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COMMISSION OF THE EUROPEAN COMMUNITIES

**BIOSYSTEMS MODELING  
A PRELIMINARY BIBLIOGRAPHIC SURVEY**

by

**F. ARGENTESI, G. DI COLA, N. VERHEYDEN**

1973



**Joint Nuclear Research Centre  
Ispra Establishment - Italy  
Department of Engineering  
and  
Scientific Data Processing Centre - CETIS**

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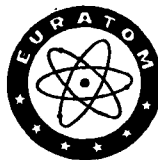
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### **ABSTRACT**

The present bibliographic survey has been made to understand the field of modelformulation for types of systems such as ecosystems, organisms, organs and biochemical systems.

The bibliography contains about **300** references covering the period up to december **1972**.

### **KEYWORDS**

**BIOLOGY**  
**BIOCHEMISTRY**  
**ENVIRONMENT**

Introduction:

The present bibliographic survey has been made to understand the field of model formulation for types of systems such as ecosystems, organisms, organs and biochemical systems.

An attempt has been made to emphasize citations that develop continuous deterministic models such as the mass and energy flow in aquatic systems.

The study of transport of radionuclides and pollutants consequent to the disposal of polluted wastes into our lifecycle is of considerable interest to many investigations.

The literature available in this field is large and scattered covering both theoretical and experimental aspects.

This has prompted the compilation of a bibliography in the hope that it will be useful to other workers in the field.

The bibliography contains about 500 references covering the period up to december 1972.

Though the main bibliographical source was Nuclear Science Abstracts, other scientific journals and reports, dealing with ecology, mathematical biosciences and systemanalysis have also been included.

Although the annotations have been kept to a minimum, an attempt was made to present the articles of particular interest.

The references have been presented subjectwise, the various subjects are as follows:

1. Mathematical modeling in Ecology.
2. Mathematical modeling in Physiology, Biochemistry and Pharmacokinetics.
3. Parameter estimation, Systemidentification and Optimization Techniques.
4. Biosystem Theory.

1. MATHEMATICAL MODELING IN ECOLOGY.

It was the purpose of this collecting to bring out the fact that recently the mathematical role in ecology and the role of ecology in the world today have both received more emphasis.

We present here a sampling of the more important citations of applications of systems ecology techniques to the analysis of radionuclide movement in ecosystems.

Mass-action formulae are suggested as a model of food chain dynamics in ecosystems.

These articles provide an interesting illustration of the behaviour of non-linear ecosystem models.

**\*\* MATHEMATICAL MODELLING IN ECOLOGY \*\***

**A. F. ALIMOV AND G.G. WINBERG**

Biological productivity of two northern lakes.  
VERH. INTERNAT. VEREIN. LIMNOL., 18, 65-70 (1972)

**L. ANTONUCCI**

Modello per il calcolo preliminare della ricettiva ambientale per gli effluenti radioattivi di una centrale elletronucleare ad acqua bollente.

IN:INT. SYMPOSIUM ON RADIOECOLOGY APPLIED TO THE PROTECTION OF man and his environment.

CEC/ROME (1971) NO 21

**L. ARGIERO, A.M. SERRA-GENTILI, AND G. ZOLI**

Modello matematico della diffusione in mare di materiale inquinante e misure sperimentale relative.

IN:INT. SYMPOSIUM ON RADIOECOLOGY APPLIED TO THE PROTECTION OF MAN AND HIS ENVIRONMENT.

CEC/ROME (1971) NO 49

**S. I. AUERBACH, S.V. KAYE, D.J. NELSON, D.E. REICHLER, P.B.**

**DUNAWAY & R.S. BOOTH.**

Understanding the dynamic behaviour of radionuclides released to the environment.

USA/A/CONF. 49/P/085.

IN: CONF-710901-20 (1971)

**S. I. AUERBACH AND D.J. NELSON**

Ecological sciences division annual progress report (1971).

ORNL-4759-ECOLOGICAL SCIENCES DIVISION PUBLICATION N430

**G. BAGLIANO, F.G. GIORCELLI**

Studio sulla correlazione nel tempo tra le radiocontaminazioni in vari anelli della catena alimentare ed il latte.

IN:INT. SYMPOSIUM ON RADIOECOLOGY APPLIED TO THE PROTECTION OF MAN AND HIS ENVIRONMENT.

CEC/ROME (1971) NO 23

**M. BERNHARD**

The utilization of simple models in radioecology

IN:RADIOECOLOGY MARINE

CYCLE DES RADIONUCLEIDES ARTIFICIELS DANS LES CHAINES ALIMENTAIRES MARINES.

ENEA, HAMBOURG (1971)

**H. BEZZEGH-GALANTAI**

Transfer of sr-90 in the chain of the air, rain, water, soil, grass and milk.

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CEC/ROME (1971) NO 54

**R. BITTEL**

Utilisation des informations des recherches relatives aux produits metalliques d'activation pour l'etude de transferts a l'homme de polluants chimiques metalliques ou organometalliques.

IN:INT. SYMPOSIUM ON RADIOECOLOGY APPLIED TO THE PROTECTION OF

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CEC/ROME (1971) NO 35

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Contribution d'un modele previsionnel a l'etablissement de formule  
le rejet d'effluents radioactifs dans les eaux.

IN:INT. SYMPOSIUM ON RADIOECOLOGY APPLIED TO THE PROTECTION OF  
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CEC/ROME (1971) NO 50

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Etude du comportement du radiocobalt dans un ecosysteme artificiel  
simple irrigue par submersion.  
CEA (1969)

R. BITTEL, M. MERLINI, C. HYTTENAERE AND O. RAVERA.

Etude des parametres du transfert du radiocobalt dans les  
ecosystemes continentaux aquatiques et irrigues.  
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2. MATHEMATICAL MODELING IN PHYSIOLOGY,  
BIOCHEMISTRY AND PHARMACOKINETICS.

Modeling is employed as an aid in the effort to resolve the structure of the system, subject to the constraints imposed by the observations, by known physiological, chemical, or physical facts and by ad hoc postulates introduced by the investigator.

A number of excellent papers have been produced on models in drugkinetics.

Most of work has been based on theoretic works developed by (communication) engineers.

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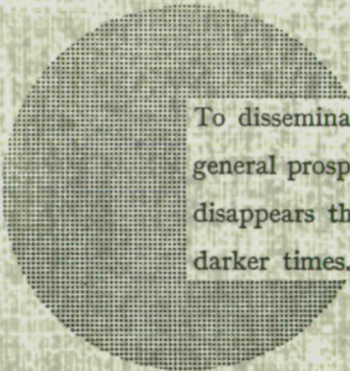
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Alfred Nobel

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