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Epidemiology of leptospirosis

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Leptospirosis is noticed everywhere in the world but with higher incidence in tropical countries as Latin America, India, south eastern Asia but even in temperate areas as European Union or Japan, with a lesser extend.

Mortality rate is around 10 p.cent of the patients but may reach 23.6 in some countries as Barbados, a Caribean island (table 1).

TABLE 1. Leptospirosis incidence (WHO-1999, 74, 237-44)

Leptospirosis Worldwide WHO * / 100 000

Country	Nb	Cumulative incidence	Mortality
Argentin	1	1.2	X
Australin	1	1.2	0.2
Barbados	17	12	23.6
Brazil	10	18	0.8
France	24	2	X
Guadeloupe/Martiniq	12	3.9	13.7
Netherland	5	23	4.9
New	8	77.4	2.6
Russian	2	1.05	X
US	1	4.3	1.5

But what means « leptospirosis » ?

Leptospirosis is induced by pathogenic Spirochaetales, belonging to the genus *Leptospira.*

Now this genus is divided in several *genomospecies* : at least 7 for the pathogenic strains. But up to now, for experimental diagnosis and epidemiological studies, the serological classification was still used. This type of classification is based on agglutinating antibodies produced by animals infected by this bacteria. So the genus *Leptospira* was divided in 2 species, the saprophytic one *L. biflexa s.l.* and the pathogenic *L. interrogans s.l.* The basic taxon is the serovar. Because of close antigenic communities, several serovars are gathered in a serogroup (Usually, names of serovars and serogroups are written in roman but for the serogroup, the first letter is a capital).

Each of the strains of *L. interrogans s.l* could induce leptospirosis.

Leptospires in contaminated material may infect a man or another Mammal. Penetrating in the blood vessels, they multiply and reach several

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organs: lung, liver and kidney or reach the cerebrospinal fluid. It is the onset of the infection and /or disease. Acute disease may be observed in several species, especially in man and dog. Hepatitis with a severe jaundice is often related to acute leptospirosis, as renal failure or pulmonary hemorrhages. But in other species as cattle, pig, horse, subacute or even chronical leptospirosis is generally observed. For these animals reproduction failure are the most frequent. Infection induces antibody production by the animals, which help to their recovery (and are used for serological diagnosis). But many of these animals remain renal carriers, shedding leptospires in their urine several weeks or months after the infection.[1-25]

So, man and domestic animals are the major species involved in leptospirosis but the most powerfull animals are the reservoirs, which are wild animals and belong generally to the Rodents group. We performed a study on trapped animals in metropolitean Francia and in Guadeloupe.

We studied first the seroprevalence in *Myocastor coypu*, *Ondatra zybethicus*, *Rattus norvegicus*, *Rattus rattus*, and other small rodents, *Oryctolagus cuniculus* and the mangooses (*Herpetesicus javanicus)* trapped in Guadeloupe.

Seroprevalence is around 48 % in the myocastors (737 animals trapped), 34 to 50% in the rats (357 *R. norvegicus* and 409 *R. rattus*) and 47 % in the mangooses, indicating that many wild animals are infected by leptospires as they secreted agglutinating antibodies. But, to be a reservoir with a strong role in the transmission of the pathogenic strains, a wild species has to shed leptospires, i.e. to be a renal carrier.

So we attempted to isolate leptospires from the kidney of some trapped animals of each species (table 2).

TABLE 2. Carriage status of several species trapped in metropolitean France and Guadeloupe

Species	Number trapped	Seropositive (%)	Isolates (%)	Serogroups isolated
M.coypu	161	19,8	3	*IH-Sej*
R.norvegicus	71	29	41	*IH*
R.rattus *	65	56	25	IH - Bal
O.zybethicus	33	50	6	*Aus - Sej*
O.cuniculus	129	40	0	0
H.javanica *	17	47	27	IH – Sej - Aus

* results in Guadeloupe
IH= Icterohaemorrhagiae, Sej= Sejroë, Bal= Ballum, Aus= Australis.

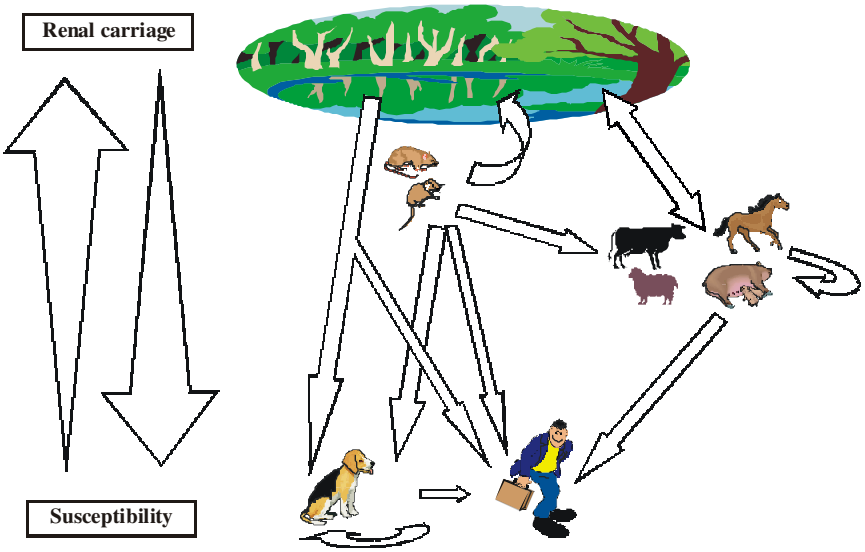

Fig. 1. Epidemiological cycle of leptospirosis.

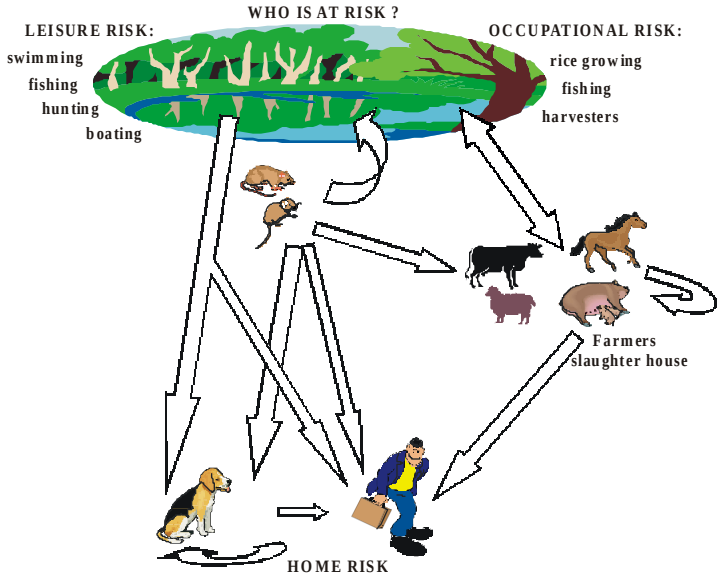

Fig. 2. People at risk.

It is often said that one species of mammal is a shedder for one "serogroup" of leptospires. We see in table 2 that several strains belonging to several serogroups were isolated from a one species. While often serologically positive in our sample, the rabbits were not identified as renal carriers.

These animals are not sick of leptospirosis, they shed leptospires in their urine and if the urine contaminates fresh water, slightly alcalin, pathogenic leptospires can remain infectious in the swamps, pounds and rivers.

Domestic animals, as man, are more often contaminated by soiled waters than by the direct contact with the wild animals. The higher is the renal carriage, the lower is the susceptibility to a clinical disease (fig. 1).

So people are at risk in several circumstances (fig. 2):

Leptospirosis is an occupationnal risk for rice growing, fishing, harvesting, but even during animal breeding and slaughter….

Leptospirosis is a leisure risk for water activities as swimming, fihing, hunting, boating…

Leptospirosis is too a home risk by rodents and in a lesser extend by dog.

The epidemiological conditions of leptospire transmission could be modified by excess of rain falls, huricanes (Mitch, El Nino), by increasing and/ or changes in Rodents populations.

The importation of a new species in one country could modify the risks: for example the american coypu is widely developped in France, mangooses were imported in Caribean Island.

Man could be more exposed to leptospire transmission by modifying its one occupational and leisure activities.

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