical significance. Indeed, at one point it is mentioned that ignorance is rampant in social psychology (page 148). On the other hand, I simply cannot believe that field of endeavour is in such an early stage of development, lacks such rigour, and is in such a state of disarray, as this book would seem to suggest.

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The Biosphere, by VLADIMIR I. VERNADSKY. (An abridged version based on the French edition of 1929.) Synergetic Press, Inc., Post Office Box 689, Oracle, Arizona 85623, USA; 24 Old Gloucester Street, London WC1 3AL, England, UK: vi + 82 pp., portrait, 20 x 14 x 0.5 cm, stiff paper cover, £3.95 (US \$5.95), 1986.

In 1926, a book entitled in Russian *Biosfera* was published in Leningrad by the 63-years-old Russian natural scientist, mineralogist, and geochemist, Vladimir Ivanovich Vernadsky, a distinguished and internationally respected Academician. This was the first scientific monograph entitled *The Biosphere*.

Born in St Petersburg on 12 March 1863, in a liberal learned family, Vladimir I. Vernadsky died in Moscow on 6 January 1945. Seven months later, on 6 August 1945, on the day of the atomic bombing of Hiroshima, Vernadsky's obituary was read at the French Académie des Sciences in Paris by the mineralogist Charles Mauguin. Vernadsky was well known in Paris, where he spent many of his working years. *The Biosphere* was published after his longest stay in France, from July 1922 to December 1925. He was never so involved in the English-speaking world.

The Biosphere was reissued in Moscow in 1967. Since the 1970s, with their rising tide of environmental concern, Vernadsky's name has been practically a 'household word' of globally-minded ecologists in the Soviet Union (see Kendall E. Bailes, 'Science, Philosophy and Politics in Soviet Union: The Case of Vladimir Vernadskii', *Russian Review*, 40, pp. 278–99, 1981).

The booklet published by Synergetic Press is in fact a very abridged English language translation based approximately on the second and more widely disseminated French edition: *La Biosphère* (Librairie Félix Alcan, 'Nouvelle collection scientifique', Paris, France: xii + 232 pp., 1929).

Vernadsky's *The Biosphere*, published for the first time in the Anglo-Saxon world* by Synergetic Press, is *not* the

much-needed academic edition, and indeed seems to me misleading. Part I, 'The Biosphere in the Cosmos' has here 10 'chapters' and 37 pages, whereas the 1929 edition contains 67 sections and 92 pages. Part II, 'The Domain of Life' has here 7 'chapters' and 29 pages, whereas the 1929 edition contains 92 sections and 108 pages. The appendix 'Living Matter and the Evolution of Species' (of 1928) has 23 pages in the French edition and here only 10 pages. The difference is important but never explained.

The preface of the 1926 Russian edition (not translated here) indicated that the two essays which form the volume are independent but related by the same approach to life as a whole and as a planetary geological phenomenon. This view, wrote the Author, was elaborated from biogeochemical studies since 1917.

The preface to the French edition (not translated) was more historically detailed than the present account. From 1922 to 1928, the Author had published many Biosphere studies in the *Revue Générale des Sciences*. Comparatively to the original Russian text, the French edition of 1929 was revised and in some parts remodelled. It should be mentioned that *The Biosphere* was presented as a follow-up of *La Géochimie* (Librairie Félix Alcan, Paris, France: iii + 407 pp., 1924), published previously in the same collection directed by the mathematician Emile Borel. Vernadsky's *Geochemistry* (never translated into English) was his lectures given in 1922–23 as a professor at La Sorbonne. Vernadsky's book on the biogeochemical cycles of The Biosphere was translated into Russian in 1927 (a second edition appeared in 1934), into German in 1930 (*The Biosphere* was translated also in Leipzig in 1930), and into Japanese in 1934. In letters of 1937 to George Sarton, Vernadsky, also active as a historian of science, emphasized the historical material collected in his *Geochemistry* (see S.R. Mikulinsky, 'Sarton and Vernadsky', *Isis*, 75, pp. 56–62, 1984).

It is important to mention that Vernadsky's *The Biosphere* was published after his most creative time in Paris, where he was stimulated by Bergson's *Creative Evolution*. He made acquaintance with Eduard Le Roy, Bergson's successor at the Collège de France, and his close friend Pierre Teilhard de Chardin, then Professor of Geology at the Institut Catholique. Vernadsky admired the overview of the whole Earth as described by E. Suess: 'The importance of life in the structure of the Earth's crust', Vernadsky wrote in *The Biosphere* (p. 44), 'has penetrated only very slowly into the scientific mind. It was as late as 1875 that E. Suess, of Vienna University, introduced the idea of The Biosphere as a special layer of the Earth's crust, a layer permeated by life. He thus gave expression of its presence over the Earth's surface.'

The concept of *Biosphere* was indeed coined by the Austrian geologist Eduard Suess (1831–1914) in the last and most general chapter of his slim 1875 book on the genesis of mountains, *Die Entstehung der Alpen*, where he explained his first geotectonic views that were later developed fully in his multi-volume *Das Antlitz der Erde* (1883–1909). 'Life' was eventually the final chapter of the last (1909) volume of *The Face of the Earth*. Vernadsky was concerned with the relationship of Man, as a living being, and the Earth, with Man's place in The Biosphere, and so was aware long before the UNESCO 1968 'Biosphere Conference' of a *problématique* now called 'Man and the Biosphere'.

Unfortunately, very few historical indications are given in this edition either in the publisher's note or in the preface. Curiously, the 'biographical note' is about the writer of the preface, a professor in Moscow engaged in space medicine and aeronautics, and not about Vernadsky himself! The only relevant reference is R. Balantine's *Ver-*

*David B. Langmuir (Santa Monica, California) sent me recently a draft preface dated 1978 for a proposed project to publish *The Biosphere* in English. Nothing came of it.

nadsky in a translation from the 1979 Russian edition (Mir, Moscow, USSR: 207 pp., 1982). This, however, is more a philosophical than a scientific biography. The only merit of this Synergetic Press publication is to reemphasize the name of this great figure of the history of living Earth sciences, because Vladimir Ivanovich Vernadsky is little known outside of Russian culture.

An unpublished paper of Kenton E. Bailes, on 'Vernadsky and the Biosphere', was prepared in 1978 and intended for publication as an introduction to a translation of Vernadsky's last major work, which was published posthumously in Moscow in 1965. An English-language version, 'The Chemical Structure of the Earth's Biosphere and its Surroundings', was unfortunately never published.

In retrospect, we agree that Vernadsky's theory of The Biosphere did prove to be revolutionary. Linking Life (including microorganisms and civilized Man) and the evolving Earth, his still-little-known work contributed to the development of an ecological world view that is opposed to the Newtonian mechanistic paradigm. Assuredly, the name and the work of Vladimir Ivanovich Vernadsky merit far better consideration in international environmental education than they have received hitherto; but latterly, with the progress of the environmental movement, things seem to be changing.

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Notices

(of books etc. that might otherwise be missed)

Field Manual for Water Quality Monitoring: An Environmental Education Program for Schools, by MARK K. MITCHELL & WILLIAM B. STAPP. Obtainable from Professor William B. Stapp, 2050 Delaware, Ann Arbor, Michigan 48103, USA: 150 pp., 22.8 x 15.2 cm, 70 photographs and charts, paperback US \$6.80 postpaid, orders for 10 or more are available at a 20% discount, 1986

The *Field Manual for Water Quality Monitoring* is a result of extensive work with upper elementary, secondary, and university, pupils and teachers. It combines an instructional model that is learner-centred and interdisciplinary with a Water Quality Index. This Index, developed by the National Sanitation Foundation, comprises nine water-quality parameters: dissolved oxygen, faecal coliform Bacteria, pH, biochemical oxygen demand, temperature, total phosphorus, nitrates, turbidity, and total solids.

Students working together gain skills in water-quality testing, and in analysing the data collected. Students also develop an understanding of water-quality parameters and of water quality in their community.

The Manual also covers benthic macroinvertebrates as biological indicators of water quality, a sample programme format, and examples of computerized graph results of water-quality data.

European Park Rangers and Wardens: Report of a Pilot Training Seminar held at the Peak National Park Centre, Losehill Hall, Castleton, Derbyshire, England, UK: 100 pp., 1986, obtainable at the Centre from Peter Townsend,

Principal, at £3.75 (including postage and packing): add £1.00 for Air Mail elsewhere in Europe or Surface Mail outside Europe.

The report is now available of the papers, discussions, and conclusions, presented at the first Seminar for European Park Rangers and Wardens. The 100-pages' report presents case-studies of the role of rangers in France, Britain, West Germany, Denmark, Holland, and the Republic of Ireland, and includes discussions on the future development of ranger services in Europe. Obtainable against payment (indicated above) from Principal Peter Townsend, Peak National Park Centre, Losehill Hall, Castleton, Derbyshire S30 2WB, England, UK.

Liming Acidic Waters: Environmental and Policy Concerns, being the proceedings of a conference sponsored by the Acid Rain Information Clearinghouse (ARIC), 33 South Washington Street, Rochester, New York 14608, USA: single copy price US \$15.00, postage included.

The edited papers and remarks of twenty-two participants at the conference, held in Albany, New York, in October 1985, provide a comprehensive summary of scientific understanding and policy implications. Included are presentations by William Dickson, Swedish National Environmental Protection Board; Charles T. Driscoll, Syracuse University; Carl L. Schofield, Cornell University; R. Kent Schreiber, US Fish and Wildlife Service; and John M. Wooten, Peabody Holding Company, Inc.

The proceedings have been edited for use by the general reader. Single copy price is 15.00 postage included. Discounts are available for multiple-copy purchases, please inquire of William Wagner, Manager of Communications. To order, send payment in US funds to: ARIC, c/o Center for Environmental Information, Inc., 33 South Washington Street, Rochester, New York 14608, USA.

Switching On to The Environment: The Critical Guide to Environmental Films. *A new publication by the Television Trust for the Environment (TVE)*, £5.95 or US \$9.00, obtainable from TVE Directorate, 46 Charlotte Street, London W1P 1LX, England, UK.

Around the world, leading film-makers have been turning their cameras onto the causes of tropical deforestation, spreading deserts, marine pollution, and other major forms of environmental destruction. *Switching On to The Environment* is the first critical guide to these films.

After a year's systematic search, just over 100 films were chosen from the ca 1000 films viewed. They include some that are works of art and others that are scientifically important but still rarely seen.

The Guide's bias is towards issues where the environmental crisis is most severe. Thus anyone wishing to gain an insight into the causes of famine, catastrophic landslides, flooding, and disasters such as that of Bhopal, will find *Switching On to The Environment* an invaluable resource.

TVE is an editorially independent Trust co-sponsored by the U.N. Environment Programme (UNEP) and Central Independent Television. TVE links the resources and expertise of television and environmental groups to increase TV coverage of resource and development issues, thereby helping to bring vital environmental truths to the attention of the viewing world. Profits from the sale of the Guide will go towards the publication of an updated guide in 1988.