

*This report contains the collective views of an international group of experts and does not necessarily represent the decisions or the stated policy of the World Health Organization*

# The Leishmaniases

---

Report of a WHO  
Expert Committee

World Health Organization  
Technical Report Series  
701

---



World Health Organization, Geneva 1984

ISBN 92 4 120701 9

© World Health Organization 1984

Publications of the World Health Organization enjoy copyright protection in accordance with the provisions of Protocol 2 of the Universal Copyright Convention. For rights of reproduction or translation of WHO publications, in part or *in toto*, application should be made to the Office of Publications, World Health Organization, Geneva, Switzerland. The World Health Organization welcomes such applications.

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

PRINTED IN SWITZERLAND

83/5943 – Schüler SA – 6000

## CONTENTS

	Page
1. Introduction.....	9
2. The leishmanias in man.....	10
2.1 Clinical forms.....	10
2.1.1 Visceral leishmaniasis (VL).....	10
2.1.2 Cutaneous leishmaniasis (CL).....	11
2.1.3 Mucocutaneous leishmaniasis (MCL).....	14
2.2 Pathology.....	14
2.2.1 Visceral leishmaniasis.....	16
2.2.2 Post-kala azar dermal leishmaniasis.....	17
2.2.3 Uncomplicated cutaneous leishmaniasis.....	17
2.2.4 Diffuse cutaneous leishmaniasis.....	18
2.2.5 Leishmaniasis recidivans.....	18
2.2.6 Mucocutaneous leishmaniasis of the New World.....	18
2.3 Host-parasite relationship.....	19
2.3.1 Immune response.....	20
2.3.2 Biological cure and immunity.....	23
2.3.3 Immunity in animal models.....	23
3. Geographical distribution of foci of the leishmanias.....	23
3.1 Distribution of the diseases.....	23
3.2 Distribution of potential vectors.....	50
3.2.1 Palearctic, Aethiopian, and Oriental regions (Old World).....	51
3.2.2 Nearctic and Neotropical regions (New World).....	52
4. Public health aspects.....	53
4.1 African Region.....	54
4.2 American Region.....	54
4.3 South-East Asia Region.....	56
4.4 European Region.....	57
4.5 Eastern Mediterranean Region.....	59
4.6 Western Pacific Region.....	60
5. The parasites.....	61
5.1 Taxonomy.....	61
5.2 Identification methods and criteria.....	63
5.2.1 Standards.....	64
5.2.2 Identification services.....	65
5.2.3 Cryobanks.....	65
6. The reservoir animals.....	66
6.1 Definition.....	66
6.2 Incrimination of reservoir hosts.....	66
6.3 Reservoir hosts of <i>Leishmania</i> pathogenic to man.....	67
6.4 Host-parasite relationship in reservoir hosts.....	70
7. The vectors.....	70
7.1 Taxonomy.....	70
7.2 Identification methods and criteria.....	71

7.3	Biology.....	73
7.3.1	Eggs, larvae, and pupae.....	73
7.3.2	Reproduction.....	74
7.3.3	Adult behaviour.....	75
7.4	Population dynamics.....	77
7.5	<i>Leishmania</i> in the sandfly.....	77
7.6	Vectorial ability and incrimination.....	79
8.	Epidemiology.....	80
8.1	Qualitative epidemiology.....	80
8.1.1	Visceral leishmaniasis.....	80
8.1.2	Old World cutaneous leishmaniasis.....	80
8.1.3	New World cutaneous and mucocutaneous leishmaniasis.....	81
8.2	Quantitative epidemiology.....	81
8.3	Transmission seasons.....	82
8.4	Transmission sites.....	82
8.5	Factors determining transmission rates.....	84
9.	Surveillance methods.....	85
9.1	Analysis of information.....	85
9.2	Disease prevalence and incidence: active and passive case-detection...	85
9.2.1	Defining the population.....	85
9.2.2	Case-finding.....	86
9.2.3	The leishmanin (Montenegro) test.....	88
9.3	Vectors: sampling methods.....	89
9.3.1	Resting- and breeding-site collections.....	89
9.3.2	Sticky traps.....	90
9.3.3	Mechanical light-traps.....	91
9.3.4	Human and animal baits.....	91
9.3.5	Other sampling methods.....	92
9.3.6	Blood-meal determinations.....	92
9.3.7	Choice of methods.....	93
9.4	Animal reservoirs: sampling and identification.....	93
9.4.1	Sampling domestic animals.....	93
9.4.2	Sampling small and medium-sized wild mammals.....	94
9.4.3	Sampling untrappable or large mammals.....	94
9.4.4	Capture and release studies.....	94
9.4.5	Identification.....	94
9.4.6	Conservation.....	95
9.5	Parasite isolation and preservation.....	96
9.5.1	Choice of isolation method.....	96
9.5.2	Choice of culture media.....	96
9.5.3	Isolation from man.....	97
9.5.4	Isolation from animals.....	97
9.5.5	Isolation from sandflies.....	97
9.5.6	Preservation.....	97
9.6	Data on the environment.....	98
10.	Control methods.....	99
10.1	Diagnosis and treatment.....	99

10.1.1 Visceral leishmaniasis.....	99
10.1.2 Cutaneous leishmaniasis.....	105
10.1.3 Mucocutaneous leishmaniasis.....	108
10.2 Sandfly control.....	109
10.2.1 Measures for reducing man-fly contact.....	109
10.2.2 Measures for reducing sandfly populations.....	110
10.3 Reservoir control.....	111
10.3.1 Old World sylvatic reservoirs.....	112
10.3.2 New World sylvatic reservoirs.....	113
10.3.3 Domestic reservoirs.....	113
10.3.4 Man as the reservoir.....	114
10.4 Control by immunization.....	114
 11. Strategies for control.....	116
11.1 Control strategies for the various forms of human leishmaniasis.....	116
11.2 Development projects and tourism.....	117
11.3 Emergency measures.....	117
11.4 Primary health care approaches.....	118
11.5 Evaluation.....	119
 12. Training and research.....	119
12.1 Training.....	119
12.2 Research.....	120
 13. Recommendations.....	122
Acknowledgements.....	124
References.....	124
Annex 1. Labelling of <i>Leishmania</i> isolates, identification centres, and sources of standards.....	125
Annex 2. Ball-point pen technique for measuring induration of skin-test reactions.....	132
Annex 3. Methods for the isolation and cryopreservation of <i>Leishmania</i> .....	133
Annex 4. Procedures for splenic aspiration and grading of parasites.....	138
Annex 5. Cost comparison of four insecticides as applied in residual spraying for malaria control.....	140

## ABBREVIATIONS

The following abbreviations are often used in this report for the various forms of leishmaniasis:

ACL	— anthroponotic cutaneous leishmaniasis
CL	— cutaneous leishmaniasis
DCL	— diffuse cutaneous leishmaniasis
LR	— leishmaniasis recidivans
MCL	— mucocutaneous leishmaniasis
NWCL	— New World cutaneous leishmaniasis
OWCL	— Old World cutaneous leishmaniasis
PKDL	— post-kala azar dermal leishmaniasis
VL	— visceral leishmaniasis
ZCL	— zoonotic cutaneous leishmaniasis

## WHO EXPERT COMMITTEE ON THE LEISHMANIASES

Geneva, 10-16 November 1982

### Members

- Dr T. Ayele, Director, Institute of Pathobiology, Addis Ababa University, Addis Ababa, Ethiopia  
Dr R. Behin, Senior Research Associate, WHO Immunology Research and Training Centre, Institute of Biochemistry, University of Lausanne, Epalinges, Switzerland  
Professor C.J. Marinkelle, Department of Microbiology, Universidad de los Andes, Bogotá, Colombia (*Co-Rapporteur*)  
Dr. M. Restrepo, Head, Public Health Laboratory and Biological Research Corporation, Medellín, Colombia  
Professor J.A. Rioux, Laboratoire d'Ecologie médicale et de Pathologie parasitaire, Faculty of Medicine, Montpellier, France  
Professor V.M. Safjanova, Head, Laboratory of Protozoal Infections with Natural Focality, The Gamaleja Institute of Epidemiology and Microbiology, Academy of Medical Sciences of the USSR, Moscow, USSR (*Vice-Chairman*)  
Dr R.N. Sampaio, Professor of Dermatology, University of Brasilia, Brasilia, Brazil  
Professor R.K. Sanyal, Retreat II, D-891 New Friends' Colony, New Delhi, India  
Dr L.F. Schnur, Department of Parasitology, Kuviv Centre for the Study of Infectious and Tropical Diseases, Hebrew University, Hadassah Medical School, Jerusalem, Israel (*Chairman*)  
Dr J.J. Shaw, Assistant Director, Wellcome Parasitology Unit, Evandro Chagas Institute, Belém, Brazil  
Dr D.G. Young, Associate Research Scientist, Department of Entomology, University of Florida, Gainesville, FL, USA (*Co-Rapporteur*)  
Dr A.R. Zahar, Chemin des Coudriers 48, Geneva, Switzerland

### Secretariat

- Dr R.W. Ashford, Department of Parasitology, School of Tropical Medicine, Liverpool, England (*Temporary Adviser*)  
Dr A.D.M. Bryceson, Hospital for Tropical Diseases, London, England (*Temporary Adviser*)  
Dr R. Killick-Kendrick, MRC External Scientific Staff, Imperial College, Ascot, England (*Temporary Adviser*)  
Dr P. de Raadt, Chief Medical Officer, Trypanosomiases and Leishmaniases, Parasitic Diseases Programme, WHO, Geneva, Switzerland (*Secretary*)

*WORLD HEALTH ORGANIZATION  
TECHNICAL REPORT SERIES*

No. 701

**THE LEISHMANIASES**

预览已结束，完整报告链接

<https://www.yunbaogao.cn/report/index/report/701>