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**GUINEA WORM ERADICATION  
A SELECTED BIBLIOGRAPHY**

**L'ERADICATION DU VER DE GUINEE  
UNE BIBLIOGRAPHIE SELECTIVE**

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**Dracunculiasis Operations Research Network (DORN)**

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CELL OF THE COMMUNITY WATER SUPPLY  
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Tel. (070) 814971 ext. 147142  
ISBN 10873  
LO: 245.3 9260

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ISBN 0 9510869 7 9

## PREFACE

When the Dracunculiasis Operations Research Network (DORN) was first set up, at the Third African Regional Conference on Dracunculiasis in Yamoussoukro, Ivory Coast, in March 1990, concern was expressed that it should help in the dissemination of research findings relevant to guinea worm eradication efforts. A particular preoccupation was the weak communication between the anglophone and francophone scientific communities, and the difficulty of access for many workers in the field to the specialised journals in which many relevant publications have appeared.

The idea for this booklet arose from discussions about how these problems could best be overcome. We made a selection of some of the most useful references on the subject, and compiled abstracts of them. Note that these abstracts have been written to concentrate on the aspects most relevant to eradication; the epidemiology of the disease, preventive interventions, human factors and so on. These were then translated from English into French or *vice-versa*, as appropriate.

The Bureau of Hygiene and Tropical Diseases agreed to assist with the production, and was able to make an additional contribution; the titles of all the articles on dracunculiasis which have been included in the *Tropical Diseases Bulletin* over the last nine years, and English abstracts of many of them. Unfortunately, it was not possible to translate these also into French.

A number of people have contributed towards this booklet. The original selection of articles was suggested by Ahmed Tayeh, and reviewed and amended by Valerie Curtis and Dr Philippe Ranque. The abstracts were written by Dr Obioma Nwaorgu and Dr Pascal Ortiz, and the translations were by Sanders Aitchedji and by Pascal Ortiz. Dr Ortiz also helped with final editing and compiled the subject index. Administrative support was provided by Kathy O'Neill. Dr Carolyn Brown organised the very substantial contribution of the Bureau, without which this booklet would not be in your hands today. On behalf of the DORN, my thanks and appreciation go to all of them.

**Sandy Cairncross**  
Co-Chair, DORN

## PREFACE

Le Réseau de Recherche Operationelle sur la Dracunculose (Dracunculiasis Operations Research Network, DORN) établi lors de la troisième Conférence Régionale sur la dracunculose, à Yamoussoukro, Côte d'Ivoire, en Mars 1990 a cherché depuis sa création à faciliter la dissémination des résultats de la recherche contribuant aux efforts d'éradication du ver de Guinée. La communication limitée entre les communautés scientifiques francophone et anglophone, et la difficulté d'accès à la littérature spécialisée pour les travailleurs de terrain, constituaient des préoccupations particulières.

L'idée de cette brochure est née des discussions pour résoudre ces problèmes. Nous avons fait une sélection des articles les plus utiles et en avons fait des résumés. La sélection des articles et la rédaction des résumés cherchent à mettre en valeur les aspects les plus pertinents à l'éradication, à savoir l'épidémiologie de la maladie, les interventions preventives, le comportement humain etc. Ensuite, les résumés ont été traduits de l'anglais en français ou *vice-versa*.

Le Bureau d'Hygiène et des Maladies Tropicales nous a aidé à produire la brochure, et nous a aussi procuré aussi les titres de tous les articles sur la dracunculose qui ont été catalogués dans le *Tropical Diseases Bulletin* les neuf dernières années, ainsi que les résumés de la plupart en anglais. Il n'était malheureusement pas possible de les faire traduire en français.

Plusieurs personnes ont contribué à cette brochure. La sélection originale des articles a été suggérée par Ahmed Tayeh, et révisée et amendée par Valerie Curtis et le Dr Phillippe Ranque. Les Drs. Obioma Nwaorgu et Pascal Ortiz ont rédigé les résumés et Sanders Aitchedji et Dr Ortiz les ont traduits. Dr Ortiz a également effectué les corrections finales et compilé l'index par sujets. Kathy O'Neill a fourni l'appui administratif. Dr Carolyn Brown a organisé la contribution importante du Bureau, sans laquelle cette brochure ne serait pas dans vos mains aujourd'hui. Ils méritent tous mes remerciements ainsi que ceux de tous les membres du DORN.

**Sandy Cairncross**  
Co-Président du DORN

# SELECTED BIBLIOGRAPHY OF ARTICLES RELEVANT TO GUINEA WORM ERADICATION

## GENERAL

1. MULLER, R. *Dracunculus* and dracunculiasis. *Advances in Parasitology*, 1971, **9**, 73–151.

## EPIDEMIOLOGY

2. MULLER, R. Guinea worm disease: epidemiology, control and treatment. *Bulletin of the World Health Organization*, 1979, **57**, (5), 683–689.
3. HOPKINS, D.R. Dracunculiasis eradication: a mid-Decade status report. *American Journal of Tropical Medicine and Hygiene*, 1987, **37**, (1), 115–118.
4. WATTS, S.J. The comparative study of patterns of guinea worm prevalence as a guide to control strategies. *Social Science and Medicine*, 1986, **23**, (10), 975–982.
5. NWOSU, A.B.C., IFEZULIKE, E.O., ANYA, A.O. Endemic dracontiasis in Anambra State of Nigeria: geographic distribution, clinical features, epidemiology and socio-economic impact of the disease. *Annals of Medical Parasitology*, 1982, **76**, 187–200.
6. STEIB, K., MAYER, P. Epidemiology and vector control of *Dracunculus medinensis* in northwest Burkina Faso, West Africa. *Annals of Tropical Medicine and Parasitology*, 1988, **82**, (2), 189–199.
7. PETIT, M.M., DENIAU, M., TOURTE-SCHAEFER, C., AMEGBO, K. Etude épidémiologique longitudinale dans le sud du Togo. *Bulletin de la Societe de Pathologie Exotique et Filiales*, 1988, **82**, 520–530.
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9. GBARY, A.R., GUIGEMDE, T.R., OUEDRAOGO, J.B. La dracunculose, un fléau éradiqué dans trois villages du Burkina Faso par l'éducation sanitaire. *Bulletin de la Societe de Pathologie Exotique*, 1987, **80**, 390–395.

## SOCIO-ECONOMIC IMPACT OF THE DISEASE

10. BELCHER, D.W., WURAPA, F.K., WARD, W.B., LOURIE, I.M. Guinea worm in Southern Ghana; its epidemiology and impact on agricultural productivity. *American Journal of Tropical Medicine and Hygiene*, 1975, **21**, (1), 243–249.
11. BRIEGER, W.R., WATTS, S., YACOOB, M. Guinea worm, maternal morbidity and child health. *Journal of Tropical Paediatrics*, 1989, **35**, 285–288.

## PREVENTION AND CONTROL

## Water Supply

12. CAIRNCROSS, S., TAYEH, A. **Guinea worm and water supply in Kordofan, Sudan.** *Journal of the Institution of Water and Environmental Management*, 1988, 2, (3), 268-274.
13. HUTTLY, S.R.A., BLUM, D., KIRKWOOD, B.R., EMEH, R.N, OKEKE, N., AJALA, M., SMITH, G.S., CARSON, C.D., DOSUNMU-OGUNBI, O., FEACHEM, R.G. **The Imo State (Nigeria) drinking water supply and sanitation project, 2. Impact on dracunculiasis, diarrhoea and nutritional status.** *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1990, 84, 316-321.
14. EDUNGBOLA, L.D, WATTS, S.T., ALABI, T.O., BELLO, A.G. **The impact of a UNICEF-assisted rural water project on the prevalence of guinea worm disease in Asa, Kwara State, Nigeria.** *American Journal of Tropical Medicine and Hygiene*, 1988, 39,(1), 79-85.
15. YACOOB, M., BRIEGER, W., WATTS, S. **Primary health care; why has water been neglected?** *Health Policy and Planning* 1989, 4, (4), 328-333.

## Filters

16. BRIEGER, W.R., RAMAKRISHNA, J., ADENIYI, J.D. **Community response to social marketing: Filters for guinea worm control.** *International Quarterly of Community Health Education* 1989-1990, 10, 3-17.

## Chemical Treatment of Water

17. GUIGEMDE, T.R., GBARY, A.R., OUEDRAOGO, J.B. **Lutte contre la dracunculose: problematique du traitement chimique des points d'eau au Temephos (ABATE®) en Afrique.** *Publications Medicales Africaines*, 1990, 110.

## Health Education

18. AKPOVI, S., JOHNSON, D.C., BRIEGER, W. **Guinea worm control: Testing the efficacy of health education in primary care.** *International Journal of Health Education*, 1983, 24, (4), 229-237.

## MISCELLANEOUS

## Human Behaviour

19. WATTS, S.T. **Human behaviour and the transmission of Dracunculiasis; a case study from the Ilorin area of Nigeria.** *International Journal of Epidemiology*, 1986, 15, 252-265.



**Disability**

20. SMITH, G.S., HUTTLY, S.R.A., BLUM, D., OKEKE, N., KIRKWOOD, B.R., FEACHEM, R.G. **Disability from dracunculiasis: effect on mobility.** *Annals of Tropical Medicine and Parasitology*, 1989, **83**, (2), 151-158.

**Cyclops**

21. ONABAMIRO, S.D. **The diurnal migration of cyclops infected with the larvae of *Dracunculus medinensis* (Linnaeus) with some observations on the development of the larval worms.** *West African Medical Journal*, 1954, **3**, 199-194.

**ARTICLES IN THE SELECTED BIBLIOGRAPHY  
ADDRESSING SPECIFIC TOPICS**

Parasitological aspects:

—Dracunculus

1.

—Cyclops

1, 5, 6, 7, 21.

Epidemiology:

—Surveillance

3.

—Incidence and prevalence

1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14.

—Geographical distribution

1, 3, 5, 7, 10.

—Seasonality

1, 2, 5, 6, 7, 8, 10.

—Type of water source

1, 2, 5, 6, 7, 8, 10, 12, 14, 19.

Clinical aspects:

—Clinical features

1, 5,

—Disability

1, 10, 11, 20.

Socio-economic impact of the disease:

1, 5, 10, 11, 15.

Human behaviour:

19.

Treatment:

1, 2.

Prevention and control:

—Health education and primary health care

9, 15, 16, 18.

- Chemical treatment of water  
1, 2, 17.
- Filters  
9, 16.
- Water supply  
1, 2, 12, 13, 14, 15.

1. MULLER, R. **Dracunculus and dracunculiasis.** *Advances in Parasitology*, 1971, 9, 73–151.

This text, written in 1971, provides an exhaustive review of literature on dracunculiasis and a reference text on biology of *Dracunculus medinensis*. Many aspects of dracunculiasis are addressed, with in-depth discussions substantiated by a number of experiments, studies and surveys. A bibliography of more than 250 titles is used which makes this article an invaluable source of documentation and reference.

After an introductory historical overview of dracunculiasis, the first section of the paper presents the nematode *Dracunculus medinensis*. A thorough description of the morphology and structure of the adult is given. Based on cited works of several authors, the life cycle is examined, covering embryogenesis, structure of the first stage larva, infection and development in cyclopoids, description of infective larva and development in the final host. Methods for maintenance of *Dracunculus medinensis* in laboratory conditions and a description of other species of *Dracunculus* are also presented.

The second section of the paper considers various aspects of the disease. The epidemiological features presented include: geographical distribution, economic effects of the disease, seasonal patterns of transmission, intermediate and reservoir hosts. Clinical and diagnostic aspects are addressed, considering symptoms and complications, site of emergence, and diagnostic methods. Treatment through drugs or mechanical procedures, and prevention through vector control and improvement of water supplies are discussed.

A brief outline of selected relevant points made in this article is presented below:

#### **Epidemiology:**

The economic effects of disability resulting from the disease are emphasized with an example of high incidence in active working age population, incapacitated for at least 10 weeks, during the period coinciding with planting season. Age and sex distributions vary according to studies but most surveys have found that sexes were about equally infected and the highest infection rates are found in 10 to 25 year olds. The seasonal patterns of transmission are shown to be a function of the climate and available sources of water. In desert and Sahel areas, transmission is limited to the period when there is water in ponds—that is, during the rainy season. On the other hand, in places where there is water in ponds all year round, there is little transmission during the rainy season. The issue of reservoir hosts is examined, focusing on the fact that there are sporadic findings of *Dracunculus medinensis* in a wide variety of animals, mostly dogs. It is not known whether there are animal reservoir hosts capable of maintaining the infection in the absence of man.

#### **Clinical and diagnostic aspects:**

They are three ways the disease can become apparent: by recognition of a palpable moving worm, by allergic symptoms or by the formation of a blister. Usually one to three worms emerge at one time, but multiple infections with up to 40 worms in one season are possible. According to various studies, the point of emergence is situated in the lower limb, in 83.5 to 99.5% of cases. In the simple course of the disease, the expulsion of the worm occurs, on average, in 4 weeks. However, complications resulting from secondary bacterial infections are extremely common. The risk of tetanus is also real; it has been shown that a significant proportion of tetanus cases in endemic areas result from guinea worm infection. Non-emerging worms have occasionally been shown to lead to arthritis.

The diagnosis is based on the emergence of a characteristic worm. The eosinophilia, usually around 13–18%, has no value for diagnosis.

**Treatment and prevention:**

Treatment has not changed since antiquity and is still based on winding the worm out on a stick. Prevention of dracunculiasis relies in part on chemical treatment of ponds and wells to control cyclopid populations. Temephos seems the best available product. Biological methods have also been advocated with the introduction of small fish in ponds. Timing of applications must take into consideration local patterns of transmission. The improvement of water supply remains the main practical control measure with the application of different technologies such as the introduction of piped water, boreholes and tubewells or simply by the improvement of existing water supply infrastructure.

**2. MULLER, R. Guinea worm disease; epidemiology, control and treatment. *Bulletin of the World Health Organization*, 1979, 57, (5), 683–689.**

Guinea worm infection is one of the most easily prevented parasitic diseases, but it is nevertheless a common cause of disability in rural areas of Africa, southwest Asia, and India; where people rely on ponds or wells infested with infected cyclopiids for their drinking water.

Infection is remarkably seasonal because of a) the influence of the climate on the types of water sources used, and b) the developmental cycle of the parasite. Suitable conditions for infection occur only where water for drinking is taken from stationary bodies of surface water such as ponds, step-wells or cisterns. Infection is not associated with running water or with draw-wells with a circumference of less than three metres. Disability due to the disease has economic repercussions because the period of infection coincides with busy periods in the agricultural year.

The author emphasizes that dracunculiasis is one of the easiest diseases to control or even eradicate, arguing that a) the period of infectivity is only a matter of weeks, b) human infection has to be contracted each year, c) there is no important animal reservoir, and d) transmission is limited to small, easily defined foci. Once transmission is interrupted in an area for a single season, infection ceases entirely unless it is reintroduced from outside. The most effective and safe ways of controlling transmission and breaking the cycle of reinfection include, a) sieving water through a cloth, b) chemical treatment of water bodies with Temephos, c) improvement of water supplies.

Treatment consists of rolling out each emerging worm onto a small stick, a few centimetres each day. Certain drugs have been shown to reduce the pain and pruritus and enable the worm to be removed more quickly. However, it is likely that these compounds act against the host reaction rather than on the worms themselves.

**3. HOPKINS, D.R. Dracunculiasis eradication; a mid-Decade status report. *American Journal of Tropical Medicine and Hygiene*, 1987, 37, (1), 115–118.**

About 120 million people are at risk of dracunculiasis in African countries and 20 million in India and Pakistan. Both major endemic countries in Asia have begun efforts to eliminate the disease. By the end of 1986, national anti-dracunculiasis programmes were underway or planned in 8 of the 19 affected African countries.

In May 1986, the World Health Assembly adopted a resolution on the elimination of dracunculiasis—the first such resolution since the successful smallpox eradication programme. India, which began its national Guinea Worm Eradication Programme in 1980, has already eliminated the disease from 1 of 7

endemic states and reduced the total number of cases found through active surveillance by 34% between 1983 and 1985. In Ivory Coast, the only African country to conduct active surveillance for dracunculiasis so far, an aggressive combined programme of rural water supply, health education and active surveillance has reduced the disease from 4,971 cases in 1976 to 592 cases in 1985. Although eradication is not likely to be achieved by the end of the Water and Sanitation Decade in 1990, the progress and momentum should be irresistible by then and evident to all.

**4. WATTS, S.J. The comparative study of patterns of guinea worm prevalence as a guide to control strategies. *Social Science and Medicine*, 1986, 23, (10), 975–982.**

This paper compares the patterns of guinea worm prevalence in India with West Africa.

Guinea worm, a parasite found in unprotected drinking water sources, causes considerable morbidity and loss of agricultural production among rural people in India and West Africa. A comparative study of village level prevalence data in the two regions reveals marked contrasts in the level and characteristics of prevalence which are useful guidelines in planning control strategies where little is known about local guinea worm epidemiology.

Indian studies generally indicate much lower village level prevalence rates than in West Africa, where peak patency rates of up to 75–80% of the total population of a settlement have been found. The higher figure indicates that all members of a community are exposed to a common infected drinking water source. The Indian studies mention effective water treatment more frequently than do those from West Africa, chiefly the filtering out of cyclopooids with a fine cotton filter.

Differences in prevalence characteristics according to age, sex or socio-economic grouping should be taken into account when planning national and local control campaigns.

One important contrast is that in West Africa the infection rates for women and for men are in most cases approximately equal, while in India they are commonly far higher for men, who tend to travel, than for women who stay at home.

In Nigeria, women are the main water collectors and contaminators, and are responsible for household water treatment. Therefore, special efforts should be made to involve them in control campaigns. Community-based education and control programmes relying on local cooperation will be effective as all residents recognise the severity of the guinea worm problem.

Although the complete eradication of the disease in West Africa will be complex because of its widespread distribution and the many sources of infection, the prospects for guinea worm eradication in that part of the world are encouraging.

**5. NWOSU, A.B.C., IFEZULIKE, E.O., ANYA, A.O. Endemic dracontiasis in Anambra State of Nigeria; geographic distribution, clinical features, epidemiology and socio-economic impact of the disease. *Annals of Medical Parasitology*, 1982, 76, 187–200.**

Guinea worm disease was found in the northeast zone of Anambra State, Nigeria, with prevalence rates as high as 50–75% in some rural villages especially those dependent on artificial ponds for their drinking water. Two species of cyclopooid copepods, *Thermocyclops nigerianus* and *Mesocyclops leuckarti*, widely recognised as intermediate hosts for *Dracunculus medinensis*, were recovered from drinking water sources in the endemic areas. The relative copepod

densities and their infection levels in various water bodies confirmed that artificial ponds in the area were the significant foci of guinea worm infections.

The farming population in these villages had the highest infection rates and it is estimated that at least 100,000 of these farmers contract the disease each year, resulting in lower agricultural productivity. The clinical course of the disease followed the pattern described by previous investigations. Only 183 (5%) of the 3641 cases examined had attended a hospital or health centre. 1551 (42.6%) patients rely on local herbs for treatment. These observations are discussed in relation to local preventive strategies against the disease.

6. STEIB, K., MAYER, P. **Epidemiology and vector control of *Dracunculus medinensis*** in northwest Burkina Faso, West Africa. *Annals of Tropical Medicine and Parasitology*, 1988, **82**, (2), 189–199.

The epidemiology of guinea worm was studied in the dry savanna zone of West Africa. The monthly incidence data collected over a period of 4 years shows that peak transmission occurs not at the end, but at the onset of the rainy season (June and July). The different types of local water source were examined for infected cyclopoid copepods. Small hand-dug water-holes proved to be the most important sites for transmission. While the domestic water supply is obtained from draw-wells in the villages throughout the year, the villagers take additional drinking water from these ponds during the planting season when farm activities require long stays in the fields.

Four cyclopoid species were found for the first time acting as natural intermediate hosts of *Dracunculus medinensis*; *Thermocyclops inopinus*, *Thermocyclops incisus*, *Mesocyclops kieferi* and *Metacyclops margaretae*. *T. inopinus* was not only the most frequently infected cyclopoid, but was also the predominating species in man-made ponds. Also, its occurrence is confined to the first half of the rainy season, coinciding with peak transmission. The epidemiology of dracunculiasis in dry and humid regions of West Africa is compared with regard to seasonality. The use of protective water filters proved to be the only adequate method for guinea worm control under the local conditions of northwest Burkina Faso.

7. PETIT, M.M., DENIAU, M., TOURTE-SCHAEFER, C., AMEGBO, K. **Etude épidémiologique longitudinale dans le sud du Togo**. *Bulletin de la Société de Pathologie Exotique et Filiales*, 1988, **82**, 520–530.

This paper considers the dracunculiasis situation in the Zio prefecture, in southwest Togo.

An exhaustive survey carried out in January 1986 allowed the delimitation of the endemic zone in this prefecture. It corresponds to the northwest area, which consists of a granito-gneissic plateau. Eighty percent of population centres were affected. The annual incidence rate for 1985 in the affected villages averaged 10%, in some cases exceeding 50%. An inverse ratio relationship was found between the incidence level and the size of the villages.

A longitudinal study was also completed in two hamlets in this region. The study period went from November 1983 to January 1985 in one, and from September 1983 to February 1988 in the other. Transmission occurred mainly in September and October, which corresponds to the secondary rainy season, or 'small rains'. Epidemic bursts were observed in both hamlets separated by a two or three year period of low or near zero incidence. This observation led the authors to suggest either transitory acquired immunity or a temporary decimation of disease vectors.

The authors conclude that all conditions have been met to allow the control of dracunculiasis in this prefecture.

8. ADEKOLU-JOHN, E.O. **Impact of lake creation on guinea worm transmission in Nigeria on the eastern side of Kainji Lake.** *International Journal of Parasitology*, 1983, **13**, (5), 427-432.

Although guinea worm transmission had previously been recorded at low intensity in dispensaries at two villages in the area to the east of the present lake shore, the disease has occurred at epidemic rates only since the lake was formed in 1968. The prevalence of 31% was recorded in five villages in which guinea worm was found. Data on the incidence at the peak of the outbreak and the economic importance of the disease are presented. Kainji Lake's postulated role in the epidemiology of the disease is discussed and the need for biological study of the disease vector is suggested.

9. GBARY, A.R., GUIGEMDE, T.R., OUEDRAOGO, J.B. **La dracunculose, un fléau éradiqué dans trois villages du Burkina Faso par l'éducation sanitaire.** *Bulletin de la Societe de Pathologie Exotique*, 1987, **80**, 390-395.

The authors carried out a study of dracunculiasis control through health education in three villages in the Banfora region, in southwest Burkina Faso. These villages were known hyperendemic foci of guinea worm infection. Health education activities aimed to inform the population about the mode of transmission of the disease as well as collective and individual means of prevention. These villages were organised within the framework of Primary Health Care, with the training of Village Health Workers (VHWs), chosen by the community and supported by Village Health Committees.

Cases were recorded initially through an exhaustive survey and then through active case detection. Cloth filters were distributed. The results of the programme were striking and two years after the initiation of activities, the disease was eradicated in these villages.

The authors recommend that the control interventions be implemented just before the transmission period. They conclude that the feasibility, low cost and acceptability by populations of health education make it an essential part of any dracunculiasis control strategy.

10. BELCHER, D.W., WURAPA, F.K., WARD, W.B., LOURIE, I.M. **Guinea worm in southern Ghana; its epidemiology and impact on agricultural productivity.** *American Journal of Tropical Medicine and Hygiene.*, 1975, **21**, (1), 243-249.

In southern Ghana, guinea worm disease was found to occur almost exclusively in villages dependent upon pond water during the dry season. The risk of increasing disease in the Accra plains is serious, because almost half of the 159 villages surveyed use pond water and residents frequently travel to endemic areas. In the study, adult male farmers were found to be at greatest risk of becoming infected.

The average work loss in untreated adults was more than 5 weeks. Because guinea worm disease is seasonal, coinciding with peak agricultural activities, and few alternative labour sources are available for the incapacitated farmer, a marked reduction in agricultural output occurs.

11. BRIEGER, W.R., WATTS, S., YACOOB, M. **Guinea worm, maternal morbidity and child health.** *Journal of Tropical Paediatrics*, 1989, **35**, 285-288.

A pilot study of 42 women in two rural Nigerian communities was conducted to determine how guinea worm disables mothers and impairs their ability to care for their children and families. Guinea worm was responsible for half of child immunization defaulting and deterred women from using maternity services. Guinea worm kept women from their jobs and trades, costing an average of

approximately US\$ 50 in lost income. Other problems mothers experienced included loss of appetite and reduced food intake, unattended child illnesses, and disabling secondary infections resulting from unhygienic self-treatment.

The guinea worm experience in Nigeria makes it obvious that safe and sufficient water is not only an economic and environmental issue, it should also be a major component of any child survival and development programme.

**12. CAIRNCROSS, S., TAYEH, A. Guinea worm and water supply in Kordofan, Sudan.** *Journal of the Institution of Water and Environmental Management*, 1988, 2, (3), 268–274.

A study of guinea worm epidemiology in South Kordofan, Sudan found two different patterns of infection. In 4 villages, all with large open reservoirs (hafirs), the prevalence in one year was over 34% and was not strongly related to age. This is suggestive of a high and uniform degree of exposure to contaminated water, presumably the water carried home for domestic purposes. In the remaining 23 villages, the prevalence did not exceed 20% but was greater in adults than in children.

This corresponds to a progressive increase in degree of exposure to contaminated water with age. This cannot be the water used at home but from sources used while away from home, e.g. when travelling, visiting, watering livestock or working in the field.

Provision of clean water supplies is not enough to prevent transmission if there is continued casual use of contaminated sources in the fields or in neighbouring villages. Guinea worm disease was associated with the use of certain water sources, particularly the poorly maintained hafirs. Although hand pumps are not sources of disease, their inadequacies in terms of yield and maintenance oblige many would-be users to drink water from riskier sources. In this context, assistance to the community in the construction of hand dug wells, where feasible, might secure readier access to water and more effective guinea worm control at less cost.

**13. HUTTLY, S.R.A., BLUM, D., KIRKWOOD, B.R., EMEH, R.N, OKEKE, N., AJALA M., SMITH, G.S., CARSON, C.D., DOSUNMU-OGUNBI, O., FEACHEM, R.G. The Imo State (Nigeria) drinking water supply and sanitation project, 2. Impact on dracunculiasis, diarrhoea and nutritional status.** *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 1990, 84, 316–321.

Morbidity due to dracunculiasis and diarrhoea in persons of all ages, and the nutritional status of young children, were used as health impact indicators in the evaluation of the Imo State drinking water supply and sanitation project in southeast Nigeria. Data were collected using repeated cross-sectional surveys and longitudinal follow up.

The new water supply had a positive impact on dracunculiasis, despite the low level of endemicity in the villages. In the cross-sectional surveys, it was found that, in the project villages, those persons drinking only borehole water had significantly lower period prevalence rates one year later than others. Moreover, those living further from the nearest borehole had higher rates of dracunculiasis. In terms of the impact of the project on diarrhoea morbidity a significant reduction was apparent only in certain sub-groups of the population, such as children in households with a lower water collection time ( $\leq 2$  hours) in the wet season.

The prevalence of wasting ( $< 80\%$  weight-for-height) among children aged less than 3 years decreased significantly over time in all 3 intervention villages; there was no such decline in the control area suggesting an impact of the project



on acute malnutrition. The introduction of boreholes produced considerable savings in water collection time which may have resulted in a health benefit by providing women with more time for child-care and other household work.

**14. EDUNGBOLA, L.D, WATTS, S.T., ALABI, T.O., BELLO, A.G. The impact of a UNICEF-assisted rural water project on the prevalence of guinea worm disease in Asa, Kwara State, Nigeria. *American Journal of Tropical Medicine and Hygiene*, 1988, 39, (1), 79-85.**

The provision of protected water supplies, in the form of boreholes within villages, reduced the point prevalence of dracunculiasis in affected communities from over 50% to 0%, or near 0%, within 3 years of intervention. However, less accessible or malfunctioning boreholes have a less dramatic impact on prevalence. In contrast, in villages unserved with boreholes, the prevalence of guinea worm remained almost unchanged. The socio-economic benefits of the decline of dracunculiasis included a rise in school enrolment, and a fall in school absenteeism. Local people saw the link between guinea worm disease and water supply and appreciated the many benefits of disease elimination in their communities.

**15. YACOOB, M., BRIEGER, W., WATTS, S. Primary health care, why has water been neglected? *Health Policy and Planning* 1989, 4, (4), 328-333.**

This paper highlights both the economic and philosophical necessity to look again at the approach to primary health care. An observational study from Nigeria is used to exemplify the need for clean water sources to eliminate guinea worm, and to promote health. Guinea worm infestation in these Nigerian study communities caused serious disability in the community and resulted in a reduced uptake of the very forms of 'selective' primary health care that have been favoured internationally—breast feeding, immunization, malaria treatment, and oral rehydration therapy. The effect of such disability on women—who have prime responsibility for the health and welfare of their families—has been seriously underestimated to the detriment of child health and survival. The authors finally emphasized the need for a clean, convenient water supply as an essential component of primary health care.

**16. BRIEGER, W.R., RAMAKRISHNA, J., ADENIYI, J.D. Community response to social marketing; filters for guinea worm control. *International Quarterly of Community Health Education*, 1989-1990, 10, 3-17.**

Guinea worm control interventions focus mainly on prevention through health promotion supported by various technologies for improvement of the quality of water supply. Each technology has an appropriate health education strategy to aid in its promotion. The community of Idere in rural Nigeria was chosen to test the social acceptability of a new monofilament nylon cloth water filter.

A social marketing strategy was used which built upon an existing primary health care program utilizing volunteer primary health workers (PHWs). These PHWs, organized into an association, were involved in all aspects of product design, production, pricing, distribution, consumer education and program evaluation. A baseline survey of potential filter consumers was conducted prior to marketing.

The PHWs proved effective in marketing the filters in Idere as one-third of households in monitored areas purchased a filter during the six-month sales period in 1985-86. Those who bought were more likely to live in hamlets or family compounds where PHWs resided (even when the resident PHW did not sell filters himself), belong to a modern religion, and have a preventive orientation toward health. Those who did not buy complained mostly of lack of

money, but other reasons given and inferred included attitudes that filters were inferior to wells, traditional beliefs that guinea worm cannot be prevented, and availability of cheaper but ineffective alternatives. Filters were found to be a particularly useful technology in the smaller, isolated farm hamlets surrounding the main town.

Recommendations are made to improve the marketing strategy through modification of filter design, price, distribution, and promotion.

**17. GUIGEMDE, T.R., GBARY, A.R., OUEDRAOGO, J.B. Lutte contre la dracunculose: problematique du traitement chimique des points d'eau au Temephos (ABATE®) en Afrique. *Publications Medicales Africaines*. 1990, 110.**

The chemical treatment of drinking water sources with Temephos (Abate®) is one of the proposed strategies for dracunculiasis control and has been shown to be effective in India. This product, used for onchocerciasis control in Africa, has been donated by American Cyanamid, for the control of the cyclopoïd vector of guinea worm.

With the objective of rational use of this control measure, the authors analyze the conditions of its implementation considering the epidemiological characteristics of dracunculiasis in Africa: bioclimatic zones, specificity of water sources (ponds), village configuration, and availability of local skilled manpower for application of the product. They conclude that the situation is very different from the one in India and care must be taken when making the decision to use Temephos in Africa.

**18. AKPOVI, S., JOHNSON, D.C., BRIEGER, W. Guinea worm control: testing the efficacy of health education in primary care. *International Journal of Health Education*, 1983, 24, (4), 229-237.**

An experimental health education and primary health care programme in several small farm villages in western Nigeria is the subject of this article. Although the programme dealt with many health and related issues, guinea worm is highlighted in this paper as a means of facilitating the measurement of results.

The programme was examined on three levels: 1) short term effects on health knowledge and attitudes, 2) intermediate behavioural results, 3) long term impact on health status. Guinea worm and the related problem of reliable water supply were both among the priority concerns raised by citizens of the communities.

**19. WATTS, S.T. Human behaviour and the transmission of dracunculiasis: a case study from the Ilorin area of Nigeria. *International Journal of Epidemiology*, 1986, 15, 252-265.**

There are two phases in the transmission cycle of dracunculiasis which are associated with human activities; (i) swallowing the infective guinea worm larvae in infected water, and (ii) the immersion of a limb with a guinea worm lesion on it into a drinking water source. In planning control strategies it is essential to understand the patterns of behaviour associated with these two phases of transmission. These include water consumption, water use and water treatment, patterns of water collection and population mobility. The author presents a framework for the analysis of human behaviour in guinea worm transmission, based on a study in an area within a 50 km radius of Ilorin, the capital of Kwara State, Nigeria.

The conclusion briefly suggests some benefits which might accrue to affected areas as the result of the consideration of behavioural factors involved in disease transmission.

20. SMITH, G.S., HUTTLY, S.R.A., BLUM, D., OKEKE, N., KIRKWOOD, B.R., FEACHEM, R.G. **Disability from dracunculiasis; effect on mobility.** *Annals of Tropical Medicine and Parasitology*, 1989, 83, (2), 151-158.

A study was conducted in northeastern Imo state, Nigeria to define the disability and restriction of mobility associated with dracunculiasis. A sample of household units was visited every 2 weeks to determine who was affected by dracunculiasis and to characterize the extent of the disability. The average duration of symptoms was 12.7 weeks (range 3-29 weeks). 50% of all episodes of the disease resulted in severe disability lasting a mean of 4.2 weeks (range 2-12). The mean period of severe disability for those aged 50 years and over was significantly higher than for those less than 50 years old. The disease occurred during the peak yam and rice harvest time and the period of preparation for the planting season.

The findings of this study can assist in improving estimates of the costs associated with dracunculiasis.

21. ONABAMIRO, S.D. **The diurnal migration of cyclops infected with the larvae of *Dracunculus medinensis* (Linnaeus) with some observations on the development of the larval worms.** *West African Medical Journal*, 1954, 3, 199-194.

A large concrete tank containing pond water in which *Thermocyclops nigerianus* were reared in large numbers was constructed on the model of a village pond which contained water all through the year. Samples were taken from various parts of this tank at different times in the day to mark out the directions of migration of this species of cyclopoid. From the figures obtained, it was deduced that migration went on both horizontally and vertically, the latter being the more pronounced. The bulk of the cyclops were then infected with the larvae of *Dracunculus medinensis* by a massive discharge of the larvae obtained from human patients into the tank.

Further series of sample-taking gave figures which allowed the following conclusions to be drawn: (a) Several cyclops died off as a result of the infection. (b) In the first 5 days after infection those cyclops moderately infected with *Dracunculus* larvae appeared to be as active in their movements as those which were not infected. (c) From the sixth day to the fourteenth day infected cyclops became less and less active until by the fourteenth day after the infection they became practically incapable of moving more than a few inches from the bottom of the tank.

This progressive slowing down of activity in the infected cyclops is thought to be due to the physiological effects of the ecdysis of the *Dracunculus* larvae inside them. These observations are related to the practical mode of acquiring the guinea worm by human beings who obtain their drinking water from village ponds in Nigeria.



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## Filtres

16. BRIEGER, W.R., RAMAKRISHNA, J., ADENIYI, J.D. Community response to social marketing; filters for guinea worm Control. *International Quarterly of Community Health Education* 1989-1990, 10, 3-17.

## Traitement chimique de l'eau

17. GUIGEMDE, T.R., GBARY, A.R., OUEDRAOGO, J.B. Lutte contre la dracunculose: problematique du traitement chimique des points d'eau au Temephos (ABATE®) en Afrique. *Publications Medicales Africaines*, 1990, 110.

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## DIVERS

## Comportements Humains

19. WATTS, S.T. Human behaviour and the transmission of dracunculiasis; a case study from the Ilorin area of Nigeria. *International Journal of Epidemiology*, 1986, 15, 252-265.

## Invalidité

20. SMITH, G.S., HUTTLY, S.R.A., BLUM, D., OKEKE, N., KIRKWOOD, B.R., FEACHEM, R.G. Disability from dracunculiasis: effect on mobility. *Annals of Tropical Medicine and Parasitology*, 1989, 83, (2), 151-158.

**Cyclopidés**

21. ONABAMIRO, S.D. The diurnal migration of cyclops infected with the larvae of *Dracunculus medinensis* (Linnaeus) with some observations on the development of the larval worms. *West African Medical Journal*, 1954, 3, 199-194.

**ARTICLES DANS LA BIBLIOGRAPHIE SELECTIVE  
QUI TRAITENT DES SUJETS SPECIFIQUES**

Aspects parasitologiques:

—Dracunculus

1.

—Cyclops

1, 5, 6, 7, 21.

Epidémiologie:

—Surveillance

3.

—Incidence et prévalence

1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14.

—Distribution géographique

1, 3, 5, 7, 10.

—Saisonnalité

1, 2, 5, 6, 7, 8, 10.

—Types de sources d'eau

1, 2, 5, 6, 7, 8, 10, 12, 14, 19.

Aspects cliniques:

—Manifestations cliniques

1, 5.

—Invalidité

1, 10, 11, 20.

Impact socio-economique de la maladie:

1, 5, 10, 11, 15.

Comportements humains:

19.

Traitement:

1, 2.

Prévention et contrôle:

—Education sanitaire et soins de santé primaire

9, 15, 16, 18.

—Traitement chimique de l'eau

1, 2, 17.

—Filtres

9, 16.

—Approvisionnement en eau

1, 2, 12, 13, 14, 15.

1. MULLER, R. *Dracunculus and dracunculiasis*. *Advances in Parasitology* (1971), 9, 73-151.

Ce texte, écrit en 1971, est une exhaustive revue de la littérature sur la dracunculose et un texte de référence sur la biologie de *Dracunculus medinensis*. Différents aspects de la dracunculose y sont abordés, avec des discussions approfondies, appuyées par de nombreuses expériences, études et enquêtes. Une bibliographie de plus de 250 titres est utilisée, ce qui fait de cet article une précieuse source de documentation et de référence.

Après des rappels historiques sur la dracunculose, la première partie de l'article présente le nématode *Dracunculus medinensis*. Une description minutieuse de la morphologie et de la structure de l'adulte est faite. S'appuyant sur les travaux de plusieurs auteurs, le cycle biologique du parasite est décrit, couvrant l'embryogénèse, le premier stage larvaire, l'évolution dans le cyclops, la description de la larve infestante et l'évolution dans l'hôte définitif. Sont également présentées des méthodes pour la conservation de *Dracunculus medinensis* dans des conditions de laboratoire ainsi qu'une description d'autres espèces de *Dracunculus*.

La seconde partie de l'article aborde les différents aspects de la maladie. Les caractéristiques épidémiologiques présentées comprennent: la distribution géographique, les conséquences économiques de la maladie, la saisonnalité de la transmission, l'hôte intermédiaire et les réservoirs. Les aspects cliniques et diagnostiques sont traités en considérant les symptômes et complications, les sites d'émergence et les méthodes diagnostiques. Les traitements mécaniques et médicamenteux ainsi que la prévention à travers la lutte contre les vecteurs et l'amélioration de l'approvisionnement en eau potable sont enfin discutés.

Une brève récapitulation des principaux points de discussion est présentée ci-dessous:

#### **Epidémiologie:**

Les conséquences économiques de l'invalidité résultant de la maladie sont illustrées par un exemple nigérian où une importante proportion de la population active est rendue impotente pendant au moins 10 semaines, en pleine période de plantage. La distribution par âge et par sexe varie selon les études, la plupart cependant montrent que les deux sexes sont également touchés et que les taux d'incidence les plus élevés sont retrouvés dans le groupe d'âge de 10 à 25 ans.

Il est démontré que les variations saisonnières de la transmission sont fonction du climat et des types de source d'eau rencontrés dans la région. Dans les régions désertiques et sahéliennes, la transmission est limitée à la période où il y a de l'eau dans les mares, c'est-à-dire pendant la saison des pluies. Par contre, dans les endroits où il y a de l'eau dans les mares pendant toute l'année, il y a peu de transmission durant cette saison.

La question des hôtes réservoirs est abordée, rappelant le fait que *Dracunculus medinensis* a été occasionnellement retrouvé chez une large variété d'animaux, principalement les chiens. Il n'a toutefois pas été établi s'il existe des réservoirs animaux capables de maintenir l'infection en l'absence de l'Homme.

#### **Aspects cliniques et diagnostiques:**

La maladie peut devenir apparente de trois façons différentes: par la palpation d'un ver mobile sous-cutané, par des symptômes allergiques ou par l'apparition d'une ampoule. Habituellement, un à trois vers émergent en même temps, cependant des infections multiples avec jusqu'à 40 vers en une saison sont possibles. Selon différentes études, le point d'émergence se situe au niveau du membre inférieur dans 83,5 à 99,5% des cas. Dans la forme simple de la maladie, l'expulsion du ver se fait en moyenne en 4 semaines. Les complications



résultant d'infections bactériennes secondaires sont extrêmement fréquentes. Le risque de tétanos est réel; il a en effet été montré qu'une proportion importante des cas de tétanos en zone endémique est consécutive à une infection par le ver de Guinée. Il a été rapporté des cas d'arthrite causés par des vers n'ayant pas émergé.

Le diagnostic est basé sur l'émergence caractéristique du ver. L'hyperéosinophilie, habituellement autour de 13-18%, n'a aucun intérêt diagnostique.

#### **Traitement et Prévention:**

Le traitement n'a pas changé depuis l'Antiquité et repose toujours sur l'extraction du ver en l'enroulant autour d'un bâtonnet. La prévention de la dracunculose repose en partie sur le traitement chimique des étangs et des puits pour lutter contre les vecteurs. Le Temephos semble le produit le plus adapté à cette fin. Des méthodes biologiques, comme l'introduction de petits poissons, ont été préconisées. L'amélioration de l'approvisionnement en eau saine reste le moyen de contrôle le plus fonctionnel avec l'application de différentes technologies telles que l'adduction d'eau en conduites, l'installation de puits forés ou à buses ou simplement par l'amélioration des structures existantes.

#### **2. MULLER, R. Guinea worm disease; epidemiology, control and treatment. *Bulletin of the World Health Organization* (1979), 57, 5, 683-689.**

Si l'infection par le ver de Guinée est l'une des maladies parasitaires les plus faciles à prévenir, elle constitue néanmoins une cause fréquente d'invalidité dans les zones rurales d'Afrique, d'Asie du sud-est et d'Inde, où les populations tirent leur eau potable d'étangs et de puits infestés de cyclopidés infectés.

L'infection est remarquablement saisonnière en raison a) de l'influence du climat sur les types de source d'eau utilisés et b) du cycle évolutif du parasite. Les conditions favorables à l'infection ne sont réunies que lorsque l'eau de boisson est tirée de points d'eau de surface tels que des mares, des puits à marches ou des citernes. L'infection n'est pas associée à des sources d'eau courante ni à des puits ayant une circonférence de moins de trois mètres. L'invalidité causée par la maladie a d'importantes répercussions économiques car la période d'infection coïncide avec celle où l'activité agricole est à son maximum.

L'auteur souligne que la dracunculose est l'une des maladies les plus faciles à contrôler voire à éradiquer, prenant comme arguments que: a) la période d'infektivité est limitée à quelques semaines, b) l'infection humaine doit impérativement se produire chaque année, c) il n'y a pas de réservoir animal important, et d) la transmission est limitée à des petits foyers facilement délimités. Une fois que la transmission est interrompue pendant une saison, l'infection disparaît à moins qu'elle ne soit réintroduite de l'extérieur. Les moyens les plus sûrs et efficaces de contrôler la transmission et de bloquer le cycle de réinfection sont: a) le tamisage de l'eau de boisson avec un linge, b) le traitement chimique des points d'eau avec du Temephos, et c) l'amélioration des sources d'eau potable.

Le traitement de la dracunculose consiste à enrouler de quelques centimètres par jour sur un bâtonnet chaque ver émergeant de la peau. Certains médicaments réduisent la douleur et l'intense démangeaison, et facilitent l'extraction du ver. Il est cependant probable que ces produits agissent sur la réaction de l'hôte plutôt que sur le ver lui-même.

**3. HOPKINS, D.R. *Dracunculiasis eradication; a mid-Decade status report.* *American Journal of Tropical Medicine and Hygiene*, (1987), 37, (1), 115–118.**

Environ 120 millions de personnes en Afrique et 20 millions en Inde et au Pakistan risquent de contracter la dracunculose. Les deux principaux pays asiatiques où la dracunculose sévit endémiquement ont, tous les deux, mis en oeuvre des efforts d'éradication de la maladie. A la fin de 1986, des programmes nationaux de lutte contre la dracunculose étaient, soit en cours, soit en projet dans 8 des 19 pays africains touchés par la maladie.

En mai 1986, l'Assemblée Mondiale de la Santé a adopté une résolution sur l'élimination de la dracunculose, la première de ce genre depuis le succès du programme d'éradication de la variole. L'Inde, qui a débuté son programme national d'éradication du ver de Guinée en 1980, a déjà éliminé la maladie de l'un des sept états endémiques et réduit, grâce à une surveillance active de la maladie, le nombre total de cas détectés de 34% entre 1983 et 1985. La Côte d'Ivoire est jusqu'ici le seul pays africain à mener une surveillance active de la dracunculose. Grâce à un programme agressif combinant l'approvisionnement des zones rurales en eau, l'éducation pour la santé et une surveillance active, le nombre de cas de dracunculose dans ce pays est passé de 4 971 en 1972 à 592 en 1985. Bien qu'il soit probable que l'éradication du ver de Guinée ne sera pas atteinte d'ici la fin de la Décennie de l'Eau et de l'Assainissement en 1990, les progrès réalisés d'ici là devraient être inexorables et évidents pour tous.

**4. WATTS, S.J. *The comparative study of patterns of guinea worm prevalence as a guide to control strategies.* *Social Science and Medicine*, (1986), 23, (10), 975–982.**

Le ver de Guinée, parasite présent dans les sources non-protégées d'eau potable, est la cause d'une morbidité considérable et de perte de production agricole chez les populations rurales de l'Inde et de l'Afrique de l'ouest. Une étude comparative des données de la prévalence villageoise de ces deux régions révèle des contrastes marqués dans le niveau et les caractéristiques de la dite prévalence. Ceci donne des lignes directrices utiles pour la planification des stratégies de contrôle dans les zones où l'épidémiologie locale du ver de Guinée est peu connue.

Les études faites en Inde indiquent des taux de prévalence villageoise généralement beaucoup plus bas que ceux d'Afrique de l'ouest où il a été rapporté que jusqu'à 75–80% de la population a été touchée par la maladie. Des chiffres aussi élevés indiquent que tous les membres d'une communauté donnée sont exposés à la maladie par l'intermédiaire d'une source d'eau infectée commune. Les études menées en Inde mentionnent des traitements efficaces de l'eau plus fréquemment que les études d'Afrique de l'ouest, principalement l'exfiltrage des cyclopidés de l'eau grâce à un filtre en coton finement tissé.

Un des principaux contrastes est qu'en Afrique de l'ouest les taux d'infection des femmes et des hommes sont, dans la plupart des cas, approximativement les mêmes, alors qu'en Inde, ils sont de loin plus élevés pour les hommes (qui ont tendance à voyager) que pour les femmes (qui restent à la maison).

Les différences dans les caractéristiques de prévalence selon l'âge, le sexe et le groupe socio-économique devraient être prises en compte lors de la planification de campagnes locales ou nationales de contrôle. Au Nigéria, les femmes sont les principales responsables de la collecte, du traitement et de la contamination de l'eau domestique. Des efforts spéciaux devraient être faits, dans les zones à haut niveau d'infection, pour les impliquer dans les campagnes de contrôle, spécialement celles qui font partie des tranches d'âge économiquement actives. Une éducation pour la santé, basée sur les besoins de la communauté, ainsi que des programmes de contrôle se fondant sur la coopération locale ne seront

efficaces que si tous les membres de la communauté reconnaissent la sévérité du problème du ver de Guinée.

Bien que l'éradication totale de la maladie en Afrique de l'ouest constituera une tâche complexe à cause de sa large distribution et de ses nombreuses sources d'infection, les espoirs d'éradication de ver de Guinée dans cette partie du monde sont bons.

**5. NWOSU, A.B.C., IFEZULIKE, E.O., ANYA, A.O. Endemic dracontiasis in Anambra State of Nigeria; geographic distribution, clinical features, epidemiology and socio-economic impact of the disease. *Annals of Medical Parasitology*. (1982), 76, 187-200.**

La maladie du ver de Guinée a été signalée dans la zone nord-est de l'Etat d'Anambra au Nigéria, avec des taux de prévalence élevés, allant jusqu'à 50-75% dans certains villages ruraux, et particulièrement ceux qui dépendent des étangs artificiels pour leur eau potable. Deux espèces de cyclopidés, *Thermocyclops nigerianus* et *Mesocyclops leuckarti*, largement reconnus comme étant les hôtes intermédiaires de *Dracunculus medinensis*, ont été prélevés dans des sources d'eau potable des zones endémiques. Les densités relatives de cyclopes et leurs niveaux d'infections dans différents points d'eau ont confirmé que les étangs artificiels de la région constituaient les principaux foyers d'infection du ver de Guinée.

La population agricole des villages étudiés avait les taux d'infection les plus élevés et il est estimé qu'au moins 100 000 agriculteurs contractent la maladie chaque année, ce qui conduit à une réduction de la productivité agricole. La fréquence des manifestations cliniques observées est conforme à ce qui a été décrit lors de précédentes études. Seulement 183 (5%) des 3641 cas examinés se sont présentés à un hôpital ou à un centre de santé. 1551 (42,6%) des malades se fient aux plantes médicinales locales pour se traiter. Toutes ces observations sont discutées par rapport aux stratégies locales de prévention de la maladie.

**6. STEIB, K., MAYER, P. Epidemiology and vector control of *Dracunculus medinensis* in northwest Burkina Faso, West Africa. *Annals of Tropical Medicine and Parasitology*, (1988), 82, (2), 189-199.**

L'épidémiologie du ver de Guinée a été étudiée dans la zone de savane sèche de l'Afrique de l'ouest. Les données d'incidence mensuelle recueillies sur une période de quatre ans, montrent que le pic de transmission a lieu, non pas à la fin mais au début de la saison des pluies (juin et juillet). Les sources d'eau locales, de différents types, ont été examinées à la recherche de cyclopidés infectés. Les petits trous d'eau creusés à la main se sont révélés être les sites les plus importants de la transmission. Ces mares sont principalement utilisées comme sources d'eau de boisson additionnelles lors du travail dans les champs durant la saison du plantage.

Quatre espèces de cyclopes se sont, pour la première fois, révélées être des hôtes intermédiaires naturels de *Dracunculus medinensis*: *Thermocyclops inopinus*, *Thermocyclops incisus*, *Mesocyclops kieferi* et *Metacyclops margaretae*. *T. inopinus* était non seulement le cyclopidé le plus fréquemment infecté, mais aussi l'espèce dominante des mares artificielles. Sa présence se confine à la première partie de la saison des pluies, ce qui coïncide avec le pic de transmission. Les caractéristiques épidémiologiques de la dracunculose dans les régions sèches et humides d'Afrique de l'ouest sont comparées par saisons. L'utilisation des filtres à eau protecteurs s'est révélé être la seule méthode adéquate de contrôle du ver de Guinée dans les conditions locales du nord-ouest du Burkina Faso.

7. PETIT, M.M., DENIAU, M., TOURTE-SCHAEFER, C., AMEGBO, K. **Etude épidémiologique longitudinale dans le sud du Togo.** *Bulletin de la Société de Pathologie Exotique et Filiales*, (1988), 82, 520-530.

Cet article traite de la situation d'endémicité de la dracunculose dans la préfecture de Zio, au Sud-Ouest du Togo.

Une enquête exhaustive a été conduite en janvier 1986 et a permis de délimiter la zone d'endémie dans cette préfecture. Il s'agit de la partie nord-ouest, correspondant exactement au plateau granito-gneissique. 80 % des centres de peuplement y sont affectés. L'incidence annuelle pour 1985 dans les villages atteints s'élevait en moyenne à 10 % avec des taux atteignant parfois plus de 50 %. Une relation inversement proportionnelle a été mise en évidence entre le niveau d'incidence et la taille des villages.

Une enquête longitudinale a également été effectuée dans deux hameaux de la région. La période étudiée s'étend de novembre 1983 à janvier 1985 dans l'un d'entre eux et de septembre 1983 à février 1988 dans l'autre. La transmission survient principalement aux mois de septembre et octobre, ce qui correspond à la petite saison des pluies. Des flambées épidémiques ont été observées dans les deux hameaux, séparées par une période d'accalmie de 2 ou 3 ans. Cette observation conduit les auteurs à évoquer la possibilité de l'existence d'une immunité acquise transitoire ou la disparition temporaire des espèces vectrices.

Les auteurs concluent que les conditions sont réunies pour permettre le contrôle de la dracunculose dans la préfecture de Zio.

8. ADEKOLU-JOHN, E.O. **Impact of lake creation on guinea worm transmission in Nigeria on the eastern side of Kainji Lake.** *International Journal of Parasitology*, (1983), 13, 5, 427-432.

Bien qu'une transmission de faible intensité du ver de Guinée ait été rapportée antérieurement dans les dispensaires de deux villages de la région située à l'est de la rive actuelle du lac Kainji, les taux épidémiques de la maladie ne sont apparus que depuis la création de celui-ci en 1968. Une prévalence de 31% a été rapportée dans cinq villages dans lesquels le ver de Guinée est désormais présent. L'incidence et l'importance économique de la maladie au moment où elle s'attaque le plus fortement aux populations, le rôle attribué au lac Kainji dans son épidémiologie et le besoin d'études biologiques du vecteur sont également présentés.

9. GBARY, A.R., GUIGEMDE, T.R., OUEDRAOGO, J.B. **La dracunculose, un fléau éradiqué dans trois villages du Burkina Faso par l'éducation sanitaire.** *Bulletin de la Société de Pathologie Exotique* (1987), 80, 390-395.

Les auteurs ont mené une étude de lutte contre la dracunculose par l'éducation sanitaire dans trois villages de la région de Banfora au sud-ouest du Burkina Faso. Ces villages étaient des foyers hyperendémiques connus de dracunculose. Les activités d'éducation sanitaire avaient pour objectif de faire connaître à la population le mode de contamination de la maladie, ainsi que les moyens de prévention collectifs et individuels. Les villages ont été organisés dans l'optique des soins de santé primaires avec la formation d'agents de santé villageois (ASV) choisis par la communauté et soutenus par un comité de santé villageois.

Les malades ont été recensés d'abord par une enquête exhaustive puis par dépistage actif. Des tamis-filtres furent distribués. Les résultats du programme ont été remarquables, et deux ans après la mise en place des activités, la maladie a été éradiquée de ces villages.

Les auteurs recommandent de réaliser les opérations de lutte peu avant la période de forte transmission. Ils concluent enfin que la faisabilité, le coût peu

élevé et l'acceptabilité par les populations font de l'éducation sanitaire une composante essentielle de toute stratégie de lutte contre la dracunculose.

**10. BELCHER, D.W., WURAPA, F.K., WARD, W.B., LOURIE, I.M. Guinea worm in southern Ghana; its epidemiology and impact on agricultural productivity.** *American Journal of Tropical Medicine and Hygiene* (1975), 21, 1, 243-249.

Il a été découvert, dans le sud du Ghana, que le ver de Guinée est présent presque exclusivement dans les villages qui dépendent de l'eau des étangs pendant la saison sèche. Le risque d'augmentation de l'incidence de la maladie dans la plaine d'Accra est sérieux car presque la moitié des 159 villages étudiés utilisent l'eau des étangs, et leurs habitants effectuent souvent des voyages en zone endémique. La présente étude a mis en évidence que les agriculteurs adultes mâles avaient plus de chances d'être infectés que les membres des autres groupes.

La quantité moyenne de jours de travail perdus chez les adultes non traités est de plus de 5 semaines. Comme la maladie est saisonnière et coïncide avec le moment où les activités sont à leur maximum, une nette diminution de la production agricole a lieu, d'autant plus qu'aucune main d'oeuvre de remplacement n'est disponible.

**11. BRIÉGER, W.R., WATTS, S., YACOOB, M. Guinea worm, maternal morbidity and child health.** *Journal of Tropical Pediatrics*, (1989), 35, 285-288.

Une étude pilote de 42 femmes de deux communautés rurales nigérianes a été menée pour déterminer comment le ver de Guinée handicape les mères de famille et diminue leur capacité à s'occuper de leurs enfants et de leur famille. Le ver de Guinée a été responsable de la moitié des cas d'enfants ne se présentant pas aux vaccinations et a dissuadé les mères d'utiliser les services de la maternité. Il a empêché les femmes de travailler et de faire du commerce, provoquant ainsi une perte de revenu moyenne de 50 dollars US. Les autres problèmes liés au ver de Guinée incluent: une perte d'appétit et une réduction de la ration alimentaire, des enfants malades non traités par leurs mères et des infections secondaires invalidantes à cause d'auto-traitements non-hygiéniques. L'expérience du ver de Guinée au Nigéria rend évident que l'approvisionnement en eau saine en quantité suffisante n'est pas seulement un problème économique et environnemental, mais qu'il devrait également constituer un élément majeur de tout programme visant à assurer la survie et le développement des enfants.

**12. CAIRNCROSS, S., TAYEH, A. Guinea worm and Water Supply in Kordofan, Sudan.** *Journal of the Institution of Water and Environmental Management*, (1988), 2, (3), 268-274.

Une étude épidémiologique du ver de Guinée dans le sud du Kordofan (Soudan) a révélé deux différents types d'infection. Dans quatre villages, tous possédant de grands réservoirs d'eau à ciel ouvert (hafirs), la prévalence de la dracunculose sur une année a été de plus de 31% et n'était pas fortement liée à l'âge. Ceci suggère un niveau d'exposition élevé et uniforme à de l'eau contaminée, probablement de l'eau apportée à la maison pour des utilisations domestiques. Dans les 23 villages restants, la prévalence n'a pas excédé 20%, mais était plus élevée chez les adultes que chez les enfants. Ceci correspond à un accroissement progressif avec l'âge du degré d'exposition à l'eau contaminée, non pas celle de la maison mais celle utilisée à l'extérieur du village, durant des voyages ou visites, l'abreuvement du bétail ou les travaux champêtres. La fourniture de sources d'eau saine n'est pas suffisante pour prévenir la transmission

si l'usage intermittent d'eau contaminée se poursuit dans les champs ou les villages voisins.

La maladie a été associée avec l'usage de certaines sources d'eau, particulièrement les hafirs mal entretenus. Bien que n'étant pas sources de la maladie, les pompes manuelles, par leurs insuffisances en matière de rendement et d'entretien, obligent de nombreux utilisateurs potentiels à boire de l'eau provenant de sources plus risquées. Dans ce contexte, une assistance aux communautés pour la construction de puits creusés manuellement, là où cela est faisable, pourrait assurer un accès plus facile à l'eau et un contrôle plus efficace du ver de Guinée à moindre coût.

**13. HUTTLY, S.R.A., BLUM, D., KIRKWOOD, B.R., EMEH, R.N., OKEKE, N., AJALA, M., SMITH, G.S., CARSON, C.D., DOSUNMU-OGUNBI, O, FEACHEM, R.G. The Imo State (Nigeria) drinking water supply and sanitation project, 2. Impact on dracunculiasis, diarrhoea and nutritional status. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, (1990), 84, 316-321.**

Les morbidités dracunculiennes et diarrhéiques chez les personnes de tous âges ainsi que la situation nutritionnelle des jeunes enfants ont été utilisés comme indicateurs de l'impact sanitaire dans l'évaluation du projet d'approvisionnement en eau potable et d'assainissement de l'Etat d'Imo dans le sud-est du Nigéria. Les données ont été recueillies par des enquêtes transversales répétées et un suivi longitudinal.

Les nouvelles sources d'eau ont eu un impact positif sur la dracunculose en dépit du faible niveau d'endémicité dans les villages étudiés. Les enquêtes transversales ont révélé que, dans les villages du projet, les personnes qui ne buvaient que de l'eau des forages avaient, un an plus tard, des taux de prévalence plus faibles que ceux s'abreuvant à d'autres sources. De plus, ceux qui étaient les plus éloignés des forages avaient des taux de dracunculose plus élevés. Quant à l'impact du projet sur la morbidité de la diarrhée, une réduction significative n'est apparue que dans certains sous-groupes de la population tels que les enfants des ménages dont le temps nécessaire à la collecte de l'eau est plus bas ( $\leq 2$  heures) pendant la saison des pluies.

La prévalence de la malnutrition ( $< 80\%$  de la valeur de référence du rapport poids/taille) parmi les enfants de moins de trois ans a significativement diminué dans les trois villages du projet. Cette diminution n'a pas été observée dans la région témoin, ce qui suggère un impact du projet sur la malnutrition aigüe. L'introduction des forages a permis une économie considérable du temps consacré à la recherche de l'eau, économie qui a pu résulter en un avantage sanitaire en donnant aux femmes plus de temps pour s'occuper de leurs enfants et des autres tâches ménagères.

**14. EDUNGBOLA, L.D, WATTS, S.T., ALABI, T.O., BELLO, A.G. The impact of a UNICEF-assisted rural water project on the prevalence of guinea worm disease in Asa, Kwara State, Nigeria. *American Journal of Tropical Medicine and Hygiene*, (1988), 39, (1), 79-85.**

La fourniture de sources d'eau protégées (par forage) a fait passer la prévalence de la dracunculose dans les communautés qui en étaient affectées de 50% ou plus, à 0% ou presque durant les trois années de l'intervention. Cependant, les forages moins accessibles ou fonctionnant mal ont eu un impact moindre sur la prévalence de la maladie. Dans les villages ne possédant pas de forages, la prévalence est restée la même. Certains des avantages socio-économiques rapidement visibles des sources d'eau rurales protégées et du

déclin de la dracunculose incluent l'augmentation des effectifs scolaires et la chute du taux d'absentéisme à l'école.

**15. YACOOB, M., BRIEGER, W., WATTS, S. Primary health care; why has water been neglected? *Health Policy and Planning*, (1989), 4, (4), 328-333.**

Cet article souligne la nécessité, aussi bien économique que philosophique, de réexaminer la façon dont sont actuellement abordés les soins de santé primaire. Une étude d'observation réalisée au Nigéria montre l'exemple d'une communauté où, bien qu'étant le plus urgent, le besoin d'approvisionnement en eau saine a été ignoré. L'infestation par le ver de Guinée a causé de sérieuses invalidités physiques dans la communauté et a eu pour conséquence une mise en application réduite de soins de santé primaire "sélectifs" internationalement privilégiés: allaitement maternel, vaccination, traitement du paludisme et thérapie de réhydratation orale. L'effet de telles invalidités sur les femmes—qui sont les premières responsables de la santé et du bien-être de leur famille—a été gravement sous-estimé, au détriment de la santé et de la survie des enfants.

Les auteurs mettent l'accent sur le besoin d'un approvisionnement en eau saine et accessible comme élément essentiel des soins de santé primaire.

**16. BRIEGER, W.R., RAMAKRISHNA, J., ADENIYI, J.D. Community response to social marketing; filters for guinea worm control. *International Quarterly of Community Health Education*, (1989-1990), 10, 3-17.**

Les activités de contrôle du ver de Guinée reposent principalement sur la prévention à travers la promotion de la santé soutenue par diverses technologies d'amélioration de l'approvisionnement en eau potable. Pour chacune de ces technologies, il existe une stratégie d'éducation sanitaire adéquate à sa promotion. La communauté rurale d'Idere, au Nigéria, a été choisie pour tester l'acceptabilité sociale du nouveau filtre en monofilament de nylon.

Une stratégie de marketing social a été utilisée, s'appuyant sur des agents de santé communautaires (ASC) participant à un programme de soins de santé primaire déjà existant. Ces agents de santé, organisés en association, ont été impliqués dans tous les aspects du projet: conception du produit, production, détermination du prix, distribution, éducation du consommateur et évaluation du programme. Une enquête de base a été réalisée sur les consommateurs potentiels de filtres.

Les agents de santé se sont révélés très efficaces pour la commercialisation des filtres puisqu'un tiers des foyers de la région étudiée ont acheté un filtre pendant les six mois de mise en vente en 1985-86. Ceux qui ont acheté ont plutôt tendance à venir d'un hameau où réside un ASC (que celui-ci vende lui-même le filtre ou non), appartenir à une religion moderne et avoir une orientation préventive envers la santé. Ceux qui n'ont pas acheté de filtre ont évoqué principalement le manque d'argent, mais parmi les autres raisons dites ou déduites figurent l'opinion que les filtres sont inférieurs aux puits, la croyance traditionnelle que le ver de Guinée ne peut pas être prévenu et la disponibilité d'autres méthodes moins chères bien qu'inefficaces. Les filtres se sont révélés particulièrement utiles dans les petits hameaux-fermes isolés entourant la ville principale.

Des recommandations sont données pour améliorer les stratégies de marketing par la modification du modèle du filtre, du prix, de la distribution et des méthodes de promotion.

**17. GUIGEMDE, T.R., GBARY, A.R., OUEDRAOGO, J.B. Lutte contre la dracunculose: problématique du traitement chimique des points d'eau au Temephos (ABATE®) en Afrique. *Publications Médicales Africaines*. (1990), 110.**

Le traitement chimique des sources d'eau de boisson par le Temephos (Abat®) est une des stratégies possibles de lutte contre la dracunculose et a fait ses

preuves en Inde. Ce produit, qui est utilisé pour la lutte contre l'onchocercose en Afrique vient de faire l'objet d'une offre par American Cyanamid pour la lutte contre les cyclopidés vecteurs du ver de Guinée.

Aux fins d'une utilisation rationnelles de ce moyen de lutte, les auteurs analysent les conditions de sa mise en oeuvre eu égard aux particularités épidémiologique de la dracunculose en Afrique: zones bioclimatiques, spécificité des sources d'eau de boisson (les mares), configuration des villages, disponibilité de compétences locales pour l'épandage du produit. Ils concluent que la situation est très différente de celle rencontrée en Inde et donc il faut garder beaucoup de réserve sur l'utilisation du Temephos en Afrique.

**18. AKPOVI, S., JOHNSON, D.C., BRIEGER, W. Guinea worm control; testing the efficacy of health education in primary care. *International Journal of Health Education*, (1983), 24, 4, 229-237.**

Un programme d'éducation pour la santé et de soins de santé primaire dans plusieurs villages d'agriculteurs de l'ouest du Nigéria constitue le sujet du présent article. Bien que ce programme traite de plusieurs problèmes sanitaires, l'accent est mis ici sur le ver de Guinée, ceci dans le but de faciliter la mesure des résultats.

Le programme en question a été examiné à trois niveaux: (1) effets à court terme sur les connaissances et les attitudes en matière de santé, (2) résultats intermédiaires sur le plan des comportements, et (3) impact à long terme sur la situation sanitaire. Le ver de Guinée et les problèmes associés à l'approvisionnement en eau saine comptaient parmi les soucis prioritaires des habitants des communautés étudiées.

**19. WATTS, S.T. Human behaviour and the transmission of dracunculiasis; a case study from the Ilorin area of Nigeria. *International Journal of Epidemiology*, (1986), 15, 252-265.**

Deux phases du cycle de transmission de *Dracunculus medinensis* sont associées aux activités humaines: (1) la déglutition de larves infestantes du ver de Guinée par absorption d'eau infectée, et (2) l'immersion d'un membre ayant une lésion causée par le ver de Guinée dans une source d'eau potable. En planifiant des stratégies de contrôle de la maladie, il est essentiel de comprendre les configurations de comportement associées à ces deux phases de la transmission, lesquelles comprennent: la consommation, le traitement et l'utilisation de l'eau; les types de collecte d'eau; et la mobilité de la population. L'auteur présente un cadre d'analyse du comportement humain dans la transmission du ver de Guinée dans une zone de 50km de rayon autour d'Ilorin, la capitale de l'Etat de Kwara au Nigéria.

Ses conclusions suggèrent brièvement certains des bénéfices qui pourraient s'accumuler dans les zones affectées comme conséquences de la prise en compte des facteurs comportementaux présents dans la transmission de la maladie.

**20. SMITH, G.S., HUTTLY, S.R.A., BLUM, D., OKEKE, N., KIRKWOOD, B.R., FEACHEM, R.G. Disability from dracunculiasis: effect on mobility. *Annals of Tropical Medicine and Parasitology*, (1989), 83, (2), 151-158.**

Une étude a été menée dans le nord-est de l'Etat d'Imo au Nigéria afin de déterminer les niveaux d'invalidité physique et de limitations de la mobilité liées à la dracunculose. Un échantillon de ménages a été visité toutes les deux semaines pour déterminer qui y était touché par la dracunculose et pour spécifier l'importance de l'invalidité. La durée moyenne des symptômes était de 12,7 semaines (avec un éventail de 3 à 29 semaines). 50% de tous les épisodes de la maladie ont eu pour conséquence une invalidité grave d'une durée moyenne de



4,2 semaines (éventail: 2-12 semaines). La période moyenne d'invalidité grave était significativement plus élevée chez les personnes âgées de plus de 50 ans. La maladie survient au plus fort de la période de récolte du riz et des ignames, qui est aussi la période de préparation au plantage.

**21. ONABAMIRO, S.D. The diurnal migration of cyclops infected with the larvae of *Dracunculus medinensis* (Linnaeus) with some observations on the development of the larval worms. *West African Medical Journal*, (1954), 3, 199-194.**

Une grande citerne en ciment contenant de l'eau provenant d'un étang et dans laquelle *Thermocyclops nigerianus* est élevé en grande quantité, a été construite sur le modèle d'un étang villageois contenant de l'eau toute l'année. Des échantillons ont été prélevés de cette citerne à différents moments de la journée afin de déterminer le sens migratoire de cette espèce de cyclopidés. Les chiffres obtenus ont permis de déduire que la migration se faisait aussi bien horizontalement que verticalement, le sens vertical étant le plus marqué. Il a ensuite été procédé à une infestation de la majorité des cyclopidés par des larves de *Dracunculus medinensis* obtenues chez des patients humains.

Des séries additionnelles de prélèvements d'échantillons ont donné des chiffres qui permettent d'aboutir aux conclusions suivantes: (a) de nombreux cyclopidés sont morts à la suite de l'infection; (b) pendant les cinq jours qui ont suivi l'infestation, les cyclopidés modérément infectés par les larves de *Dracunculus* paraissaient aussi actifs dans leurs mouvements que ceux qui n'avaient pas été infectés; (c) du sixième au quatorzième jour, les cyclopidés infectés sont devenus de moins en moins actifs et, le quatorzième jour suivant l'infection, ils étaient pratiquement incapables de se déplacer de plus de quelques centimètres du fond de la citerne.

Ce ralentissement progressif de l'activité des cyclopidés infectés est, pense-t-on, dû aux effets physiologiques de la desquamation des larves dracunculienues qu'ils portent. Ces observations sont liées à la façon dont les humains sont infectés par le ver de Guinée au Nigéria, c'est-à-dire en allant chercher de l'eau dans les étangs.



## GENERAL BIBLIOGRAPHY ON GUINEA WORM

SANGHVI, P. K. **Epidemiological studies on guinea-worm in some newly discovered villages of Jhabua district (M.P.) and test of carica papaya leaves on guinea worm infection.** *Indian Journal of Medical Sciences* (1989) **43** (5) 123–124

Epidemiological survey was carried out for prevalence of guinea worm infection in 12 villages having a total population of 10 281 persons in Jhabua district of M.P. The prevalence was 2.85%. Infection was more common in males. A paste of leaves of carica papaya with opium and common salt applied for 3 days was helpful in relief of symptoms and easy extraction of worm from the body.

BAPNA, S. **Relative susceptibilities of cyclops species from Rajasthan State to guinea worm (*Dracunculus medinensis*) larvae.** *Bulletin of the World Health Organization* (1985) **63** (5) 881–886

The role of eight different species of cyclops as intermediate hosts of *Dracunculus medinensis* has been studied by investigating their relative preferences for the ingestion of free-living larvae, the time required for larval penetration into the haemocoel, the number of larvae lethal to the copepods, and the threshold of tolerance for successful development of the larvae within the cyclops. On the basis of larval development up to the infective stage, four species of cyclops—*Paracyclops fimbriatus*, *Thermocyclops oithonoides*, *Mesocyclops leuckarti* sensu lato and *Microcyclops varicans*—were ranked as suitable hosts. *Eucyclops scerrulatus* was partially refractory, and *Tropocyclops prasinus* and *Ectocyclops rubescens* were completely refractory. Guinea worm larvae were pathogenic to *Macrocyclus distinctus*.

**Dracunculiasis surveillance.** *Weekly Epidemiological Record* (1983) **58** (4) 21–23

A survey for guineaworm in India in 1981 showed that 10 582 villages (population 12.2 million) in 7 states were affected. In 1982 (up to June) 29 906 cases were reported (Andhra Pradesh, 3049; Gujarat, 423; Karnataka, 4211; Madhya Pradesh, 3542; Maharashtra, 3776; and Rajasthan, 14 905). In Tamil Nadu (where extensive anti-dracunculiasis efforts had been undertaken for many years) there were no cases. The Government of India hopes to eradicate guineaworm in 5 years by education, improved water supplies, and the treatment of unsafe water with temefos.

F. Hawking

GUIGUEMDE, T. R. SOKAL, C. D. ROUX, J. **Dracunculiasis: a public health problem? La dracunculose, un probleme de sante publique?** *Medecine d'Afrique Noire* (1983) **30** (10) 419–426

It is concluded that the disease is a major public health problem. A table in this article lists the numbers of cases of dracunculiasis reported annually, when the data are available, by 15 countries in West Africa and Asia during the years 1972–81.

ADEKOLU-JOHN, E. O. **The impact of lake creation on guinea-worm transmission in Nigeria on the eastern side of Kainji Lake.** *International Journal for Parasitology* (1983) **13** (5) 427–432

Although guineaworm transmission had previously been recorded only at low intensity in 2 villages on the eastern side of Kainji Lake, the disease occurred in endemic proportions over a wide area after the formation of the lake in 1968. The epidemiology of the outbreak and the probable role of Kainji Lake are discussed.

W. Crewe

GUIGUEMDE, T. R. STEIB, K. COMPAORE, T. (ET AL.) **Epidemiological studies and control of dracontiasis in a humid savannah zone (south-west Bourkina Fasso). I. Studies of the vector.** Etudes epidemiologiques et controle de la dracunculose en zone de savane humide (sud-ouest de la Haute-Volta): resultats de la premiere annee d'etude. I. Etudes du vecteur (les cyclops). *OCCGE Informations* (1984) **12** (89) 15–41

In the first year of a longitudinal study of cyclops, the vector of guinea-worm, in the water sources of 2 villages in Bourkina Fasso (Upper Volta), numerous cyclops of 7 different species were found in ponds and to a lesser degree (<50 cyclops/10 l, compared

with >500 in many ponds) in wells, both unlined and lined with parapets. The authors conclude that guinea-worm transmission can also occur at wells with parapets. [However, as they do not report the prevalence of infection of the cyclops, they do not substantiate this conclusion.]

[See also the 2 following abstracts.]

A. M. Cairncross

GUIGUEMDE, T. R. KAGONE, M. COMPAORE, T. (ET AL.) **Epidemiological studies and control of dracontiasis in a humid savannah zone (south-west Bourkina Fasso). II. Clinical studies.** Etudes epidemiologiques et controle de la dracunculose en zone de savane humide (sud-ouest de la Haute-Volta): resultats de la premiere annee d'etude. II. Etudes cliniques. *OCCGE Informations* (1984) 12 (89) 43-72

A survey of guinea-worm infection in 3 villages in Bourkina Fasso yielded period prevalences of 37%, 24% and 53% during the previous year. Prevalences were similar in males and females, and highest in the 16-45 years age range. Total incapacitation lasted an average of 17.5 days, and in 45% of cases it lasted longer than 10 days. Out of 1696 persons studied (roughly half the population of the villages), 7 adults over 45 years, all of whom had lived there since birth and used no prophylaxis, could not recall ever being affected. [No reason for this was found.]

The authors recommend their survey method, using a questionnaire administered in December/January with recall over the previous agricultural year.

A. M. Cairncross

GUIGUEMDE, T. R. KAGONE, M. COMPAORE, T. (et al.) **Epidemiological studies and control of dracontiasis in a humid savannah zone (south-west Bourkina Fasso). III. The socioeconomic consequences of dracontiasis; outline of a method for evaluation of the economic cost of the disease.** Projet d'etudes epidemiologiques et de controle de la dracunculose en zone de savane humide (sud-ouest de la Haute Volta): resultats de la premiere annee d'etude. III. Les consequences socio-economique de la dracunculose: esquisse d'une methode d'evaluation du cout economique de cette maladie. *OCCGE Informations* (1984) 12 (89) 73-90

An estimate is made of the economic cost of dracontiasis on the basis of data from 3 villages in Bourkina Fasso where the mean prevalence in the previous year was 36%. [The following estimates are converted at the rate of FCFA 480 = \$1.00.] A previous study found that on average 17.5 days of agricultural work are lost per case. These are valued at \$0.88 for young adults and \$0.44 for those aged 6-15 years and over 45 years, on the basis of agricultural production figures, and a total cost in lost production of \$3.87 per head of population is derived. Productivity lost due to partial incapacity is not counted in the analysis. The authors also estimate the cost of treatment with anti-inflammatory drugs, antibiotics, antitetanus serum and bandages during emergence of the worm at \$14.90 for a typical case. They note that most patients do not seek treatment, but estimate that the cost in lost production might be halved by this treatment.

A. M. Cairncross

**Dracunculiasis surveillance (Benin, Ivory Coast, Togo).** *Weekly Epidemiological Record* (1984) 59 (42) 325-327

**Dracunculiasis.** *Weekly Epidemiological Record* (1985) 60 (5) 32-33

An investigation in 1983 showed that dracontiasis exists throughout the Punjab. A table gives the distribution of cases reported in Punjab Province in 1980 by district.

**Dracunculiasis: global surveillance summary—1984.** *Weekly Epidemiological Record* (1985) 60 (9) 61-65

Understanding of the extent and impact of dracontiasis has improved considerably, although not sufficiently, during recent years. This report summarizes recorded cases of dracontiasis country by country and year by year from 1980 to 1983, and considers that the first priority for each country involved is to develop a national plan of action suited to its own needs and resources. India is the only country so far to have established a national guinea-worm eradication programme [see *Trop. Dis. Bull.*, 1983, 80, abst. 831]. However, attack rates seem to be higher in West Africa than in India, and at least 50 million people

live in endemic zones in West Africa as compared with 13 million living in affected villages in India. The Indian Eradication Programme has concentrated on identifying infected villages and giving them the highest priority in provision of safe drinking-water supplies. It now plans to emphasize vector control (using Abate) and health education. In Africa it is now proposed to hold a regional meeting under WHO auspices to review the situation and make recommendations for action.

W. Crewe

**KOBAYASHI, A. KATAKURA, K. HAMADA, A. (ET AL.) Human case of dracunculiasis in Japan.** *American Journal of Tropical Medicine and Hygiene* (1986) **35** (1) 159-161

Part of a female *Dracunculus medinensis* worm was recovered from an abscess on the leg of a 42-year-old Japanese man resident in Shizuoka. The patient had made a short visit to China 7 years previously but because the prepatent period has been estimated to be 10-14 months the authors consider infection was acquired in Japan, making theirs the first report of dracontiasis among humans or animals in Japan. About a year before clinical symptoms appeared the patient had eaten raw loaches in Numazu (Japan), but it is not known whether these were imported or of local origin.

Carolyn A. Brown

**GUIGUEMDE, T. R. Climatic features of the endemic areas and epidemiological modes of dracontiasis in Africa. Caracteristiques climatiques des zones d'endemie et modalites epidemiologiques de la dracunculose en Afrique.** *Bulletin de la Societe de Pathologie Exotique et de ses Filiales* (1986) **79** (1) 89-95

In Africa, the endemic areas of dracontiasis involve 2 climatic zones: the Sudanese-Sahelian zone which is characterized by the alternation of a short rainy season and a long dry season, and the Liberian-Nigerian zone which is characterized by 2 rainy seasons and 2 dry seasons. The rainfall in each zone determines a specific cyclic evolution of the Cyclops (the vectors of the disease) in the ponds which are the most important places of transmission. The climatic cycle having an annual rhythm the same as the cycle of dracontiasis (12-14 months) results for each zone in a constant period during which the epidemiological conditions of transmission are the more suitable and during which the disease peaks: beginning of the rainy season (May-June) in the Sudanese-Sahelian zone and right in the dry season (December-February) in the Liberian-Nigerian zone.

During the International Drinking Water Supply and Sanitation Decade, it is important that the strategies of control and the national programme of control take into account these epidemiological features of dracontiasis.

**KHAN, H. D. AMIN-UD-DIN, M. SHAH, C. H. Epidemiology and socio-economic implications of dracunculiasis in eleven rural communities of district Bannu (Pakistan).** *Journal of the Pakistan Medical Association* (1986) **36** (9) 233-238

**GBARY, A. R. GUIGUEMDE, T. R. OUEDRAOGO, J. B. Dracontiasis: study of beliefs and attitudes in savannah endemic area (Burkina Faso).** *Dracunculose: etude des croyances et attitudes des populations en zone endemique de savane (Burkina-Faso).* *Bulletin de la Societe de Pathologie Exotique et de ses Filiales* (1987) **80** (2) 242-251

A study in 6 villages in south-west Burkina Faso with an incidence of dracontiasis of 20.3% (range, 3.7-56.7% for the individual villages).

**Dracunculiasis surveillance: Uganda.** *Weekly Epidemiological Record* (1984) **59** (10) 69-71

Between January 1983 and June 1986 UNICEF plans to improve existing boreholes in Uganda to provide potable water for a million people and to drill 660 new boreholes for a further 132 000 people. A consultant epidemiologist was sent to assess the possibility of using dracontiasis to monitor the effect of the programme on the risk of waterborne-disease transmission. A variety of search methods for the disease were used, including health unit records, case histories, active searches of villages, roadsides or markets, and cluster surveys of villages. Most of the districts of Kitgum, Kotido and Moroto was considered endemic for dracontiasis and the West Nile, West Moyo and Nebbi Districts were reported to be a "questionable" endemic area. Land bordering the endemic and questionable endemic areas constitutes epidemic areas where focal, sporadic outbreaks result from imported disease. Dracontiasis was associated with the use of 3 types of

drinking water sources (ponds or waterholes, swamps, and stagnant pools in streambeds) and was a particular problem in villages in which "valley tanks", constructed for cattle use, were used for drinking water. The Uganda National Committee for International Drinking Water Supply and Sanitation Decade has recommended that Kitgum District should be a primary target for safe water programmes. To determine the effect of the UNICEF's plan of action for rural water supplies in Uganda an initial survey of 600 000 people in the endemic area was planned, ending early 1984, to be compared with a second survey done 2 years after the introduction of safe water sources. The consultant considered that dracunculiasis could be eliminated from Uganda if the people could be persuaded not to use unsafe sources of water and if the goal of 1 borehole/200 people could be achieved.

Carolyn A. Brown

EDORH, A. A. **A serious consequence of dracunculiasis: a cancerous ulcer.** Une conséquence grave de la dracunculose: l'ulcère cancerise. *Afrique Medicale* (1986) **25** (239) 147-148

A report of a case.

ZAMAN, V. CONNOR, D. H. AHMED, M. **A dracunculosis case with unusual presentation from Pakistan.** *Acta Tropica* (1985) **42** (2) 195-196

The patient, who presented with a painful lump in the left hypochondrium, had unusual clinical, radiological and histopathological manifestations. The authors state that dracunculiasis should be considered in the diagnosis of calcified irregular or ovoid bodies.

KLIKS, M. M. RAO, C. K. **Development of rapid ELISA for early serodiagnosis of dracunculiasis.** *Journal of Communicable Diseases* (1984) **16** (4) 287-294

A rapid ELISA was developed for the detection of specific antiparasite IgG using an affinity-purified, peroxidase-labelled conjugate. Crude antigen was prepared by homogenization and extraction of intact adult female worms in phosphate-buffered saline. Standard microtitre plates were coated with approximately 5 µg of antigen per well. To establish the assay samples of [serum from] clotted venous blood (32) and/or filter paper blood (63) were collected from 70 active acute and convalescent cases; paired venous and filter paper samples were collected from 25 of these persons. Samples were tested at 4-fold dilutions from 1 in 4 to 1 in 1000. Serum and conjugate incubations were 20 min each at 37°C. Plates were read visually 20 min after addition of ABTS substrate and colour change was compared with non-endemic control sera at each dilution. End point titre was taken as the highest dilution of test serum having a greater degree of visualized colour change than the non-endemic control serum. By this criterion 67 (96%) of the patients were positive; mean titre was 1 in 256. Serum from paired clotted blood and filter paper eluates gave comparable results at all dilutions. The 2 patients with negative responses had broken, retracted worms with massive abscesses and may have been lacking in free antibody. Sera from 15 bancroftian filariasis patients, 5 persons with acute malaria and 10 normal persons from non-endemic areas were all negative.

GALLI, M. ALMAVIVA, M. BASSANI, L. CIANTIA, F. GENCHI, C. FALAGIANI, P. **Specific IgE response in dracunculiasis.** [Correspondence]. *Transactions of the Royal Society of Tropical Medicine and Hygiene* (1985) **79** (2) 283

A radioallergoabsorbent test, with extract of first-stage larvae of *Dracunculus medinensis* as antigen, was used to test 7 serum samples from Uganda, taken immediately after blisters containing *D. medinensis* female worms had burst. All the patients had high titres of specific IgE antibody whereas control sera from 5 patients with other helminthiases were all negative.

Carolyn A. Brown

KALE, O. O. **Fall in incidence of guinea-worm infection in western Nigeria after periodic treatment of infected persons.** *Bulletin of the World Health Organization* (1982), recd 1983 **60** (6) 951-957

Drug trials with niridazole and metronidazole, mebendazole, or thiabendazole and metronidazole were carried out between 1971 and 1974 in 17 rural areas in western Nigeria endemic for guinea worm. Chemotherapy and/or dressing of ulcers was given to all infected persons over the trial period and in after years. A longitudinal study of infection in these villages showed a marked fall in annual incidence over 8 years. Treatment

appeared to reduce the reservoir of infection and the pollution rate of the water supply. Most water still contained uninfected Cyclops. The study shows the potential role of therapeutic measures in controlling the infection. Satisfactory control could be further improved by elimination of Cyclops. Attention is drawn to the relevance of these results for the International Drinking Water Supply and Sanitation Decade.

Rosemary Rogers

**Dracunculiasis surveillance.** *Weekly Epidemiological Record* (1984) **59** (38) 291-293

The conclusion reached by a consultant epidemiologist from the assessment of UNICEF-assisted water projects in 3 states of Nigeria was that the incidence of dracunculiasis is an excellent indicator of the improvement of drinking-water provision.

[See also *Trop. Dis. Bull.*, 1985, 82, abst. 268.]

ZAMAN, V. BAPNA, S. RENAPURKAR, D. M. **Scanning electron microscopy of *Dracunculus medinensis* first-stage larva.** *Proceedings of the Helminthological Society of Washington* (1989) **56** (1) 60-63

HARADA, M. SUGURI, S. INATOMI, S. KATAKURA, K. KOBAYASHI, A. **Scanning electron microscopy on the first stage larvae of *Dracunculus medinensis*.** *Japanese Journal of Parasitology* (1989) **38** (1) 17-21

WATTS, S. J. **Human behaviour and the transmission of dracunculiasis: a case study from the Ilorin area of Nigeria.** *International Journal of Epidemiology* (1986) **15** (2) 252-256

Dracunculiasis can be entirely eradicated by the provision of protected drinking water for all members of the community. In planning control strategies it is essential to understand the patterns of behaviour associated with the two phases of transmission related to human activities, namely, swallowing the infective guinea worm larvae in infected water and, 10-12 months later, the immersion of a limb with a guinea worm lesion on it in a drinking water source. These patterns of behaviour include water consumption, water use and water treatment, patterns of water collection and population mobility. The recent increase in the levels, frequency and distance involved in population circulation is associated with increased prevalence rates. This analytical framework is used in a study of disease transmission in the area within a 50 km radius of Ilorin, the capital of Kwara State, Nigeria, as part of a larger survey in the State carried out between 1979 and 1984 [see also *Trop. Dis. Bull.*, 1984, 81, abst. 3286]. The conclusion briefly suggests some benefits which might accrue to affected areas as the result of the consideration of behavioural factors involved in disease transmission.

*From the author's summary*J. Haworth

ILEGBODU, V. A. CHRISTENSEN, B. L. WISE, R. A. ILEGBODU, A. E. **Source of drinking water supply and transmission of guinea worm disease in Nigeria.** *Annals of Tropical Medicine and Parasitology* (1987) **81** (6) 713-718

This study was made in a rural community in Nigeria during 1982. Pond water accounted for 76% of domestic water owing to inadequacy of a piped supply. The ponds received storm water run-off and were contaminated with sewage as indicated by relatively high counts of faecal coliforms and faecal streptococci and the presence of parasitic protozoa and helminths.

Thermocyclops, the vector for guinea-worm, was found in all ponds and was most numerous at the height of the dry season. The distance of a pond from the nearest household was inversely proportional to the number of cyclops in the water. The authors suggest that the cycle of infection is maintained by infected people wading into ponds to obtain water. The provision of safe water is essential if the chain of infection is to be broken.

R.A.E. Barrell

GUIGUEMDE, T. R. OUEDRAOGO, J. B. GBARY, A. R. STEIB, K. **Cyclopidae, intermediary hosts of guinea-worm in Sudano-Sahelian area (Burkina Faso): a longitudinal survey.** Etude longitudinale des cyclopidés, hotes intermediaires du ver de guinee en zone soudano-sahelienne (Burkina Faso). *Annales de Parasitologie Humaine et Comparee* (1987) **62** (5) 484-491

During 18 months covering 2 annual rainy seasons, 338 monthly water samples were taken in 29 ponds of 2 dracontiasis endemic villages of south-western Burkina Faso. The dynamics of ponds inhabited by Cyclopidae have been surveyed as far as their densities and their species are concerned. [The authors] identified a total number of 17 species from 6 genera of which the decreasing order in frequency is: Thermocyclops, Mesocyclops, Metacyclops, Cryptocyclops, Microcyclops and Allocyclops. The dominant species are: Thermocyclops crassus consimilis, Metacyclops margaretae, Thermocyclops oblongatus and Thermocyclops neglectus decipiens. The crowds of these major species during the period of dracontiasis high transmission in the surveyed area (June to July) suggest, in the absence of a search for *Dracunculus medinensis* larvae, that they should play the principal part as vector of the parasite in this area.

KAMAL, R. MANGLA, M. PRAKASH, D. SHARMA, G. L. SRIVASTAVA, R. C. **Relative toxicity of natural pyrethrins against Mesocyclops leuckarti sensu lato: the carrier of dracunculiasis.** *Insect Science and its Application* (1988) 9 (4) 437-440

Pyrethrins I and II were extracted from 5 seasonal Compositae herbs collected from semi-arid and hilly areas of north India. The relative toxicity of natural pyrethrins was evaluated against Mesocyclops leuckarti sensu lato. Based on the LC values, the extract of the plants could be arranged as follows: *Tagetes minuta* > *Pulicaria crispa* > *T. patula* > *T. minuta* [from a different locality] > *P. angustifolia*.

The assay involved the exposure of adult cyclops to the purified plant extracts in Petri dishes for 24 h. The LD<sub>50</sub> for *T. minuta* from 1 locality was 0.0226 p.p.m. compared with a value of 0.0155 for pure pyrethrin 20%.

Carolyn A. Brown

MUKHERJEE, S. N. DESHPANDE, P. SHARMA, R. N. **Effect of azadirachtin on Mesocyclops leuckarti sensu lato, vector of dracunculiasis.** *Indian Journal of Medical Research* (1990) 91 Nov. 461-463

Extension or otherwise of characteristic insect development inhibitory effects of the neem sesquiterpenoid azadirachtin have been examined on eggs and nauplii of the crustacean cyclops, *M. leuckarti sensu lato*, a major vector of guinea-worm disease at 0.1 p.p.m. and above doses. Azadirachtin reduced survival of early nauplii (N<sub>1</sub> to N<sub>3</sub>) at 0.1 p.p.m. and above doses. No such effect was observed when eggs and late nauplii (N<sub>4</sub> to N<sub>5</sub>) were exposed. Azadirachtin did not affect the moult cycle when late nauplii (N<sub>4</sub> to N<sub>5</sub>) were exposed continuously till adulthood. At all concentrations tested, adult cyclops exhibited normal mating.

HENDERSON, P. L. FONTAINE, R. E. KYEYUNE, G. **Guinea worm disease in Northern Uganda: a major public health problem controllable through an effective water programme.** *International Journal of Epidemiology* (1988) 17 (2) 434-440

During a modified cluster survey in 1984 2014 people in Uganda were questioned about their household and its members, their age and sex, and the date of emergence and location of any guinea-worms, and the type of and distance from their water source. In all, 389 people reported that  $\geq 1$  guinea-worm(s) had emerged over the previous year. Those who used a bore hole as their main water source showed the lowest rates of infection.

Sheila M. Crewe

PETIT, M. M. DENIAU, M. TOURTE-SCHAEFER, C. AMEGBO, K. **Epidemiology of dracontiasis: a 5-year study in south Togo.** Etude épidémiologique longitudinale de la dracunculose dans le sud du Togo. *Bulletin de la Société de Pathologie Exotique et de ses Filiales* (1989) 82 (4) 520-530

BRAIDE, E. I. EGBE, E. I. O. OKORO, J. I. INYANG, A. **Prevalence and geographical distribution of dracunculiasis (guinea-worm disease) in Cross River State, Nigeria.** *Tropical and Geographical Medicine* (1989) 41 (4) 289-293

Records from epidemiological units, clinics and hospitals throughout the Cross River State showed that 70 villages in 3 of the 17 local government areas (all in the northwest) had endemic guinea-worm disease. The affected villages had no safe sources of drinking



water, the villagers depending on stagnant pools and some streams. Comparison with data from previous surveys suggests that the disease is spreading eastwards and southwards.

Sheila M. Crewe

EDUNGBOLA, L. D. WATTS, S. **An outbreak of dracunculiasis in a peri-urban community of Ilorin, Kwara State, Nigeria.** *Acta Tropica* (1984) **41** (2) 155-163

The building of the Asa dam to supply Ilorin, the capital of Kwara State in Nigeria, with drinking water caused the formation of a stagnant pond in the lower portion of a seasonal stream with serious results on the health of local people. The Egbejila community (700-1000 people) used to obtain water from the stream when available and from a more distant fast-flowing perennial river in the dry season; dracunculiasis used to be unknown. This paper gives a graphic description of an outbreak of guinea worm infection that resulted from the use of the stagnant pond as a source of drinking water: of 589 people examined 45% had at least one active lesion with a protruding guinea worm; of those infected 67% had more than 1 lesion (1 person had 13) and 55% were unable to perform their usual activities. *Thermocyclops nigerianus* and *Dracunculus medinensis* were isolated from the pond.

Carolyn A. Brown

**Update: dracunculiasis eradication—worldwide, 1989.** *Morbidity and Mortality Weekly Report* (1990) **38** 51/52 882-885

This report reviews very briefly the efforts made to eradicate guinea-worm disease during the past decade. [Although the article is too short to contain much new information, it is a summary that will be useful to those not familiar with the infection.] Possible strategies for "eradicating" dracontiasis in the 1990s are outlined.

Sheila M. Crewe

EDUNGBOLA, L. D. WATTS, S. J. KALE, O. O. **The distribution of dracunculiasis in Nigeria: a preliminary study.** *International Journal of Epidemiology* (1988) **17** (2) 428-433

Dracontiasis is present in all the states of the Federation of Nigeria and in the Federal Capital Territory of Abuja; it is recorded from all vegetation zones (except the small area of semi-desert Sahel in the extreme northeast), and in all rainfall zones.

Sheila M. Crewe

EDUNGBOLA, L. D. **Dracunculiasis in Igbon, Oyo State, Nigeria.** *Journal of Tropical Medicine and Hygiene* (1984), reed 1985 **87** 4 153-158

Less than 5 years after the introduction of guinea-worm into a small community in Oyo State, Nigeria, over 75% of the economically active adults are infected and many are severely incapacitated. Peak transmission occurs in November, at the end of the rainy season, when the numbers of *Thermocyclops* in local ponds are high. There are no wells in the village.

W. Crewe

EDUNGBOLA, L. D. WATTS, S. J. **Epidemiological assessment of the distribution and endemicity of guinea worm infection in Asa, Kwara State, Nigeria.** *Tropical and Geographical Medicine* (1985) **37** (1) 22-28

An investigation in 1983 showed dracontiasis to be widespread and highly prevalent in a rural area adjacent to Ilorin: 6230 individuals in 11 villages were examined, and 53% had the infection. More adults than children showed clinical evidence of active dracontiasis but there was no marked difference between the sexes. Factors responsible for the high endemicity and the distribution pattern of the infection in different areas are discussed, as well as its sociological impact.

W. Crewe

ILEGBODU, V. A. CHRISTENSEN, B. L. WISE, R. A. KALF, O. STEELE, J. H. CHAMBERS, L. A. **Age and sex differences in new and recurrent cases of guinea worm disease in Nigeria.** *Transactions of the Royal Society of Tropical Medicine and Hygiene* (1987) **81** (4) 674-676

In this population-based cross-sectional survey of the prevalence and incidence of guinea worm disease in Idere, a rural agricultural community of Oyo state in Nigeria, epidemiological data were collected by household interview of all 501 households (6527

persons, 3594 females and 2933 males). 86% of the households had at least one case. The prevalence was 32.4% in the overall population, but varied markedly by age and sex. About 10% of prevalent cases were first-time infections or new cases. Males over 19 years of age had a higher prevalence rate than adult females; however, females had a higher prevalence rate at younger ages. The prevalence in females peaked (47%) at 35 to 44 years; for males the proportion was highest (57%) at ages 45 to 54 years.

**UDONSI, J. K. Dracontiasis in the Igwun River Basin, Nigeria: its distribution, epidemiology, and transmission dynamics.** *Tropical Medicine and Parasitology* (1987) **38** (4) 304-308

In a cross-sectional dracontiasis survey [in 1985-86] of the Igwun Basin, Nigeria, 879 persons from 7 communities were examined. Ninety-five (10.8%) had dracontiasis blisters and ulcers. Male prevalence of 14.9% was significantly higher ( $P < 0.001$ ) than the female prevalence of 6.9%. Infection increased with age, rising from 2% in 1-4 years old children to 15.8% in the 35-44 years old adults. Sixty-five percent of infected males had blisters, 34.4% had ulcers. Among females, 48.4% had blisters, 51.6% had ulcers. Among the males, blisters and ulcers showed seasonal variations, with 80% cases of blisters between November and April, and 20% between June and October. Seasonal morbidity pattern in females did not show any significant variation ( $P > 0.20$ ). The density of cyclopoid copepods increased in the dry season in relation to decreasing rainfall. The highest cyclops count was 18 cyclops/l of water recorded between January and February, while the lowest was zero recorded in July in some areas. The infection rates of cyclops rose from 10% in November to a peak value of 20% between January and February, with the lowest rate of 5% in July. Larval burden of cyclops also rose from 3 L3s/cyclops in June, to 5 L3s/cyclops in January. Dracontiasis appears to be a relatively new disease in the area, and its spread has been enhanced by the interaction of human behavioural, and parasite-vector ecological factors which are seasonally modulated.

**WATTS, S. J. Dracunculiasis in Africa in 1986: its geographic extent, incidence, and at-risk population.** *American Journal of Tropical Medicine and Hygiene* (1987) **37** (1) 119-125

The paper presents an assessment of the extent, incidence and prevalence of dracontiasis in the savannah belt of Africa. Dracontiasis, infection with guinea-worm, is transmitted by drinking contaminated water and therefore global eradication is feasible. The paper documents the geographical distribution and incidence of the disease in Africa from data obtained mainly from an African Workshop on Dracunculiasis in 1986. It is estimated that the annual incidence of the disease is 3.32 million with an at-risk population of about 120 million. However, the validity of the data is highly suspect: the estimates may be an over- or under-emphasis of the true prevalence. Whatever the figures, it is clear that the disease presents a major public health hazard in that part of Africa associated with a predominantly tropical wet and dry climate.

*T. Rathwell*

**Dracunculiasis: global surveillance summary 1986.** *Weekly Epidemiological Record* (1987) **62** (45) 337-339

A table shows the reported numbers of cases of dracontiasis in 12 African countries and in India for 1984, 1985 and 1986. However, the accuracy of the figures is questionable because of problems of notification to WHO. At the end of 1986 only Ivory Coast and India were undertaking surveys of cases of the disease, although it is officially reportable in several countries. The Centers for Disease Control, Atlanta, have developed 3 animal models for drug testing: *Dracunculus medinensis* in rhesus monkeys and *D. insignis* in raccoons and ferrets.

*Sheila M. Crewe*

**STEIB, K. MAYER, P. Epidemiology and vectors of *Dracunculus medinensis* in northwest Burkina Faso, West Africa.** *Annals of Tropical Medicine and Parasitology* (1988) **82** (2) 189-199

The authors studied 3 villages in the dry savannah zone over 4 years. The inhabitants are subsistence farmers, and peak transmission occurs at the onset of the rainy season (June and July) when the villagers are working in the fields and using small hand-dug ponds or water-holes for drinking-water. *Thermocyclops inopinatus* was considered the most

important vector. Filtration of drinking-water was the only adequate control method, and synthetic gauze filters were preferred by the local population.

Sheila M. Crewe

OFUEZIE, I. E. ADENIYI, I. F. **The prevalence and endemicity of dracunculiasis in Akowide village, Oyo State, Nigeria.** *Annals of Tropical Medicine and Parasitology* (1990) **84** (2) 163-169

An epidemiological assessment of the prevalence and endemicity of guinea-worm infection at Akowide village in Oyo State, Nigeria was carried out between September 1986 and August 1987. A total of 325 people were interviewed and examined during the period. The data obtained were analysed to show the relationship between the prevalence of the disease and the population structure in the affected community.

Overall, about 15% of persons in the village were infected. The rate of infection was significantly lower ( $P < 0.05$ ) in children (less than 20 years of age) than in adults (20 years of age and above). Among men, it was highest (29%) within the age groups of 20-24 and 45-49 years, while the highest rate among females (30%) was among the age group of 10-14 years of age. In the 0-14 and 30-44 years age groups the average rate of infection was higher in females ( $21.1 \pm 8.1\%$ ) than in males ( $13.9 \pm 6.1\%$ ), while in the age groups of 15-29 and 45 years and above the average rate of infection was significantly higher ( $P < 0.05$ ) in males ( $23.4 \pm 4.7\%$ ) than in females ( $14.8 \pm 2.9\%$ ). The severity and duration of incapacitation was high (63%) among the affected persons, and the disease was found to have serious detrimental effects on the socio-economic life of this village.

FABIYI, J. P. **Geographical distribution of dracontiasis in Bauchi State, Nigeria.** *Discovery and Innovation* (1991) **3** (3) 72-76

A cross-sectional examination of 17 950 subjects (9120 male) from randomly selected rural and urban centres in Bauchi State was done in September-November 1988 (the end of the wet season) to determine the geographical distribution of dracontiasis. All the 20 Local Government Areas were affected (as shown by the presence of protruding *Dracunculus medinensis* worms in the groups of people examined), with the positivity rates at the various centres ranging from 0 to 82%. The infection rates reflected the availability of protected water and were in general much lower in urban centres than in rural areas. Males had higher infection rates than females (52% compared with 34%, overall). The seriousness of this public health problem, particularly in rural areas, in Bauchi State had not previously been realized because earlier data had been obtained from hospital records.

Carolyn A. Brown

ILEGBODU, V. A. KALE, O. O. WISE, R. A. CHRISTENSEN, B. L. STEELE, J. H. JR CHAMBERS, L. A. **Impact of guinea worm disease on children in Nigeria.** *American Journal of Tropical Medicine and Hygiene* (1986) **35** (5) 962-964

In 1981-82 768 boys and 727 girls aged 6-14 years were examined at 4 primary schools in a village in south-western Nigeria: 22% of the girls and 20% of the boys were infected with guinea worm, and on average the infected children were absent for about 25% of school days as compared with a 2.5% absentee rate for uninfected children. Nearly 6% of children left school permanently because of guinea worm infection. The implications of these findings in relation to educational attainment are briefly discussed.

W. Crewe

**Dracunculiasis: Togo.** *Weekly Epidemiological Record* (1987) **62** (28) 205-206

Although reporting of dracontiasis became compulsory in Togo in late 1983, <2000 cases were reported in 1984 and 1985—the estimated annual incidence was >440 000 (population, 2.8 million). Control measures instituted by the Togo Government (with help from outside agencies) have included an extensive rural water supply programme and health education. Reduced numbers of cases have been reported from some prefectures, but no change or even increased numbers from others. In 1 village, Kati in Kloto Prefecture, the number of reported cases of dracontiasis was reduced from 928 in 1981 to only 7 in 1985, as a result of a health education project set up there by a medical missionary organization which involved 14 volunteer health promoters and the installation of 10 new wells.

An editorial note concludes that with stronger national co-ordination, and with community mobilization as seen in Kati, it is conceivable that Togo could eliminate dracontiasis by the end of the International Drinking Water Supply and Sanitation Decade in 1990 or soon after.

Carolyn A. Brown

**Dracontiasis: Ivory Coast.** *Weekly Epidemiological Record* (1987) **62** 23 169-170

This short note records how a rural water supply programme started in 1973 (providing some 12 500 new wells by 1985), and a health education and surveillance campaign undertaken since the end of 1982 (involving health workers who cover 2100 villages, i.e. 25% of the total), have reduced the reported incidence of dracontiasis in Ivory Coast from 67 123 cases in 1966 to 1889 in 1985.

Carolyn A. Brown

IMTIAZ, R. HOPKINS, D. R. RUIZ-TIBEN, E. **Permanent disability from dracontiasis.** [Correspondence]. *Lancet* (1990) **336** Sep. 8 630

It is estimated that in 1988 the annual permanent disability from dracontiasis in Ilorin State, Nigeria, was about 5/100 000 population. (In comparison, data for 1988 showed permanent disability (lameness) from poliomyelitis to be 38.3/100 000 in Ilorin.) Thus, dracontiasis is a significant cause of lameness in Nigeria.

[Disability in dracontiasis results from skin sepsis in lesions in the leg with complications including septic arthritis.]

E.M. Scrimgeour

SMITH, G. S. BLUM, D. HUTTLY, S. R. A. OKEKE, N. KIRKWOOD, B. R. FEACHEM, R. G. **Disability from dracontiasis: effect on mobility.** *Annals of Tropical Medicine and Parasitology* (1989) **83** (2) 151-158

The study was part of an evaluation of the UNICEF-assisted Drinking Water Supply and Sanitation Project in Imo State, Nigeria. A sample of household units (100 in year 1, 195 in year 2) [in northeastern Imo State] was visited every 2 weeks to determine who was affected by dracontiasis and to characterize the extent of related disability. The average duration of symptoms was 12.7 weeks (range 3-29 weeks). Fifty eight per cent of all episodes of disease resulted in severe disability (with the individual unable to leave the compound) lasting a mean of 4.2 weeks (range 2-12). The mean period of severe disability was significantly higher for those aged 50 years and over than for those less than 50 years old. In the area studied, the disease occurred during the peak yam and rice harvest time and the period of preparation for the planting season. This is the first study to document systematically and prospectively the marked restriction of normal activity in affected individuals and the long duration of the disability. These findings can assist in improving estimates of the costs associated with dracontiasis and of potential economic benefits if the disease were eradicated.

BRIEGER, W. R. GUYER, J. **Farmers' loss due to guinea worm disease: a pilot study.** *Journal of Tropical Medicine and Hygiene* (1990) **93** (2) 106-111

Guinea-worm [*Dracunculus medinensis*] is endemic in Idere, a rural community in Oyo State (Nigeria), and in 1987-88 it was estimated that 15% of the population were affected. In-depth interviews were conducted with 20 farmers who had been disabled by the worm between October 1987 and May 1988. Information was sought on: time and duration of illness, crops usually planted and crops the farmer could not plant because of guinea-worm. The study depended on subjective estimates by the farmers based on yields normally obtained. Data analysis was primarily descriptive with emphasis on processes and trends observed. The average age of the farmers was 45 years (range 27-68), and they were affected by guinea-worm for between 1 and 7 months. The disability ranged from difficulty in walking (1 farmer) and walking with the aid of a stick (2) to being bedridden (17). Time of infection varied, with 8 farmers affected only in autumn/winter (October to January), 3 from February to May only, whereas in the rest the infection spanned both seasons. Rains begin any time from March onwards, so many crops are planted in the spring (February to May). The 4 main crops grown were maize, cassava, yams and melons, but not all were grown by all the farmers. Losses were experienced in all crops due to inability to plant. It was estimated that total losses of the 20 farmers were 26 590

Nigerian naira, and for the whole community would be 358 965 Nigerian naira (equivalent to US\$90 000). However, it was clear that days of disablement due to guinea-worm did not always indicate direct financial loss. For example, timing of illness may not coincide with planting of a particular crop, a short duration of illness may allow the farmer to compensate for days lost. The design of large-scale surveys based on results from this pilot study and the importance and economics of guinea-worm control are discussed.

M.R. Hails

PENDSE, A. K. SHARMA, A. K. MEWARA, P. C. **Dracunculus orchitis: a case report.** *Journal of Tropical Medicine and Hygiene* (1987) **90** (3) 153–154

EBERHARD, M. L. RAB, M. A. DILSHAD, M. N. **Red Dracunculus medinensis.** *American Journal of Tropical Medicine and Hygiene* (1989) **41** (4) 479–481

A report of 2 cases in unrelated individuals living in the Punjab (Pakistan).

FAGBEMI, B. O. HILLYER, G. V. **Immunodiagnosis of dracunculiasis by Falcon assay screening test–enzyme-linked immunosorbent assay (FAST-ELISA) and by enzyme-linked immunoelectrotransfer blot (EITB) technique.** *American Journal of Tropical Medicine and Hygiene* (1990) **43** (6) 665–668

The Falcon assay screening test–enzyme-linked immunosorbent assay (FAST-ELISA) and the enzyme-linked immunoelectrotransfer blot (EITB) technique were used to test human sera with *Dracunculus medinensis* adult worm antigen in order to assess their potential value in the immunodiagnosis of dracunculiasis. The human sera used were from patients with prepatent and patent *D. medinensis* infections or from patients infected with other nematodes (*Onchocerca volvulus* and *Loa loa*) or trematodes (*Schistosoma mansoni* and *S. haematobium*), as well as uninfected Nigerian and Puerto Rican normal controls. In the FAST-ELISA, the sera from prepatent and patent dracunculiasis patients gave the highest absorbance values relative to normal human sera. The highest cross-reactivity was observed with onchocerciasis sera; no cross-reactivity was seen with sera from individuals with loiasis or schistosomiasis mansoni or haematobia. By the EITB, sera from dracunculiasis patients specifically recognized a 16 kDa protein (Dm 16) and antibodies to Dm 16 disappeared 2 months after worm extraction. Recognition of Dm 16 occurred from the late prepatent stage. A 17 kDa protein (Dm 17) was also recognized by dracunculiasis sera, but antibodies to Dm 17 disappeared more slowly and were present 1 year after recovery.

KALE, O. O. ELEMILE, T. ENAHORO, F. **Controlled comparative trial of thiabendazole and metronidazole in the treatment of dracontiasis.** *Annals of Tropical Medicine and Parasitology* (1983) **77** (2) 151–157

In a placebo-controlled field trial [in Nigeria] involving 111 cases of dracontiasis, thiabendazole (at 50 mg/kg daily for two days or 100 mg/kg daily for two days) was compared with metronidazole (at 30–40 mg/kg t.d.s. for three days) for effectiveness against the guinea-worm, *Dracunculus medinensis*. All three regimens gave similar results and were significantly more effective than the placebo in bringing relief from symptoms of the disease and in the healing of guinea-worm ulcers. Elimination of adult worms was more rapid, but not significantly so, in patients treated with anthelmintic than in the control group. ...Metronidazole was generally well tolerated but transient dose-related side-effects, mostly gastrointestinal, occurred in about 50% of patients treated with thiabendazole.

EBERHARD, M. L. BRANDT, F. H. RUIZ-TIBEN, E. HIGHTOWER, A. **Chemoprophylactic drug trials for treatment of dracunculiasis using the Dracunculus insignis–ferret model.** *Journal of Helminthology* (1990) **64** (2) 79–86

Ferrets treated with up to 3 doses of diethylcarbamazine, albendazole or ivermectin, at various times after their inoculation with *Dracunculus insignis*, yielded worm burdens that were not significantly different from those recovered from untreated inoculated ferrets. Metrifonate and CGP6140 in more limited trials were also ineffective in reducing worm recovery. The authors conclude that these agents commonly used for other helminthic

infections do not appear promising for the control of human guinea-worm infection, at least as shown in this model.

Carolyn A. Brown

HOPKINS, D. R. **Dracunculiasis eradication: the tide has turned.** *Lancet* (1988) ii July 16 148-150

Notes are given of the progress towards eradication of dracunculiasis made in 17 countries up to March 1988. The author considers that the disease could be eradicated by December 1995 if the current momentum is intensified.

Sheila M. Crewe

RENAPURKAR, D. M. DESHMUKH, P. B. **Acorus calamus as a cyclopcide.** *Bulletin of Haffkine Institute* (1983), reed 1985 11 (2) 25-28

Although the organophosphate temephos will remove Cyclops from aquatic reservoirs for 5-7 weeks at 0.5-1.0 mg/l, its use in drinking-water sources is hazardous. The authors therefore investigated plants for cyclopicidal agents. They cite Deshmukh's thesis work which showed that the oil of *Acorus calamus* (calamus or sweet flag) inhibits the growth of many insects. Its essential oil contains  $\beta$ -asarone (related to myristicin, an allylbenzodioxole). Exposure of 20 adult cyclops to 5-10 p.p.m. of the oil for 24 h resulted in 100% mortality. The active ingredient was identified as  $\beta$ -asarone.

D.W. FitzSimons

SRIDHAR, M. K. C. KALE, O. O. ADENIYI, J. D. **A simple sand filter to reduce guinea worm disease in Nigeria.** *Waterlines* (1985) 4 (2) 16-19

Methods for removing Cyclops from water are listed, and their relative suitability for poor communities is discussed. The paper describes an experimental filter consisting of a box, 0.5 m  $\times$  0.5 m  $\times$  1.0 m containing sand and gravel, which costs US\$ 15 to make and can be placed beside a water source; improvements to the design are also suggested.

Sandy Cairncross

HOPKINS, D. R. **Dracunculiasis eradication: a mid-decade status report.** *American Journal of Tropical Medicine and Hygiene* (1987) 37 (1) 115-118

A campaign to eradicate dracunculiasis has been underway from the beginning of the International Drinking Water Supply and Sanitation Decade (1981-1990), since providing safe drinking water is the most effective means to prevent that disease. About 120 million persons are estimated to be at risk of the infection in Africa, and 20 million more in India and Pakistan. Both major endemic countries in Asia have begun efforts to eliminate the disease, and by the end of 1986, national anti-dracunculiasis programs were underway or planned in 8 of the 19 affected African countries. In May 1986, the World Health Assembly adopted a resolution on the elimination of dracunculiasis—the first such resolution since the successful Smallpox Eradication Program. India, which began its Guinea Worm Eradication Program in 1980, has already eliminated the disease from one of seven endemic states, and reduced the total number of cases found through active surveillance by 35% between 1983 and 1985. In Cote d'Ivoire (Ivory Coast), the only African country to conduct active surveillance for dracunculiasis so far, an aggressive combined program of rural water supply, health education, and active surveillance has reduced the disease from 4971 cases in 1976 to 592 cases in 1985.

KAUL, S. M. JOSHI, G. C. SEHGAL, P. N. **Field evaluation of temephos one per cent sand granule formulation against Cyclops.** *Journal of Communicable Diseases* (1987) 19 (2) 168-171

Temephos one percent sand granule formulation was evaluated against Cyclops under field conditions near Bahadurgarh (Haryana). It was found effective for a period of 5 weeks and 8 weeks respectively when tested at 0.5 p.p.m. and 1 p.p.m. Fifty percent emulsion concentrate (EC) formulation was found effective for 5 weeks and 12 weeks respectively at 0.5 p.p.m. and 1 p.p.m. Granular formulation could be used as an alternative to EC formulation as it is easy to handle and apply.

SULLIVAN, J. J. LONG, E. G. **Synthetic-fibre filters for preventing dracunculiasis: 100 versus 200 micrometres pore size.** *Transactions of the Royal Society of Tropical Medicine and Hygiene* (1988) **82** (3) 465-466

Filtering of drinking water to remove the copepod intermediate hosts of *Dracunculus medinensis* is a primary strategy for control of guinea-worm disease. Since filters of different porosities are used, [the authors] tested the efficiency of synthetic-fibre filters of 100  $\mu\text{m}$  and 200  $\mu\text{m}$  pore size in removing the various stages of 3 species of copepods from water samples. The 200  $\mu\text{m}$  mesh retained the larger copepodid stages including adults (C III-VI), but permitted passage of smaller copepodids and all naupliar stages. The 100  $\mu\text{m}$  mesh retained all but the earliest naupliar stages (N I-II) which are unlikely to harbour guinea-worm larvae.

GBARY, A. R. GUIGUEMDE, T. R. OUEDRAOGO, J. B. **Dracontiasis, a scourge eradicated through health education in three villages of Burkina Faso.** La dracunculose, un fleau eradique dans trois villages du Burkina Faso par l'education sanitaire. *Bulletin de la Societe de Pathologie Exotique et de ses Filiales* (1987) **80** (3) 390-395

Guinea-worm infection was studied in 3 villages in a hyperendemic region of Burkina Faso. The villagers were educated not to enter ponds when they drew water, and to filter the water before drinking it. Each village elected a "health committee" to supervise preventive measures from 4 weeks before the usual onset of cases of dracontiasis (in May). Within 2 years the disease has been eradicated from all 3 villages, by a method (health education) that cost little and was well accepted by the population.

Sheila M. Crewe

SEHGAL, P. N. GHOSH, T. K. KAUL, S. M. **Guineaworm Eradication Programme: current status and implementation through the primary health care.** *Journal of Communicable Diseases* (1987), reed 1988 **19** (1) 25-30

The Guineaworm Eradication Programme in India was launched in 1980. In 1986 there was an overall reduction of just over 25% in the number of cases compared with 1985 (detailed figures are given in the paper), and the eradication strategy was apparently proceeding satisfactorily.

Sheila M. Crewe

HOPKINS, D. R. RUIZ-TIBEN, E. **Draunculiasis eradication: target 1995.** *American Journal of Tropical Medicine and Hygiene* (1990) **43** (3) 296-300

Substantial progress has been achieved over the past 3 years by the campaign to eradicate dracunculiasis. The target of eradication by 1995 has been set by the African Regional Office of the World Health Organization and accepted by the United Nations Children's Fund (UNICEF) and the United Nations Development Program. India and Pakistan continue to reduce their cases of the disease dramatically. In Africa, Ghana and Nigeria conducted national village-by-village searches in 1988-1990 and, between them, found >800 000 cases of the disease. Most African countries have now prepared national plans of action, appointed national coordinators, and intend to use UNICEF's assistance to conduct national searches by the end of 1990. An international donors' conference held in 1989 facilitated major new assistance for the initiative by UNICEF, the United Nations Development Program, the United States Agency for International Development, the Japanese International Cooperation Agency, the Peace Corps, the American Cyanamid Company, and DuPont. The World Health Organization held a meeting early in 1990 to draft criteria and recommend the process for certifying achievement of elimination of dracunculiasis in formerly endemic countries. The major remaining obstacles to eradication of dracunculiasis by 1995 are civil wars in northeastern Africa and the apathy of some national and international officials.

EDUNGBOLA, L. D. WATTS, S. J. ALABI, T. O. BELLO, A. B. **The impact of a UNICEF-assisted rural water project on the prevalence of guinea worm disease in Asa, Kwara State, Nigeria.** *American Journal of Tropical Medicine and Hygiene* (1988) **39** (1) 79-85

The provision of protected bore-holes with hand pumps to supply water in savannah villages in Nigeria reduced the prevalence of dracontiasis from about 50% to nearly 0% within 3 years in places where no other water supply was used. The fall in prevalence was less marked when the bore-hole was not advantageously sited, was sometimes not working,

or was otherwise unsatisfactory. (Detailed results are given in the paper, and the social and economic benefits of the reduced prevalence are discussed.

Sheila M. Crewe

ABDUR RAB, M. **Adieu! Guinea worm.** *Journal of the Pakistan Medical Association* (1989) **39** (3) 83–88

Some 10–48 million people in East and West Africa, India and Pakistan suffer from dracunculiasis. The disease is transmitted only in drinking water contaminated with cyclops containing infective-stage larvae, and is therefore in theory entirely preventable. It is likely that most people recover fully after the worm is expelled, but the disease is debilitating for a month or more in the acute phase and may be permanently disabling if complications, usually due to secondary bacterial infections, occur. Drugs have a minimal effect and treatment is based on the mechanical withdrawal of the worm after it has penetrated out through the skin. The social and economic consequences of endemic disease are enormous. Control consists of appropriate treatment of water supplies and of widespread health education. The United Nations had declared an International Drinking Water Supply and Sanitation Decade, one of the aims of which is the eradication of guinea-worm. Following several international workshops, Pakistan entered into a programme of eradication in 1987 with a target date for elimination of 1990. The pilot study on ways and means has been completed and the definitive phase has begun.

[This is a very readable update of dracunculiasis and the efforts being made to control it.]

J.G. Cruickshank

RICHARDS, F. HOPKINS, D. **Surveillance: the foundation for control and elimination of dracunculiasis in Africa.** *International Journal of Epidemiology* (1989) **18** (4) 934–943.

Accurate epidemiological surveillance is a fundamental requirement for the control and elimination of guinea-worm disease, and Africa is the last major region lacking official programmes to monitor the incidence and distribution of the disease. The authors discuss the value of various types of surveillance activities, and the overall establishment and control of surveillance schemes.

Sheila M. Crewe

IMTIAZ, R. ANDERSON, J. D. LONG, E. G. SULLIVAN, J. J. CLINE, B. L. **Monofilament nylon filters for preventing dracunculiasis: durability and copepod retention after long term field use in Pakistan.** *Tropical Medicine and Parasitology* (1990) **41** (3) 251–253.

The large copepodid stages (CIII–CVI) of the genus *Cyclops*, which are capable of supporting the development of larvae of *Dracunculus medinensis*, are retained by monofilament nylon filters of mesh size 200  $\mu\text{m}$ . Households in 2 villages in worm-infested areas of Pakistan were provided with filters, instructed in their use, and were told that all drinking water must be filtered. The filters were retrieved 12 months later in one village and after 15 months in the other. A proportion had been lost or discarded and there were varying degrees of clogging with sand and dirt in the remainder. However, very few were sufficiently clogged to reduce water flow to unacceptable levels and microscopic examination of the mesh revealed only minor mechanical damage. A culture of Mesocyclops was passed through 8 randomly selected used filters and all the intact live CIII–CVI copepodids were retained. The study forms the basis of a practical means of preventing oral transmission of *D. medinensis* in the field but it is clear that compliance may be difficult to maintain.

J.G. Cruickshank

CHIPPAUX, J. P. **Failure of thiabendazole in dracontiasis prophylaxis.** Echec du thiabendazole en prophylaxie de la dracunculose. *Medecine Tropicale* (1990) **50** (4) 455–458.

Thiabendazole was given in a single dose of 50mg/kg to 76 volunteer subjects in a Benin village where dracontiasis was endemic (prevalence about 35%). In comparison with control subjects from the village, over a 2-year period the treated subjects showed no significant differences in incidence, morbidity or duration of the disease. The number of



aberrant migrations to the trunk or upper limbs, or incidents of failure of the female worms to reach the skin, were not significantly affected by this dose of thiabendazole.

*E.M. Scrimgeour*

NWAORGU, O. C. **The effectiveness of combined control measures on the prevalence of guinea worm disease in Anambra State, Nigeria.** *Journal of Helminthology* (1991) **65** (3) 226-231.

The prevalence of guinea worm *Dracunculus medinensis* was determined in communities in Anambra State, Eastern Nigeria during the 1984-1985 guinea worm season. Thereafter combined intervention measures which included health education and community participation in pond treatment were introduced in one of the two communities. There was a decrease in disease prevalence from 88.7% to 33% in Group A (372 households) and from 88% to 53% in Group B (368 households), two years after control measures were introduced in Igbeagu community. However, in 345 households in Mpu community without control measures, any decrease was not significant (from 88.7% to 86.5%). Health education combined with pond disinfection proved to be a much better intervention measure, contributing to the change in attitude and therefore decrease in disease prevalence, than pond disinfection alone.

LITVINOV, S. K. **How the USSR rid itself of dracunculiasis.** *World Health Forum* (1991) **12** (2) 217-219.

The article provides a short historical account of the eradication of guinea-worm disease from the USSR. The author highlights the contribution made by the construction of a safe water supply in Bukhara in 1929 (the infection had been focused in and around this city). The last indigenous human case of dracontiasis in the USSR was reported in 1931. Only carnivorous animals in areas in the south have been found infected with *Dracunculus medinensis*, the causative agent, since that date.

*Carolyn A. Brown*

EDUNGBOLA, L. D. WATTS, S. J. **The elimination of dracunculiasis in Igbon, Oyo State, Nigeria: the success of self-help activities.** *Journal of Tropical Medicine and Hygiene* (1990) **93** (1) 1-6.

Guinea-worm disease was eradicated from the village of Igbon by strategies based on community self-help. The villagers and researchers based at the University of Ilorin and the Teaching Hospital co-operated in various ways to prevent contamination of water supplies, culminating in the construction of protected wells. In November 1978 the prevalence rate of dracontiasis was 59%, but since 1982 no cases have been recorded there.

*Sheila M. Crewe*