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MICROBIOLOGICAL METHODS FOR MARINE POLLUTION MONITORING

(WHO/UNEP Joint Project, MED POL Phase II)

Summary Report on the Fifth Training Course and Intercalibration Exercise

Athens, 2–7 November 1992

ABSTRACT

The course was organized in collaboration with the Department of Applied Microbiology and Immunology of the School of Hygiene, Athens, Greece, and attended by 14 microbiologists from seven Mediterranean countries. Participants determined concentrations of the main bacterial indicators, as well as *Salmonella* and *Staphylococcus* in seawater samples. Results showed variations both between methods used and individual readings, and recommendations for further studies on methods were made.

TARGET 20

WATER QUALITY

By the year 2000, all people should have access to adequate supplies of safe drinking-water, and the pollution of groundwater sources, rivers, lakes and seas should no longer pose a threat to health.

Keywords

MICROBIOLOGICAL TECHNICS
SEAWATER – standards
WATER POLLUTION – analysis
EDUCATION

Introduction

Fourteen participants from seven Mediterranean countries attended this course and exercise. Most of them were microbiologists engaged in monitoring the microbiological quality of coastal marine recreational and shellfish waters. Lectures and laboratory supervision were provided by the host Institute, the Department of Applied Mircobiology and Immunology of the School of Hygiene, Athens, Greece.

Under the terms of the 1976 Convention for the Protection of the Mediterranean Sea against Pollution and the 1980 Protocol for the Protection of the Mediterranean Sea against Pollution from Land-based Sources, Contracting Parties have undertaken to establish a marine pollution monitoring system for the Mediterranean Sea area, and to systematically assess, as far as possible, the levels of pollution along their coasts.

To facilitate the achievement of these objectives, the Long-term Programme of Pollution Monitoring and Research in the Mediterranean Sea (MED POL Phase II) has been a decisive factor in the development of national pollution monitoring programmes in Mediterranean countries. All these programmes include the determination of bacterial concentrations in coastal recreational areas and, where applicable, shellfish-growing areas. As a result, several existing microbiological laboratories have been upgraded and new ones established. This has resulted in the need for more trained personnel, as well as for harmonization of methodologies between the different institutions in the various countries to ensure comparable results and to enable regular region-wide assessments to be performed.

This course and exercise, the fifth in the series, was convened jointly by WHO and the United Nations Environment Programme (UNEP) in collaboration with the School of Hygiene, Athens, Greece. It took place in English and had the following objectives:

- to further train microbiological laboratory personnel from Mediterranean institutions participating in the MED POL Phase II programme by familiarizing them with jointly agreed methods for determination of the main bacterial parameters in seawater and shellfish;
- to contribute to the building-up of a nucleus of trained personnel in Mediterranean countries capable of organizing microbiological courses at national or local level;
- to promote contacts between scientists from different laboratories through discussion on mutual problems in the application of the relevant microbiological techniques;
- to improve comparability of results obtained in the microbiological component of the MED POL programme through intercalibration of data;
- to make recommendations for future training courses.

Results

Participants determined the concentrations of four major bacterial indicator organisms (total coliforms, faecal coliforms, *Escherichia coli* and enterococci) in prepared samples of natural seawater, in the case of the first three using both the membrane filtration culture (MF) method and the most probable number (MPN) method. In the case of enterococci, only the MF method was used. They also determined concentrations of *Staphylococcus aureus* in seawater samples, using both MF and MPN methods, and isolated *Salmonella* and *Campylobacter*, also from seawater samples. Lectures, which were mainly delivered by members of the professional staff of the host institute, covered the following topics:

- microbiological monitoring within the framework of the MED POL programme;
- introduction to microbiological methodology for seawater examination;
- quality control and quality assurance;
- health risks from seawater pollution;
- pollution, eutrophication and shellfish;
- microbioligical sampling of seawater;
- pathogenic organisms in seawater and shellfish;
- statistical methodology; and
- statistical evaluation of results.

The results obtained during the laboratory exercise showed a range of variation, both between individual participants and between the two methods (MF and MPN) applied by each participant for the same bacterial parameter. Counts obtained by the MPN method were invariably higher than those obtained by the MF method. The results obtained by four of the participants were considered apart, owing to the relative inexperience of the individuals in question in a number of the techniques used. However, there was a variation in most of the results obtained even among the rest of the participants, most of whom had extensive experience in the microbiological analysis of seawater. This variability had been obtained, in various degrees, in all the exercises organized in the past. It was below the general average in the present course, probably through efforts made by the organizers to reduce sample heterogeneity to the minimum possible.

Recommendations

Participants were issued with a questionnaire requesting information on what percentage of the course

work provided them with new knowledge, as well as other comments on the course in general and suggestions for future courses. For most of the participants, approximately 50% of the course programme provided them with new knowledge. This was expected, as the component dealing with bacterial indicators (as distinct from pathogens) was designed to serve as a comparability exercise.

No formal recommendations were made by participants as a whole. However, both during group discussions and in reply to the appropriate parts of the questionnaire, most of them proposed that such courses be held as frequently as possible and that individual participants have the opportunity to attend more than one course. Opinion was divided as to the proposed relative weight to be placed on the lecturing and practical components of future courses, as well as on specific topics to be included in each. The general feeling among the more experienced participants was, however, that emphasis be accorded to techniques, such as pathogen determinations in seawater and microbiological analysis of sand, which were not routinely used at the present time, but which were gradually acquiring importance.