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June 2004

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ACTM Secretariat, PO Box 123,

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Tel +61 (0)7 3872 2246

Fax + 61 (0)7 3856 4727

Email: actm@tropmed.org

Design

Polly Ink Graphic Design, Mt Glorious Qld 4520

Australia

Tel +61 (0)7 3289 0057

Email: mdkpollyink@aol.com

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The Annals will appear twice a year and will consider for publication, papers on a wide range of topics relating to tropical and travel medicine. All papers will be refereed prior to acceptance for publication.

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Discipline of Pathology,
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Fax + 61 (0)3 6226 4833***

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As part of our series of invited editorials, Emeritus Professor Rod Campbell discusses the important topic of zoonotic diseases – diseases that are proving a challenge in all parts of the world, tropical and temperate.

Editor.

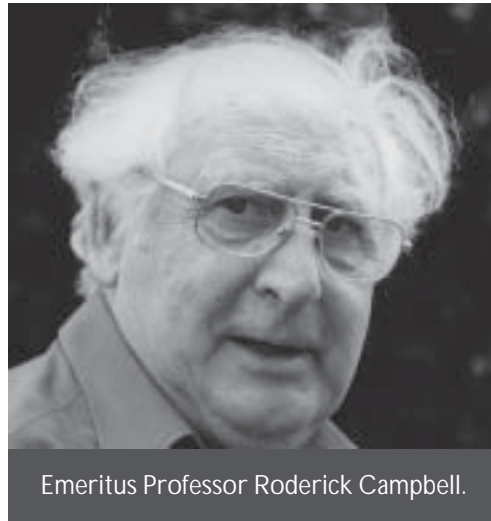
Invited Editorial:

ANIMAL HEALTH AND EMERGING HUMAN DISEASES

Emeritus Professor Roderick Campbell, James Cook University

(Annals of the ACTM, 2004; 5:1.2-4)

***ANIMAL HEALTH AND
EMERGING HUMAN
DISEASES***
*Emeritus Professor Rod Campbell,
AM, PhD, DSc, DVMS, MRCVS,
FRCPath, FACTM, FACVSc, FRSE*
Australian Institute of Tropical
Veterinary Science
James Cook University
Townsville
Queensland 4811
Australia



Emeritus Professor Roderick Campbell.

Diseases of animals communicable to man, the zoonoses, have been known since at least biblical times. Today the audio, televisual and print media report them almost daily as there is global concern about the impact they have made on human health in recent years and, in some cases, because of their economic effects. In 2002, due to the type and intensity of publicity about SARS, an unnecessary economic meltdown occurred in east Asia and threatened the existence of some international airlines.

The new zoonotic wave

There is no doubt that newly recognised zoonotic diseases of major importance confront us today. Between 1979 and 1986, 28 new zoonoses were recognised and others, notably SARS, appeared in the ensuing years. Human immunodeficiency virus (HIV), Ebola virus, bovine spongiform encephalopathy (BSE) and its human counterpart *m*vCJD, acute severe respiratory coronavirus syndrome (SARS), Nipah virus, bat lyssa virus, equine Hendra virus, avian influenza and others have caused serious incidents or epidemics in recent decades. Diseases such as Japanese B encephalitis, known longer, have become better

diagnosed. While all this is going on, we should not lose sight of the zoonotic infections that have always been with us. Leptospirosis, Q fever, salmonellosis and scores of others are still out there in their characteristic ecosystems.

Three immediate problems face health workers and in particular, medical and veterinary scientists. The first is to accurately define the epidemiology of these modern plagues using appropriate diagnostic methods. Second, to evolve rapid and effective methods of control. And last but not least, to assess their real significance. Too much alarm was raised during the SARS outbreak which, apart from a period of denial in China and a brief mishap in Toronto, was generally well controlled. In contrast, the enormous global response to the discovery of ONE case of BSE in Canada and in the United States illustrates the power of publicity (and politics) over common sense. Too little concern was shown for a time in some circles about HIV-AIDS. The reluctance of the South African Government to accept the basic cause of their national tragedy, which continues, set back control programs for years. On the positive side, some successes can be reported, as in the United States and Australia, where vigorous public awareness programs reduced the incidence of HIV, although there is evidence that unless sustained, they may lose some of their impact. Even in a developing country like Uganda, progress can be made if the government takes the matter seriously and the social and medical infrastructure is adequate.

Control programs

While recognising that predisposing factors such as local customs, farming systems, social attitudes, war, lack of health services, and poverty may contribute to the dissemination of zoonotic infections, medical and veterinary workers must focus their attention urgently on control and prevention by all possible methods. These will be achieved more quickly if the two professions work together. In some universities in Australia and abroad where the respective disciplines are close (preferably side by side or even in the same building), this has already been recognised. Both may use the basic diagnostic technology required. In the field, however, veterinarians are closer to the farming systems associated with BSE and avian influenza, while medical workers must directly protect the human populations at risk. By an integrated approach a more accurate, holistic, view of the problem can be perceived and acted upon.

The response to most modern epidemics, including the zoonotics, has generally been rapid and eventually

successful. The incidence of BSE and *m*vCJD is mercifully, if slowly, in decline in Britain. Some campaigns have been assisted by the intervention of the international agencies WHO, OIE and FAO, but these cannot guarantee disease control at national levels. Following a vigorous culling policy of poultry in Asia after the avian influenza outbreak in 2003, several countries launched extensive vaccination programs against the avian H5N1 viral strain. While it is hoped that this will eradicate the infection there is no guarantee that viral antigenic drift will not occur with possibly serious human or avian effects. It is also known that not all Asian countries have the capacity or resolve to monitor the behaviour of the virus among vaccinated populations.

The biosecurity scene

The urgent need for national and international biosecurity against accidental or intentional spread of disease has also intensified the interest in zoonotic infections. Anthrax bacilli were recently used in the United States and, although clumsy, unpredictable and limited in their scope, the disease proved to be fatal after postal dissemination. Infectious disease is infinitely subtle.

The interface between northern Australia, Papua New Guinea and south-east Asia, our tropical front door, demands an efficient national biosecurity system. Australia is fortunate in already having a vigilant Department of Agriculture, Forestry and Fisheries and the Australian Quarantine and Inspection Service which confronts us at every international air terminal. We are all familiar with the bins where, on arrival, we must discard our salami or chicken sandwiches. Yet theoretically, infectious agents could still enter directly from visiting boats, people, foodstuffs or even wild birds.

The threat is real. The presence of foot and mouth disease (not a zoonosis) in the Philippines to which our livestock are susceptible could endanger not only our cattle, sheep and pigs, but undermine the economy to the extent of more than \$8 billion per annum, approximately the current budget surplus including pre-election promises. The recent spread of rabies from Sulawesi to Flores in Indonesia brings that zoonosis closer. The existence of Nipah virus in Malaysia and more recently Bangladesh is a cause for concern. We should not forget that in the 70s the discovery of sheep bluetongue virus in insects in the Northern Territory, though not in sheep, caused 52 countries to suspend the importation of livestock and livestock products from Australia. This episode showed not only the vulnerability of Australian trade but also suggested a lack



Above. Vaccination of chickens against avian influenza has occurred in some countries.

of understanding of the basic principles of virology, epidemiology and animal production systems in 52 countries.

Strengthening the defences

Australia is particularly strong in medical and veterinary technologies, many of them held in common. While the presence of AFFA and AQIS are reassuring elements in our defence against disease, further steps can be taken to reinforce the surveillance and control systems of the country. Departments of Health and Agriculture each have their own organisations at Commonwealth and State level, while the universities and medical institutes are another area of strength. Through them, Australia has led the world in aspects of microbiology, parasitology and immunology for many years as typified by the Nobel Laureates Florey, Burnet and Doherty (a veterinarian). The Australian Animal Health Laboratory of CSIRO at Geelong was specifically designed to allow the study of national and foreign zoonotic and other diseases. Already, extensive interstate exercises have been held to test the capability of laboratory and field services to deal with outbreaks. Steps are also being taken to improve the efficiency of our diagnostic services. Following the debacles of BSE and foot and mouth disease in the UK, AFFA has set up a review of Australian veterinary diagnostic resources which will bring together workers in Commonwealth and State Departments as well as the universities, and help to coordinate their technical capabilities in the event of a disease introduction.

The universities should be actively recruited to the national surveillance system. Those with medical and veterinary faculties, including the Australasian Institute of Tropical Veterinary Science at James Cook University, have long and extensive experience in dealing with exotic diseases

in Australia, on the continents of Asia, Africa and elsewhere. Recently their personnel have assisted in the control of rabies, avian influenza and SARS in outbreaks overseas.

The triumvirate of Commonwealth and State departments and the universities can form a rapid response group to counter a disease outbreak in any part of Australia. With our extensive land mass and areas of low population across the northern interface with Asia, the country is extremely vulnerable. Wildlife or livestock could act as maintenance or transmission hosts for some time before a disease is recognised. Diagnostic organisations in Northern Australia are both sensors and defences in the biosecurity system. While all outbreaks must be regarded seriously and controlled quickly, there is always a need for accurate risk assessments. Armed with these, medical and veterinary authorities can advise the media who, it is hoped, will report accurately. That popular concept 'deadly virus', (even when the agent is a bacterium!), should be used with discretion. In the field of public relations, microbiologists, clinicians and others have a special responsibility to present a clear and balanced opinion on the topic of the day, not always easy in the heady environment of a television interview.

The ultimate goal is, of course, prevention. With present knowledge and our technical resources, we should extend and maintain strong links with sister professions in other countries, constantly exchange information and transfer technology where it may be needed. Australia has particularly good relations of long standing with veterinary and medical organisations in south-east Asia, assisted by agencies such as AUSAID and the Australian Centre for International Agricultural Research (ACIAR). These should be maintained for the benefit of all countries in our defence against zoonotic and other infectious diseases. Recent events have shown their disastrous international impact.

The Australasian College of Tropical Medicine is a broad society, welcoming medical, veterinary and other scientists into its membership. This structure encourages the flow of information through literature and conferences to the benefit of Australia and our Australasian and South Pacific regions. The zoonoses have been regular topics. This enlightened policy should be continued and expanded wherever possible through information transfer, clinical cooperation and research.

Review Article:

TRADITIONAL MEDICAL TREATMENTS KAVA (*Piper methysticum*)

Dr Graham Pinn, Dubai London Clinic

(Annals of the ACTM, 2004; 5:1.5-7)

History

Captain James Cook first described the Kava beverage in an account of his voyage to the South Seas in 1768. He described the ceremonial use of an intoxicating drink prepared from the root of *Piper methysticum*, a plant which has been widely used through the South Pacific for thousands of years. It is thought the first usage was in Vanuatu (where it is still regularly used) and subsequently it spread to other Polynesian and Melanesian Islands. It is particularly used as a ceremonial drink in Fiji and Samoa. In Vanuatu it is used as a relaxing drink, consumed at the end of the day in the meeting-house (Nakamal). It results in an initial numbing of the mouth followed by a deep peaceful sleep, with no hangover. It is little used in New Caledonia or the Solomon Islands and now rarely in Hawaii.

Botany

Piper methysticum is a member of the pepper family. The shrub grows up to three metres in height and is cultivated in Fiji and the Western Pacific. The rootstock (sometimes in error called the rhizome) provides the source of the active ingredient, Kava lactones. Today Kava is cultivated commercially as well as being grown in the wild.

Traditional use

Traditionally Kava was used for a range of medical problems including headache, anxiety and insomnia. It was used topically for toothache, skin disorders, including leprosy and vaginal infections. By mouth it has been given as treatment

**TRADITIONAL MEDICAL
TREATMENTS
KAVA (*Piper methysticum*)
Dr Graham Pinn, MBBS (Lon), FRACP,
FRCP, MRNZCGP, MACTM, DCH
Medical Director
Dubai London Clinic
PO Box 12119
Dubai
United Arab Emirates
Email: dlc@emirates.net.ae
Fax: +971 4 3446191**

for urinary infection and venereal diseases such as syphilis and gonorrhoea. It has also been used to treat asthma¹. It is possible that the local pain relief relates to its anaesthetic effect but an antiseptic effect has also been reported. Prior to the advent of antibiotics Kava oil was used in combination with Sandalwood oil (trade name Gonosan), as an orthodox treatment for gonorrhoea².

Traditionally the root of the plant is used and the plant fibres are broken down by grinding with a pestle and then mixing with water. On the island of Tanna (Vanuatu Group) the drink was traditionally prepared by pre-pubertal boys chewing the root and spitting out the residue into coconut shells (a practice which is fortunately now dying out as the island has 20% endemic rate of Hepatitis B). Nowadays a food processor seems to be more commonly used but the product in its original form still looks like mud, smells like mud and tastes like mud (personal experience). It is still very popular both with men and their wives prefer the sedation it produces to the excitability and perhaps violence associated with alcohol.

Modern use

Modern use has been primarily as a sedative although its mode of action in the brain is unclear. There is no interaction with GABA (gamma amino butyric acid) but Kava lactones may have an effect on GABA receptor binding³. There have been a large number of clinical trials carried out confirming its effectiveness. Most of the work has been carried out in Germany where there have been six randomised double blind placebo controlled trials of standardised extract. Four of the trials were of several months duration and included, in two studies, people with a variety of anxiety disorders and, in two, perimenopausal anxiety symptoms. There were also two short-term trials, in one group pre-operatively and in another group awaiting the result of tissue samples to exclude cancer. The trials were reviewed in a meta-analysis in 2000⁴ and all six studies seemed to confirm benefit with symptomatic improvement noted, without loss of mental activity, within a week. A more recent Cochrane review published in 2003 confirms these views⁵. Kava has also been compared with Benzodiazepines and has been found to have an equivalent effect to Oxazepam 5mg, 3 x daily and Bromazepam 3mg, 3 x daily without loss of mental alertness or dependency potential⁶. It has also, more recently, been compared with the newer anxiolytic Buspirone with equal effect⁷. Not surprisingly there appears to be some anticonvulsant activity in animal studies but the large doses required prohibit long-term use as a treatment for epilepsy⁸. An

interesting epidemiological study has suggested that consuming Kava on a long-term basis reduces the incidence of Cancer⁹. It has also been used homoeopathically for gastritis and urethral pain¹⁰.

Adverse effects

Short-term side effects include nausea, tremor, drowsiness and headache. Allergic skin reactions have also been reported. With overdosage, dyskinesia and choreoathetosis have been reported¹¹ and the plant has been shown to exacerbate Parkinsonian symptoms¹². Long-term adverse effects reported primarily affect the central nervous system and skin. In chronic heavy usage (400mg or more of Kava lactones for more than six months) dementia has been reported, aggravated by use in combination with alcohol. The other recognised long-term side effect is a dry scaly rash, the rash disappears with cessation of treatment.

Abnormal liver function tests were first noted in association with Kava as early as 1988 and more recently a small number of cases have been reported (small compared with the large usage). An in depth review in many of the cases found a concomitant use of other potential hepato-toxins such as alcohol or statins which could also be incriminated in causing liver disease¹³. It does seem that there is a rare but serious risk of liver damage¹⁴, severe enough to require liver transplantation. Because of concern, the product has been withdrawn from the market in many countries. Liver damage related to traditional Kava consumption is not found in Vanuatu (personal experience), it may be that genetic differences between consumers have a part to play. One paper has reported that in Polynesians there is an important cytochrome P450 detoxifying enzyme which may not be present in other races and may prevent liver damage¹⁵. Another possible explanation is that the modern preparation process may itself produce toxicity, different extraction techniques use alcohol or acetone for extraction of Kava lactones as compared with water in the traditional preparation¹⁶.

Drug interactions

The use of Kava in combination with alcohol increases the hypnotic effect and also alcohol toxicity. Attempts at using Kava as a substitute for alcohol in some Northern Australian Aboriginal populations have not worked well and have caused increased medical problems¹³. Not surprisingly Kava in combination with Benzodiazepines increases the sedative effect and a resulting case of coma has been reported¹⁷.

The German Commissioning E-Monograph recommends administration for a period not exceeding three months and cautions use with driving or use of heavy machinery¹⁸.

Dosage

Dosage is one and a half to three grams per day of dried root. The active ingredient, Kava lactones, provides a means of standardising preparations and a daily dosage of 100-200mg is recommended. It is the ability to standardise this preparation which has allowed more reliable investigation with clinical trials. Kava tablets are standardised to contain 60mg of Kava lactones and the normal dose is one tablet two to four times daily.

Contraindications

Contraindications to treatment include Parkinson's disease, depression and psychosis. It is not recommended for pregnancy or nursing mothers. With the recent concerns about potential liver damage it should not be used in patients with pre-existing liver disease or those who consume significant amounts of alcohol¹⁹.

Summary

In summary Kava has proven hypnotic, anxiolytic, skeletal muscle relaxant, local anaesthetic and mild analgesic actions. The withdrawal of the drug from the market in some counties because of concern about liver damage may prove to be an over-reaction, overall it seems to be very safe²⁰.

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Research Paper:

UNUSUAL ANOPLOCEPHALID TAPEWORM INFECTIONS IN SOUTH AFRICA

*Dr John Freaan, National Health Laboratory Service, Johannesburg
Leigh Dini, National Health Laboratory Service, Johannesburg*

(Annals of the ACTM, 2004; 5:1.8-11)

Introduction

Cestodes as a group are part of the routine diagnostic landscape in South Africa, reflecting the country's substantial burden of human tapeworm disease. Humans may be the normal definitive hosts, harbouring adult cestodes, for example *Taenia* species and *Hymenolepis nana*. They may also be accidental intermediate hosts, becoming infected with larval stages producing, for example, cysticercosis and hydatid disease. Less frequently, humans may be accidentally infected with adult tapeworms of animals, which typically cause diagnostic confusion, and we present some recent (1996-2000) such examples.

Methods

Specimens were referred to the Parasitology Reference Unit, National Institute for Communicable Diseases of the National Health Laboratory Service (NHLS) from routine laboratories of the NHLS that provide public hospital diagnostic services, or from private clinical laboratories. Putative proglottids were squashed between slides to extrude their contents, which were examined microscopically, unstained. Tapeworm identifications were based on published descriptions.^{1,2,3} The parents of the children involved, and the one adult, were interviewed telephonically.

Results

Brief clinical histories are shown in the Table. In the children, it was invariably the mother that noticed small round to oval particles in her child's stool. These

UNUSUAL ANOPLOCEPHALID TAPEWORM INFECTIONS IN SOUTH AFRICA

*Dr John Freaan, MB, BCh, MMed,
DTM&H, MSc, FACTM*

Leigh Dini, BSc (Hons), MSc
Parasitology Reference Unit
National Institute for
Communicable Diseases
National Health Laboratory
Service
PO Box 1038
Johannesburg 2000
South Africa

Table: Unusual anoplocephalid cestodes in humans, South Africa

Case No.	Age, gender	Place of residence	Clinical features	Relevant history	Tapeworm identity
1	23 months, M	Roodepoort, Gauteng Province	asymptomatic; proglottids noticed in stool	pet rabbit, cats and dogs	<i>Inermicapsifer madagascariensis</i>
2	29 months, M	Klerksdorp, Northwest Province	abdominal pain, weight loss (2kg) over 2 months	pet rabbits, dogs	<i>Inermicapsifer madagascariensis</i>
3	19 months, M	Benoni, Gauteng Province	asymptomatic; proglottids noticed in stool	pet hamster, stools of which were negative	<i>Inermicapsifer madagascariensis</i>
4	10 months, F	Lichtenburg, Northwest Province	exematous rash on limbs		<i>Inermicapsifer madagascariensis</i>
5	18 months, M	Umkomaas, KwaZulu-Natal Province	anal pruritis; proglottids noticed in stool		<i>Inermicapsifer madagascariensis</i>
6	12 months, F	Grahamstown, Eastern Cape Province	asymptomatic; proglottids noticed in stool	father was involved in rodent research	<i>Inermicapsifer madagascariensis</i>
7	28 years, F	Johannesburg, Gauteng Province	asymptomatic; proglottids noticed in stool	had been in the presence of captive monkeys	<i>Bertiella studeri</i>

were inconspicuous, resembling whitish or brownish undigested grain kernels or rice grains. In only one case was a definite strobila passed, and no scolex was present. Macroscopic and microscopic examination of the proglottids and their contents were typical of *Inermicapsifer madagascariensis* (in the children) (Figures 1 to 3) and *Bertiella studeri* (in the adult case) (Figure 4). Differentiation between *Raillietina* species and *I. madagascariensis* can be difficult unless the adult tapeworm scolex is available; we used the mid-lateral position of the genital pore in the proglottids as the distinguishing feature. However, there appears to be no record in the international literature of *Raillietina* spp. infections occurring in humans in Africa.⁷

Discussion

The original documentation of the presence of *I. madagascariensis* parasite in humans dates to 1870 in a child in the Comores Islands.¹ An array of genus and species synonyms for the parasite was resolved with unification under the binomial used here (see Ortlepp⁴ for further discussion of the taxonomy). The geographic distribution includes Indian Ocean islands, Cuba, Venezuela, Thailand, the Philippines, and central, east and southern Africa.^{1,2} Ortlepp described the first human infections with *I. madagascariensis* in South Africa in 1961,⁴ but referred to earlier reports of cases in Africa from Kenya (1949) and the Congo (1950). More recent descriptions of cases in



southern Africa are from Zimbabwe and Zambia.^{5,6} These reports and others,⁷ as well as the series we present here, have in common young children as their subjects, which is clearly related to human behaviour. The propensity of young children at the crawling or toddling stage to put objects in the mouth accounts for the apparently narrow risk period from one to three years of age; however, maternal interest in the contents of nappies also makes it more likely that infections will be detected in this group compared to toilet-trained children. The proglottids are

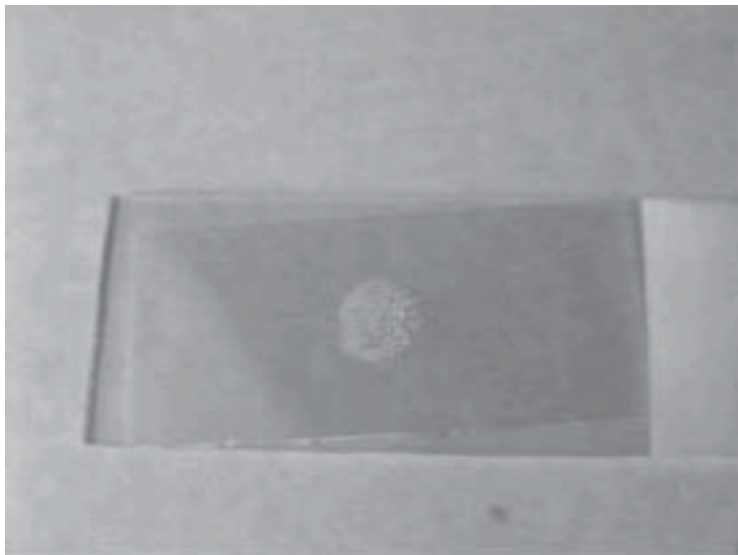


Figure 2. Contents of a crushed gravid proglottid of *I. madagascariensis*, showing multiple egg capsules.

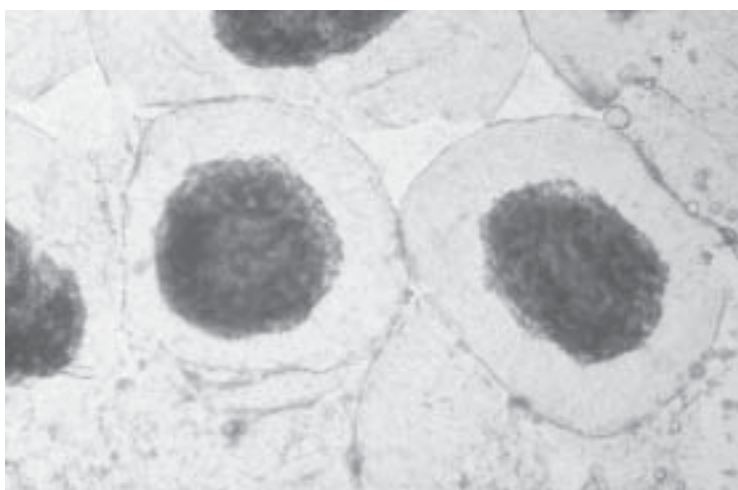


Figure 3. Egg capsules of *I. madagascariensis* with dark central parenchymal cell mass containing the eggs (mag 100 x)

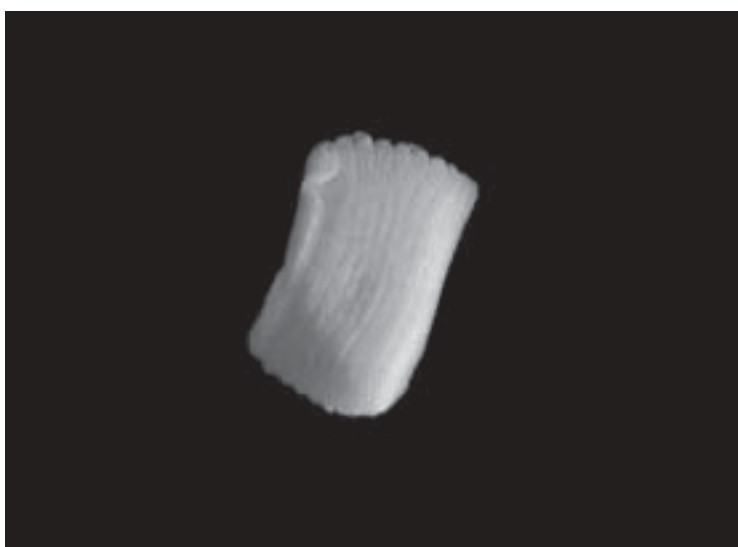


Figure 4. Small segment of *Bertiella studeri* strobila, showing the short but very wide proglottids.

small and inconspicuous and difficult to distinguish from food residue in the faeces and undoubtedly most infections are undetected. Signs and symptoms are usually absent or mild; one of our cases had abdominal pain and weight loss (Table), which has been reported previously, as have anorexia and irritability.⁵ Belding mentioned an infected child who had anaemia, asthenia, bronchitis and functional cardiac symptoms.¹

In Africa the tapeworm utilises a wide variety of rodents, as well as hyraxes, as natural definitive hosts,^{4,5} and oribatid mites or as yet unidentified insects as intermediate hosts, a feature common to this group of cestodes (family Anoplocephalidae).¹ Interestingly, outside mainland Africa (for example in Cuba and Madagascar) the parasite is not found in rodents and appears to have adapted to inter-human transmission.^{4,5} The father of one of our cases was involved in rodent research, which may have contributed to the transmission risk. Goldsmid⁵ cited a similar case whose parents were chinchilla breeders. The tapeworm clearly has a wide host range but potential host status of rabbits and hamsters, the choice of pets of some of our cases, is not known. The faecal pellets of the hamster in case 3 were examined but no evidence of cestode infection was found.

Bertiella studeri, the cestode identified from an adult female (Table, case 7), is another anoplocephalid tapeworm. The patient remembered that she had accidentally swallowed a small particle that had fallen into her mouth at the time she was close to some (unidentified) monkeys at a private zoo near Cape Town, South Africa. Three months later she noticed proglottids in her faeces (Figure 4). This cestode's natural hosts are non-human African and Asian primates; human cases are uncommon and result from accidental ingestion of the oribatid mite intermediate host.^{1,8} A study of intestinal helminths in chacma baboons (*Papio ursinus*) from widely separated localities in the former Transvaal, South Africa, showed that about half were infected with *B. studeri*, and the cestodes were present in baboons in all four sampling sites.⁹ As with *I. madagascariensis*, the true incidence in humans is unknown as most infections are clinically silent, although Galán-Puchades reported a patient with oesophageal discomfort that resolved on treatment.⁸ From the literature⁵ and our experience (Table, cases 4, 6, 7) benzimidazole derivatives (mebendazole, albendazole) are ineffective as treatment, and niclosamide is the agent of choice for treating both of these anoplocephalid tapeworms. Praziquantel was effective in the published *Bertiella studeri* case mentioned above.⁸

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MICRO-ORGANISMS ISOLATED FROM FAECAL SPECIMENS IN TASMANIA

**Dr Graeme Schreuder, BM.BCh
(Oxon), FRACGP, FACTM, MPH&TM,**

M.Sc, DTM&H. DIH

Director of Medical Services
Calvary Health Care, Tasmania
Honorary Senior Lecturer
Division of Clinical Sciences
University of Tasmania
Hobart Tasmania 7000
Australia

**Emeritus Professor John Goldsmid,
BSc(Hons), MSc, PhD, FRCPath, FIBiol,
FAIBiol, FASM, Hon FACTM, Hon
FRCPA**

Discipline of Pathology,
University of Tasmania
Hobart Tasmania 7000
Australia

Research Paper:

Micro-organisms isolated from faecal specimens in Tasmania

**Dr Graeme Schreuder, Calvary
Health Care, Hobart
Professor JM Goldsmid,
University of Tasmania**

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Infectious diarrhoea is a significant public health problem world-wide and Traveller's Diarrhoea, caused by a wide range of enteric organisms, affects 30-50% of travellers to developing countries¹⁻⁴ Returned travellers, together with overseas visitors, immigrants and refugees may all influence the prevalence and range of species recorded by diagnostic laboratories in industrialised countries.

A retrospective analysis was

undertaken of the range of faecal microorganisms recorded for 2002 from two diagnostic laboratories in southern Tasmania; a large public sector hospital that also covered screening of refugees and a private pathology laboratory that covered the private sector hospitals and General Practitioners (including the local travel clinics).

The results are shown in Table 1 below:

Table 1: Micro-organisms isolated from stools in Tasmania 2002

<i>Species</i>	<i>Number of isolations</i>		
	<i>Public</i>	<i>Private</i>	<i>Total</i>
<i>Campylobacter</i> spp	93	552	645
<i>Blastocystis hominis</i>	12	292	304
<i>Salmonella</i> spp	25	231	256
<i>Clostridium difficile</i>	93	-	93
<i>Giardia duodenalis</i>	20	69	89
<i>Endolimax nana</i>	64	14	78
<i>Entamoeba coli</i>	29	19	48
<i>Cryptosporidium parvum</i>	-	40	40
<i>Entamoeba histolytica</i> <i>/dispar</i>	23	3	26
<i>Schistosoma mansoni</i>	23	1	24
Hookworm	18	6	24
<i>Aeromonas</i> sp	10	-	10
<i>Hymenolepis nana</i>	10	-	10
<i>Dientamoeba fragilis</i>	1	6	7
<i>Trichuris trichiura</i>	4	2	6
<i>Iodamoeba butschlii</i>	4	1	5
<i>Chilomastix mesnili</i>	4	-	4
<i>Enterobius vermicularis</i>	-	4	4
<i>Strongyloides stercoralis</i>	4	-	4
<i>Entamoeba hartmanni</i>	3	-	3
<i>Taenia</i> sp	3	-	3
<i>Cyclospora cayatanensis</i>	-	2	2
<i>Plesiomonas shigelloides</i>	1	-	1
<i>Schistosoma japonicum</i>	1	-	1

A number of facts emerge from these results:

- The commonest pathogens recorded were *Campylobacter*, *Salmonella*, *Blastocystis* and *Giardia*. *Clostridium difficile* was a common isolate, but from the public hospital only.
- Entamoeba histolytica* or *Entamoeba dispar*? Both laboratories reported *Ent. histolytica* based on parasite morphology. In practice, unless antigen testing is done, this is best reported as *Ent. histolytica / dispar*. In a routine laboratory situation, if antigen testing is not available, it is probably reasonable to treat the isolate as *Ent. histolytica*, although if the patient has no history of travel to the tropics then *Ent. dispar* is the more likely species. It is worth noting that we have seen a case of invasive amoebiasis with a liver abscess in a traveller from North Queensland and thus northern Australia must also be considered as a potential source for *Ent. histolytica*.
- A significant number of imported “exotic” pathogens were diagnosed.

A number of questions arise from these results:

- What about the recognised pathotypes of *Escherichia coli*? Pathotype testing is not available as routine in Tasmania and thus these pathogens would not be identified and it must be remembered that enterotoxigenic *Esch. coli* (ETEC) is by far the main cause of Travellers’ Diarrhoea³.
- An interesting finding in Tasmania is the high level of *Salmonella mississippi* isolated from humans here. This probably reflects a high prevalence of infection in the native animal population and (probably) contamination of water from this source.
- Why no shigellae? This has been commented on in earlier research where it was found that endemic shigellosis was rare in Tasmania, but it did occur⁵. The low isolation rate in Tasmania was exacerbated by the use of selective media designed particularly for salmonellae and not necessarily ideal for shigellae⁵. In fact in 2002 only one case of shigellosis was reported in Tasmania as a whole – diagnosed in a returned traveller from Fiji (Coleman, personal communication).
- Why no *Ascaris*? One assumes the lack of *Ascaris* isolations, particularly in refugees, is due to prior

screening and treatment before arrival. *Ascaris* is relatively easy to detect during mass screenings prior to arrival while other parasite species might be more difficult to detect unless repeat specimens are examined.

- e. What is the significance of *Blastocystis hominis*? This remains debatable and we suggest that where patients are suffering from diarrhoea and no recognised pathogens have been identified (after a careful examination by a competent laboratory) and the *Blastocystis* is detected in large numbers, it should be considered as the cause of the symptoms.

We feel strongly that results such as these, coming as they do, from a temperate region of Australia with a relatively low level of infectious disease in general and, additionally, with fewer overseas travellers, immigrants and refugees and the demonstration of a wide range of intestinal organism species, many of which are imported, has an important bearing on the training of young doctors in Australia. We are concerned at the current trend of reducing the microbiological component of medical courses in Australia. Young doctors need to know more, rather than less medical/clinical microbiology – and a knowledge of the relevant aspects of laboratory medicine is central in this. Further, clinicians must be aware that enteric organisms may often be associated with a wide range of clinical effects (sometimes not directly involving the gastrointestinal tract itself) and including irritable bowel syndrome (*Campylobacter* spp., *Blastocystis hominis*, *Giardia duodenalis*); ileocecalitis (*Campylobacter* spp.; *Yersinia* spp.; non-enteric fever salmonellae); neuropathies including the reactive neuropathies (*Campylobacter* spp.; non-enteric fever salmonellae; *Yersinia* spp.)⁶⁻⁹.

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