CONTENTS

NOTE TO THE READER ............................................... 7

LIST OF PARTICIPANTS ............................................. 9

PREAMBLE ...................................................................... 15

  Background .......................................................... 15
  Objective and Scope ................................................ 15
  Selection of Topics for Monographs .............................. 16
  Data for Monographs .............................................. 16
  The Working Group ............................................... 17
  Working Procedures ............................................... 17
  Exposure Data ....................................................... 18
  Biological Data Relevant to the Evaluation of Carcinogenicity to Humans .............................. 19
  Evidence for Carcinogenicity in Experimental Animals ........................................ 20
  Other Relevant Data in Experimental Systems and Humans ........................................ 22
  Evidence for Carcinogenicity in Humans .......................... 23
  Summary of Data Reported ....................................... 26
  Evaluation .......................................................... 27
  References .................................................................. 30

ALCOHOL DRINKING

  1. General Introduction: Alcohol Drinking and the Public Health 35
  2. Worldwide Production and Use of Alcoholic Beverages 41
     2.1 Worldwide production .......................................... 41
        (a) Kinds of alcoholic beverages .................................. 41
        (b) Production methods .......................................... 42
        (c) Production volumes ......................................... 45
CONTENTS

2.2 International trade ................................................. 51
   (a) Beer .................................................. 51
   (b) Wine ................................................. 52
   (c) Spirits ................................................ 52

2.3 Trends in consumption ....................................... 54
   (a) Total consumption per head ............................. 55
   (b) Beer consumption ...................................... 55
   (c) Wine consumption ...................................... 64
   (d) Consumption of spirits .................................. 64

2.4 Drinking patterns ........................................... 66

3. Chemical Composition of Alcoholic Beverages, Additives and Contaminants ................................................... 71
   3.1 General aspects ............................................. 71
   3.2 Compounds in beer .......................................... 73
   3.3 Compounds in wine ........................................ 79
   3.4 Compounds in spirits ........................................ 86
   3.5 Additives and contaminants ................................... 93

4. Biological Data Relevant to the Evaluation of Carcinogenic Risk to Humans ................................................................. 101
   4.1 Carcinogenicity studies in animals ............................. 101
      (a) Ethanol and alcoholic beverages .......................... 101
      (b) Modifying effects of ethanol on the activity of known carcinogens ........................................ 105
      (c) Carcinogenicity of metabolites .................................. 115
   4.2 Other relevant data from experimental systems .................. 115
      (a) Absorption, distribution and excretion .................... 115
      (b) Metabolism ........................................... 116
      (c) Modifying effects of ethanol on the metabolism of xenobiotics ........................................ 120
      (d) Modifying effects of ethanol on intermediary metabolism .... 121
      (e) Major toxic effects ........................................ 122
      (f) Effects on reproduction and prenatal toxicity ................... 126
      (g) Genetic and related effects ................................... 135
   4.3 Other relevant data in humans ................................ 142
      (a) Absorption, distribution and excretion .................... 142
NOTE TO THE READER

The term 'carcinogenic risk' in the IARC Monographs series is taken to mean the probability that exposure to an agent will lead to cancer in humans.

Inclusion of an agent in the Monographs does not imply that it is a carcinogen, only that the published data have been examined. Equally, the fact that an agent has not yet been evaluated in a monograph does not mean that it is not carcinogenic.

The evaluations of carcinogenic risk are made by international working groups of independent scientists and are qualitative in nature. No recommendation is given for regulation or legislation.

 Anyone who is aware of published data that may alter the evaluation of the carcinogenic risk of an agent to humans is encouraged to make this information available to the Unit of Carcinogen Identification and Evaluation, International Agency for Research on Cancer, 150 cours Albert Thomas, 69372 Lyon Cedex 08, France, in order that the agent may be considered for re-evaluation by a future Working Group.

Although every effort is made to prepare the monographs as accurately as possible, mistakes may occur. Readers are requested to communicate any errors to the Unit of Carcinogen Identification and Evaluation, so that corrections can be reported in future volumes.