

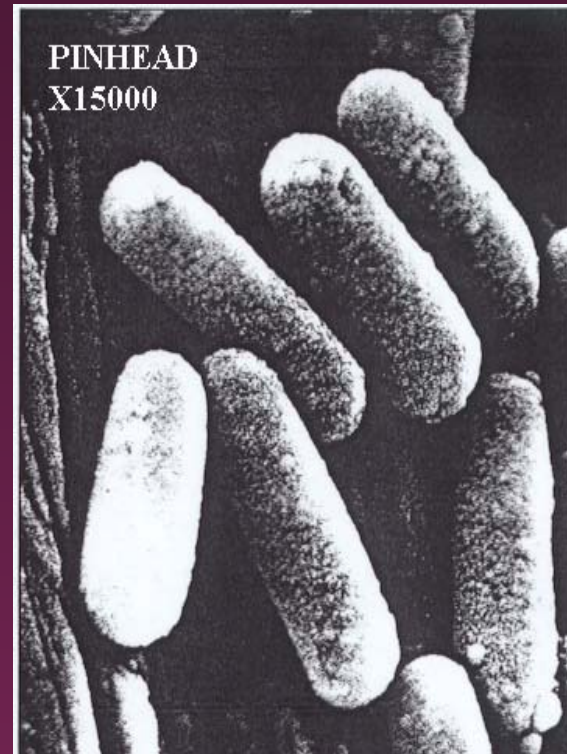
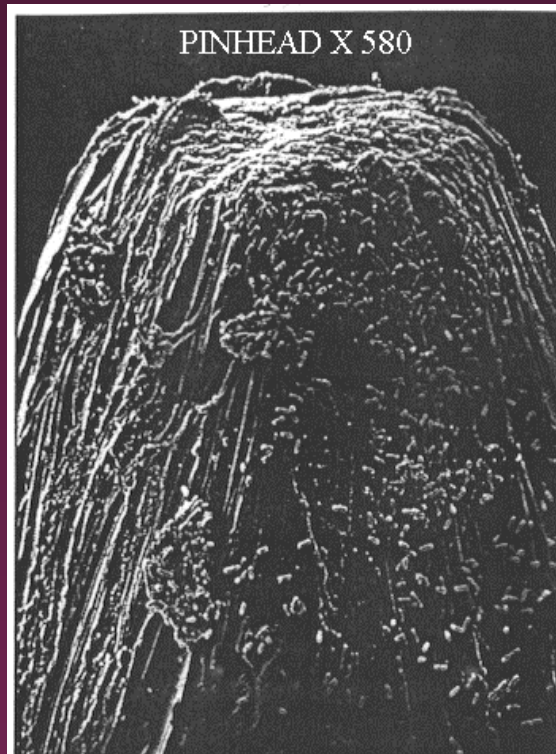
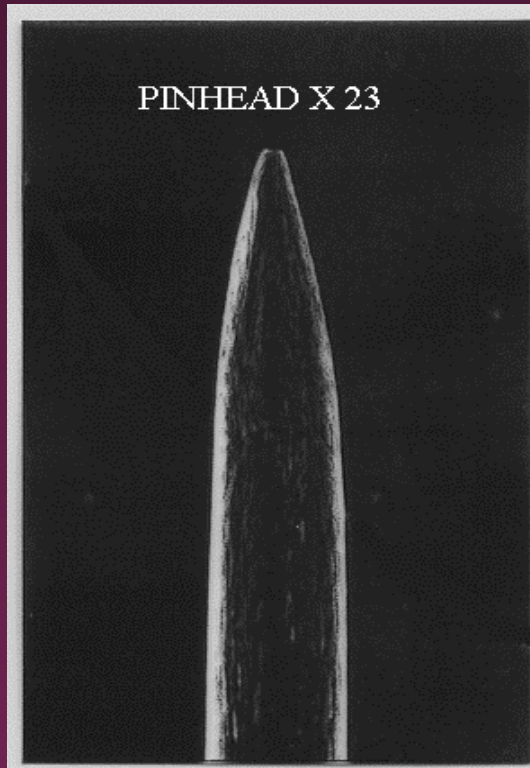
VTEC - E. coli

“Know Your Enemy”



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'Wanted' Poster?



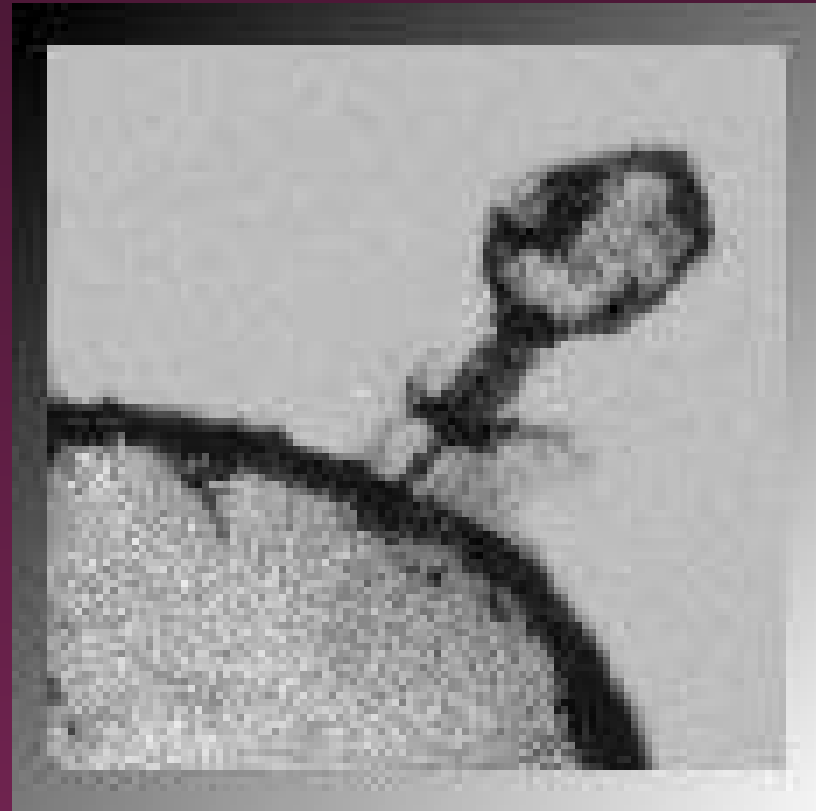
E. coli

- First isolated in 1885
- 000s of strains
- Majority are harmless
- Commonly found in intestinal tract of man & animals
- Presence of E. coli in food or the environment indicates faecal contamination



Enter VTEC E. coli...

- One of four types of E. coli that cause diarrhoea
- Theory - a toxin-producing gene from a bacteriophage (a virus that infects bacteria) became incorporated into the genetic makeup of a “normal” E. coli



VTEC E. coli

- First reported in Canada in 1977
- Incidence in the UK has increased markedly since 1981 (when it was first reported)
- Most common type is O157:H7 (letters & numbers refer to specific markers on the surface of the bacteria).
- Now there are more than 1000 laboratory confirmed cases per year in the UK

Why is VTEC *E. coli* so nasty?

Genetic changes (the new *eae* gene) led to VTEC *E. coli* adopting the following mechanism of infection:

- **A**ttachment - to the intestinal wall (using the outer parts of its cellular structure)
- **E**ffacement - destruction of layers of cells in the intestinal wall

What symptoms are produced?

- Severe abdominal cramps and diarrhoea, initially watery but becoming grossly bloody (**haemorrhagic colitis**)
- In up to 7% of cases **haemolytic uraemic syndrome** (HUS) can develop - red blood cells get destroyed, acute renal failure, can have long term implications e.g. dialysis. [Under 5s particularly; 10% fatality rate]
- **TTP** can develop (usually in adults) - HUS symptoms + bleeding under the skin + neurological complications. [Fatality rate in the elderly can reach 50%]

Other Clinical Details

- Incubation period 1 - 14 days, but typically 3 to 4 days
- Infectious dose is very low - may be as low as **100** bacteria!! (c.f. Salmonella 1,000, 000 +)
- Infections are usually self-limiting, with symptoms usually resolving within 2 weeks (except for HUS or TTP)
- Almost 20% of victims are hospitalised (c.f. 1.4% for other foodborne disease ('>**10 times as dangerous?**'))
- Overall fatality rate of 1 - 5%, but may be much higher in some institutional outbreaks

How is VTEC E. coli spread?

- **Cattle** are thought to be the main reservoir.
- Outbreaks have been associated with (undercooked) beefburgers/meat products, contaminated/unpasteurized milk and yoghurt, faecally contaminated raw vegetables/salads and water, and contaminated/unpasteurized apple juice (E. coli O157 is acid tolerant).

Cross Contamination - Where Does It Take Place ?

- Faeces on carcasses, udders etc
- Meat: Minced beef - surface area
- (Work) Surfaces (raw + cooked foods)
- Knives & equipment
- Hands
- Person-to-person spread has occurred in households, nurseries and infant schools.

Controlling the Spread of VTEC E. coli In Food Premises

- Thorough **cooking** of meat (E. coli O157 has similar 'thermal durability' to Salmonella)
 - Beefburgers to be cooked until juices run clear, and there are no pink bits inside
 - Minced beef and minced beef products should be cooked to a minimum internal temperature of 70°C for 2 minutes or equivalent
 - Use of a digital instant readout thermometer to check temperature at centre
- Suitable **chilled** temperature control of foods
- **Prevention of cross contamination**, separation of raw & cooked foods, effective cleaning regimes, good personal hygiene.
- Wash salads and vegetables thoroughly. Consider the use of a Fresh Produce Wash.

E. coli O157 - Further sources of Information

- http://www.phls.co.uk/topics_az/ecoli/ecoli_facts.htm
(This page is on the UK's Public Health Laboratory Service website)
- <http://www.ces.ncsu.edu/depts/foodsci/agentinfo/org/ecoli.html>
(This page provides a useful set of links to E. coli-related pages in the USA).