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# The Plague of Thebes, a Historical Epidemic in Sophocles' Oedipus Rex

## Technical Appendix

Table. Characteristics of pathogens possibly responsible for the plague of Thebes described by Sophocles in Oedipus Rex\*

Pathogen	Disease	Zoonosis in cattle	Stillbirth/miscarriage	Infertility	Highest reported acute mortality rate	Highly contagious (droplets/aerosol transmission)	Epidemics have been described	Described as early as 5 <sup>th</sup> century BC
<i>Yersinia pestis</i>	Plague	No (reported mainly in rodents, cats, camels) (1,2)	NA	NA	100% (1,2)	Yes (2)	Yes (1,2)	Probably yes (1350 BC) (3)
<i>Leishmania</i> spp.	Leishmaniasis	Yes (4)	Yes ( $\approx$ 10.5% for cutaneous and visceral) (5)	NA	70% (6)	No (sandfly bite) (7)	Yes (7)	Probably yes (7th century or possibly as early as 2500 to 1500 BC) (8)
<i>Leptospira</i> spp.	Leptospirosis	Yes (9)	Yes (in acute infection) (9)	NA (reported in animals)	50–70% (10)	No (rarely reported direct transmission between humans) (9)	Yes, usually in association with rainfalls, flooding and rodent infestation (9)	Probably yes (recognized as an occupational hazard of rice harvesting in ancient China) (9)
<i>Lyssavirus</i> spp.	Rabies	Yes (11)	NA	NA	100% (11)	No (11)	Yes (12)	Yes (Eshuma Code of Babylon circa 2000 BC) (11)
Hepatitis E Virus	Hepatitis E (13)	Yes (13)	Yes (13)	NA	4% (13) (73% in pregnancy) (14)	No (13,14)	Yes (13,14)	No (earliest outbreak attributed to HEV was in Delhi, 1955) (13,15)
Coronaviridae	Common cold, SARS	Yes (16)	NA	NA	15% (55% in persons >60 years of age) (17)	Yes (17)	Yes (16,17)	No (first characterized in the 1960s) (18)
<i>Influenzavirus A</i>	Influenza	Yes (19)	Yes (20)	No (21)	5–10% (22) (may be higher) (23)	Yes (24)	Yes (22,23)	Yes (25)
<i>West Nile virus</i>	West Nile virus infection	No (26,27)	No (26,27)	NA	10% (26)	No (26–28)	Yes (26,27)	Probably not (molecular dating shows low possibility of human infection before 1000 years ago) (29)
DEN 1-4 <i>Flaviviruses</i>	Dengue and dengue hemorrhagic fever	Not the same virus in humans and cattle (30,31)	Not in a high rate (32)	NA	47% (33)	No (30)	Yes (30)	No (earliest record of Dengue symptoms found in China, during Chin dynasty, 265-420 A.D.) (30)

Pathogen	Disease	Zoonosis in cattle	Stillbirth/miscarriage	Infertility	Highest reported acute mortality rate	Highly contagious (droplets/aerosol transmission)	Epidemics have been described	Described as early as 5 <sup>th</sup> century BC
<i>Brucella abortus</i>	Brucellosis	Yes (34)	Yes (35)	No (34) (only in natural host) (36)	80% in cases in which endocarditis was concurrently present (37)	Yes (38)	Yes (39)	Probably yes (known since the time of Hippocrates) (40)
<i>Listeria monocytogenes</i>	Listeriosis	Yes (41)	Yes (42)	No (43)	63% (42)	No (42)	Yes (42)	No (early 20 <sup>th</sup> century) (44)
<i>Orthopoxviridae</i>	Smallpox	No (45)	Yes (46)	Yes (47)	30% (48)	Yes (48)	Yes (48)	Yes (observations from 1100-1580 BC, even earlier phylogenetic origin) (49)
<i>Measles virus</i>	Measles	Yes (not reported in cows) (50)	Yes (51)	No (52)	15% (after encephalitis) (52)	Yes (52)	Yes (53)	No (not described BC, and recent phylogenetic analysis showed its origin in 11th–12th century AD) (54)
<i>Salmonella typhi</i>	Typhoid fever	No (55)	Yes (56)	NA	30% (when left untreated) (57)	No (58)	Yes (59)	Yes (60)
<i>Francisella tularensis</i>	Tularemia	Yes (mainly on rabbits, ticks, deerflies, squirrels) (61)	No (reported in sheep) (62)	NA	60% (63)	Yes (63)	Yes (63)	Probably yes (earliest outbreak credited, in 1715 BC Canaan) (64)
<i>Yersinia enterocolitica</i>	Gastroenteritis	No (mainly in pigs, dogs, cats, sheep and wild rodent strains) (65)	No (reported in sows, cattle) (66)	NA	50% (after septicemia) (67)	No (65)	Yes (68)	Probably not ( <i>Yersinia</i> spp. is an ancient pathogen (3), first recognized reference to <i>Y. enterocolitica</i> in the USA in 1934 (69))
<i>Rickettsia prowazekii</i>	Epidemic typhus	No (mainly in flying squirrels) (70)	NA	NA	60% (70)	Yes (70)	Yes (71)	Yes (may have originated millions of years ago) (72)
<i>Lymphocytic Choriomeningitis Virus</i>	Choriomeningitis	No (mainly in rodents, house mice, pet hamsters) (73)	Yes (74)	NA	30% (among infants diagnosed with congenital infection) (74)	Yes (73)	Yes (75)	Probably yes (LCMV is quite ancient and the extensive diversity of the virus has accumulated over the past 1,000–5,000 years) (76)
<i>Aspergillus</i> spp.	Aspergillosis	Yes (77)	No (most frequent cause of abortions in cattle) (77,78)	NA	86% (treated immunocompromised patients) (77)	Yes (77)	Yes (79)	No (first introduced in 1729) (80)

\*NA, not available; SARS, severe acute respiratory syndrome; LCMV, lymphocytic choriomeningitis virus; HEV, hepatitis E virus; BC, before Christ.

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