Terminal haemorrhage from the nose, mouth and/or anus following sudden death is characteristic of anthrax and plays an important role in the cycle of infection (see Fig. 1). It is, however, not always present and apparently it is rarely, if ever, seen in certain species, for example, bison. In these, opening of the carcasses by scavengers and spillage of blood and body fluids at that point may be the means of perpetuation of the disease.
Fig. 4 Stages in the development and resolution of uncomplicated cutaneous anthrax lesions

A. As first seen (day 1).
B. Day 2 or 3.
C. Day 4.
D. Day 6.
E. Day 11.
F. Day 150 after presentation.

Resolution of all but the most severe lesions is usually complete without surgical intervention, leaving only light scarring. Severe lesions (Fig. 5) may require prosthesis and sensitive areas, such as the eyelid, may need surgical attention. Kindly supplied by Dr WE Kobuch, I7-Gynécologie Obstétrique, Toulouse, France.
Fig. 5 Evolution and resolution of a severe cutaneous lesion in a 64-year-old female patient

A. When first seen on day 3 of disease. On the dorsal site of the right forearm, there is a purple, large vesicular ring (10 x 10 cm in diameter) with a depressed centre surrounded with erythema extending from the lesion to the whole hand and to the axillary region. Intravenous penicillin G is initiated.

B. Day 11 (day 9 of therapy). The oedema has resolved and the erythema has disappeared. A black eschar has formed and is surrounded by a large, hard induration. Administration of penicillin is stopped on the 10th day of therapy.

C. Day 17. The eschar is large, dried and black.

D. A thick, dried and black eschar persists until week 4.

E. Erythema and induration around the lesion have resolved. The eschar was removed surgically on day 34. Surgical debridement is required. The lesion leaves deep tissue damage and a skin graft is indicated.

F. The wound is grafted on day 44.

* Kindly supplied by M. Doganay, Erciyes Universitesi, Tip Fakültesi, Infeksiyon Hastalıkları Kliniği, Kayseri, Turkey.
Fig. 7 Anthrax toxin action\textsuperscript{a,b}

\textsuperscript{a} See text, section 5.5.3, for details of events being depicted.

\textsuperscript{b} Kindly supplied by Dr J. Collier, Microbiology and Molecular Genetics, Harvard Medical School, Boston, USA. Reproduced from The Scientist, 10 June 2002 by kind permission of the editor.
Fig. 8 Anthrax bacteriology

A. Capsulated *B. anthracis* in the blood of an animal that has died of anthrax. Stained with polychrome methylene blue (M’Fadyean stain). In vivo the bacilli are in short chains (in vitro they frequently form long chains – depicted in C). The clearly demarcated pink-stained capsule surrounding the box-car shaped bacilli in blood from a dead animal is a definitive diagnostic confirmation of anthrax. Unstained “ghosts” around bacterial cells are not acceptable for diagnosis and may be putrefactive bacteria.

B. On blood agar, the colony is non-haemolytic and characteristically tacky; it can be teased up in the manner shown with an inoculating loop. Note also the curly tails sometimes seen in *B. anthracis* colonies. (Reproduced from Turnbull et al.1990a, by permission of Edward Arnold/Hodder & Stoughton.)

C. Spores and vegetative cells of *B. anthracis* which belongs to *Bacillus* species morphological group 1, characterized by spores being centrally or subterminally positioned in, and not swelling, the sporangium. The smear is from a sporulation agar culture; note the chains referred to in the description of A (Malachite green stain, oil immersion lens).

D. Mucoid and rough colonies of *B. anthracis* on capsule agar incubated in an atmosphere of 5% CO₂. The rough colonies represent cells that have lost pXO2 (see Figs 6 & 7). (Kindly supplied by Patricia Fellows, Frederick, M.D., USA).

(Continued overleaf)
Fig. 8 Continued

E. *B. anthracis* colonies (large ones) on PLET agar. These are typically ‘‘bee’s-eye” in appearance; concave with a matt surface, approximately 2.5 mm in diameter after 36 hours at 37 °C. See also Fig. 14.

F. A simple 3-in-1 test. *B. anthracis* (east and west) and two non-anthrax *Bacillus* species (north and south) on blood agar. *B. anthracis* is non-haemolytic and sensitive to the diagnostic “gamma” phage and to penicillin. Note the haemolysis around the edge of the top (north) culture and that neither of the non-anthrax species shows sensitivity to the phage or penicillin.
Fig. 10 Mobile incinerators for disposal of carcasses

A–D: note in A the bag to prevent further environmental contamination by blood issuing from the nose and mouth and, in B, incineration is from underneath the carcass. In D it can be seen that ground has been well scorched. (Kindly supplied by Nigel Durnford, Trading Standards Department, Gloucestershire County Council, Gloucester, United Kingdom.)

(Continued overleaf)
Fig. 14 Colonies of *B. anthracis* on selective PLET agar after 42 hours at 37 °C

The colonies are “bee’s-eye” in appearance: dome-shaped with a matt texture but not dry. (See also Fig. 8E.)