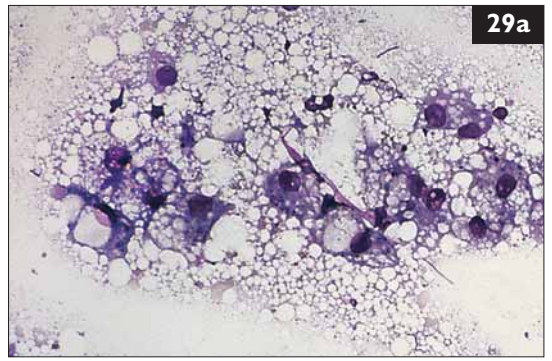
27, 28: Answers

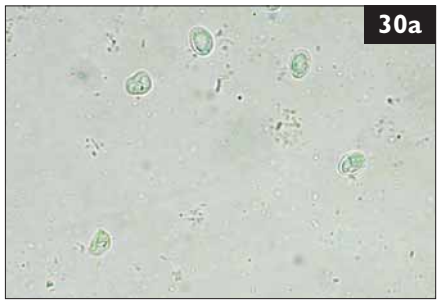
27 a A corpus amylacea. This is an acellular structure that could be confused with a cell since it has a densely staining centre that can be mistaken for a nucleus. The peripheral, concentric layers are less dense and should not be confused with cytoplasm. These bodies are thought to be composed of glycoproteins and they do not calcify. They are found in respiratory cytology specimens in humans with chronic alveolar oedema and/or obstruction due to cardiac insufficiency, pulmonary infarction and chronic bronchitis. They may be seen in low numbers in respiratory specimens from horses, dogs and cats with similar conditions.
b The corpus amylacea is significant since it supports the history of chronic obstruction. Casts of inspissated mucus with many embedded neutrophils were seen in other fields of this tracheal washing smear and provided additional cytological support for mechanical obstruction of airways.

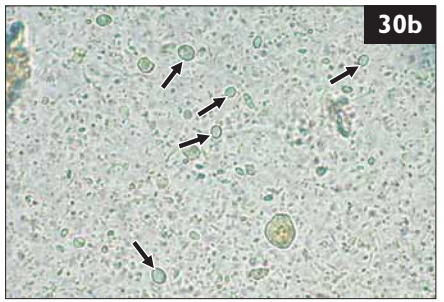
28 a The cytological characteristics and location of the mass are compatible with haemangiopericytoma, a common skin tumour in dogs. The spindle cells tend to be plump, occurring singly or in bundles, with ovoid, single and occasionally multiple nuclei (not illustrated). The cells tend to possess feathered 'tails' and the cytoplasm is usually lightly to moderately basophilic and may contain a few discrete vacuoles. Generally, mild to moderate anisocytosis and anisokaryosis are present. The origin of these tumours is uncertain. They appear to be associated with the periphery of blood vessels (pericytes) and may be related to peripheral nerve sheath tumours. These tumours tend to be solitary and locally invasive, although they may appear well-circumscribed. Although metastasis is uncommon, recurrence following surgery is common, especially if the excision is incomplete.
b Because of the need for wide margins during excision, surgery may need to be repeated. Wide margins may be difficult to obtain because of the location of the mass (limb, often in the vicinity of a joint). This results in a high incidence of recurrence (up to 60% of cases); therefore, amputation or radiation therapy may be considered as alternative or complementary therapies, respectively.
Note: This case is illustrative of a spindle cell tumour that does not have extremely aggressive morphological features. The degree of atypia may vary in tumours of this type, depending on the rate of growth, whether they are ulcerated and whether or not there has been previous removal. Often a diagnosis of spindle cell tumour is as specific a diagnosis as can be made; in some cases there may be a high index of suspicion of haemangiopericytoma or schwannoma based on the location and features of the cells, and this diagnosis can be suggested with a high degree of confidence. Differential diagnoses include cutaneous fibrosarcoma or other types of sarcoma. The biological behaviour (high rate of local recurrence with low or infrequent metastasis) is similar in many types of cutaneous spindle cell tumours, so cytological identification is important and wide and deep surgical excision is indicated to help increase the probability of complete removal. In many cases, histological evaluation is needed to confirm the tumour type.

29, 30: Questions

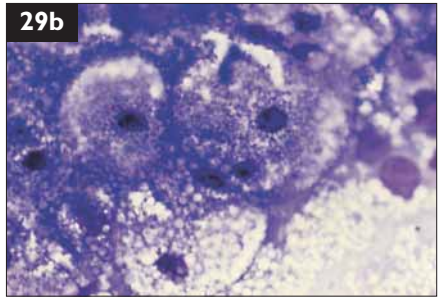


29 A six-year-old female spayed DSH cat presented for chronic weight loss and a recent history of vomiting and severe lethargy. Physical examination revealed pale, icteric mucous membranes. The temperature was 38°C (100.4°F) and pulse and respiration rates were slightly increased. Abdominal palpation and radiographs revealed diffuse hepatomegaly. Examination of a peripheral blood smear indicated RBC shape abnormalities including severe acanthocytosis. Abnormal biochemistry values were: AST = 150 U/l (ref. = 2–36 U/l); ALT = 350 U/l (ref. = 6–80 U/l); ALP = 135 U/l (ref. = 2–43 U/l); bilirubin = 68 µmol/l (ref. = 0–3.4 µmol/l). An FNA of the liver was obtained and a smear made (**29a**) (Wright–Giemsa, ×25).
a Explain the abnormal RBC shape and the biochemistry abnormalities.
b Describe the cytological findings, and give your cytological interpretation.
c List the differentials for your diagnosis, and discuss treatment options.



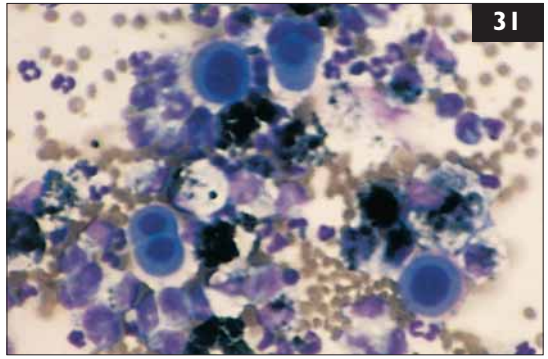


30 A 16-week-old Shih Tzu presented with mucoid diarrhoea. The puppy was outwardly well and had a good appetite. A zinc sulphate faecal float (×40) was made (**30a**). A saline mount (×40) was made for comparison (**30b**).
a What are these organisms?
b Describe how and where to look on the zinc sulphate faecal float to find the cysts.
c Are yeast cells larger or smaller than these cysts? Do they float?

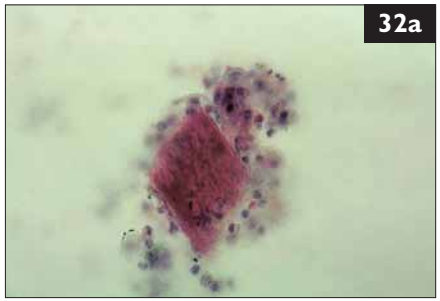


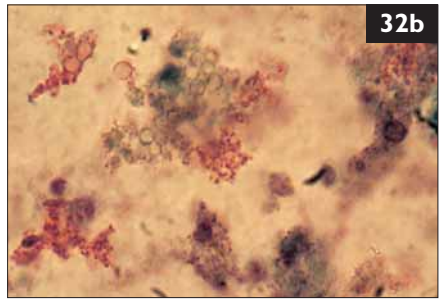
29 a Acanthocytes are spherical erythrocytes with blunt tipped spicules of different lengths projecting from the surface at irregular intervals. Abnormal amounts of lipid may accumulate in the outer half of the lipid bilayer during liver disease. This causes the membrane to evaginate and form spicules, resulting in acanthocytosis. The mild elevation in ALT and AST suggests minimal hepatic damage. Elevated bilirubin and alkaline phosphatase are indicative of cholestatic liver disease. Even mild elevations of serum ALP are significant in the cat because of the short half-life of the enzyme in this species.
b Several hepatocytes are seen, many of which contain distinct, punctate, clear cytoplasmic vacuoles. The nuclei of many of these hepatocytes are pushed to the periphery due to cytoplasmic vacuoles. Abundant punctate vacuoles are also noted in the background. The cytological interpretation is vacuolar degeneration compatible with hepatic lipidosis.
c Hepatic lipidosis in cats may be a primary disease or may occur secondary to other metabolic, inflammatory or neoplastic conditions. Approximately 50% of cases are idiopathic. Differentials for secondary hepatic lipidosis include diabetes mellitus, pancreatitis, hyperthyroidism, steroids or neoplasia. The key to successful management of cats with lipidosis, as seen in this case, is early diagnosis and intensive nutritional support. Cats typically require nutritional support for 3–6 weeks with high-protein, calorie-dense food, usually via PEG tubes. Because these cats are already ill and stressed, extreme care must be taken not to cause further stress by force-feeding.
Note: An additional photomicrograph is included here for comparison (**29b**) (Wright–Giemsa, ×100 oil). The multiple small, crisply defined cytoplasmic vacuoles within hepatocytes are characteristic of this condition.

30 a *Giardia* species cysts.
b First check the entire slide for other parasite ova routinely at ×100. This gives the *Giardia* cysts time to float to the top of the zinc sulphate solution. Increase magnification and scan carefully, just under the cover slip – air bubbles, especially small ones, are a useful landmark for finding the very top of the solution droplet beneath a cover slip. *Giardia* cysts, when they are numerous, will all be in the same plane of focus.
c Yeast cells are very commonly mistaken for *Giardia* cysts, but are slightly smaller. Yeast will tend to sink to the bottom of the droplet.



31 An 11-year-old mongrel dog has been losing weight and is dyspnoeic. Serosanguineous fluid is withdrawn from the pleural space (TP = 34 g/l, NCC = 10.6 $\times 10^9$/l). A cytospun smear is made from the fluid (**31**) (Wright–Giemsa, ×50 oil).
a What cells are present?
b What is the fluid classification?
c What is your diagnosis?





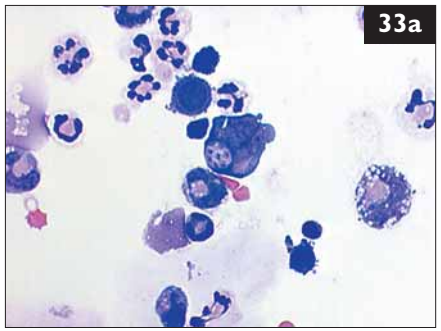
32 A seven-year-old horse used for three-day eventing is evaluated on the treadmill with endoscopy in place. Fresh blood is observed in the tracheal mucus as the horse is exercised. Exercise is discontinued. A tracheal washing is collected the following day and smears prepared.
a What is illustrated in the smears (**32a, b**) (Papanicolaou, ×20 and ×100 oil, respectively)?
b What is the significance of these findings?

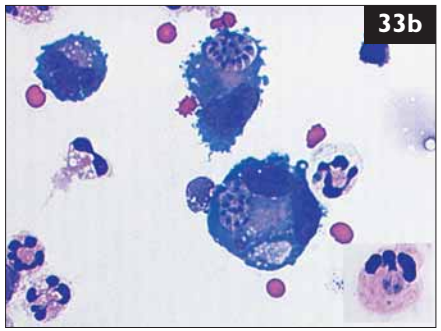
	Transudate	Modified transudate	Exudate
Total protein (g/l)	<25	>25	>30
NCC ($\times 10^9$/l)	<1.5	<5	>5
Predominant cell type	Mesothelial cells Macrophages	Mesothelial cells Macrophages	Neutrophils Macrophages

31 a A mixed cell population is present, consisting of RBCs, neutrophils, macrophages and reactive mesothelial cells. A lot of black pigment is present extracellularly and intracellularly within the macrophages. This is melanin and the macrophages are melanophages.
b An exudate. (Guidelines for fluid classification in dogs and cats are shown above.)
c Metastatic melanoma.

32 a There is a cast of mucoproteinaceous material containing many erythrocytes in **32a**. The erythrocytes stain red-orange. Note the smooth sides of the cast indicative of formation within an airway. The ends (upper left and lower right) are jagged. Such a cast is consistent with recent haemorrhage. Based on studies of horses with blood instilled into the lung and those with respiratory cytology collected at known intervals following pulmonary haemorrhage, this appearance can be found 1–3 days following blood instillation or pulmonary haemorrhage. Finding of erythrocytes in a cast is unusual; more often, erythrocytes are seen as discrete cells in the background of the smear.

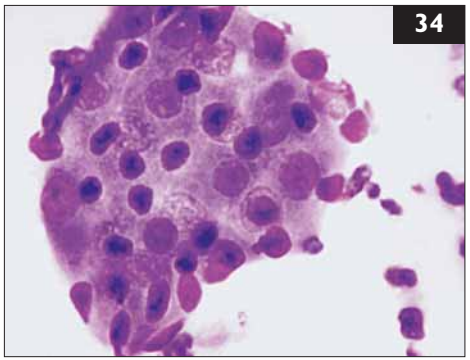
There are lysed, crenated and fragmented erythrocytes, often in clumps, in **32b**. This is typical of erythrocytes associated with blood instillation or pulmonary haemorrhage that has occurred 1–3 days previously. Sometimes, blood contamination will include lysed and intact erythrocytes, but the clumped, crenated and fragmented appearance is typical of 'ageing' blood and should raise the suspicion of recent pathological haemorrhage.
b The significance of these findings relates to recent pulmonary haemorrhage, probably within the last 1–3 days. The cast of material or presence of lysed, crenated and fragmented erythrocytes in clumps is supportive of pathological haemorrhage rather than contamination with blood at collection. The finding of a few, single fresh erythrocytes may be within normal limits in a respiratory cytology specimen. Contamination with blood due to mild trauma during collection usually results in single, discrete erythrocytes that are lysed or intact. Contamination with blood is an unusual finding in cases with routine collections. It is more common if the animal is fractious or if there is difficulty that results in endoscopic trauma to the airways. Communication with the cytologist regarding difficult collections or those with a high probability of traumatic contamination is recommended.





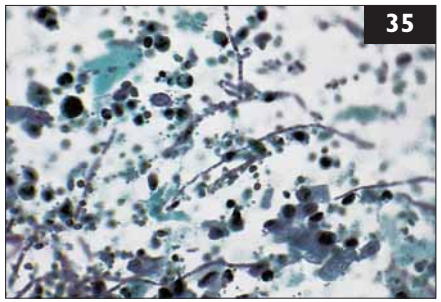
33 A cat presented with pyrexia, pneumonia and dyspnoea. Pleural fluid was obtained and smears made from sediment from the fluid. Similar findings were also obtained from bronchoalveolar lavage.
a Identify the aetiological agent in this exudative effusion, with precise reference to the exact stage of its life cycle as seen in these photomicrographs (**33a, b**) (Wright–Giemsa, ×50 and ×100 oil, respectively).
b What other laboratory tests would you like to use to support your cytological suspicion?
c Given the following laboratory results, what can you determine about the kinetics of *Toxoplasma gondii* from these values: IgM – ELISA ~ 1:256; IgG – ELISA ~ 1:64?
d Toxoplasmosis is a potential zoonotic risk. Are cat owners and veterinarians at significantly higher risk than the general population of acquiring *T. gondii* infection?
e Are seropositive cats a risk for pregnant women or immunocompromised individuals?

34 A ten-year-old entire male Beagle presents with multiple nodular enlargements surrounding the anus. This is associated with ulceration and bleeding and is accompanied by a disagreeable odour. Fine needle aspiration is performed and smears prepared (**34**) (Wright's, ×100 oil).
a What is the most likely diagnosis?
b What therapy would you recommend?

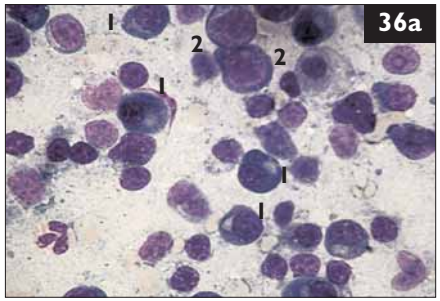


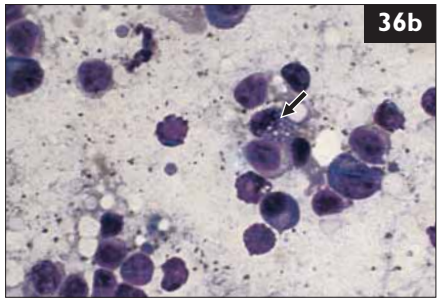
33 a Intracellular protozoon consistent with *Toxoplasma gondii*. Stage: tachyzoites, multiplying within macrophages and neutrophils (insert lower right corner, **33b**).
b Serology.
c IgM antibodies can identify early infection at 1–2 weeks post exposure. They peak at 3–6 weeks and usually drop to negative at 12 weeks post exposure. Caution: some cats can have sporadic low IgM ELISA titres for up to one year post exposure. IgG antibodies develop at approximately two weeks post infection and can remain high for several years to the life of the cat. Based on the high IgM titre and presence of IgG, this patient has an active, progressing to established *T. gondii* infection. A diagnosis of active infection can also be made by a four-fold increase in serial IgG tests 2–3 weeks apart.
d No. Minimizing risk does not have to include prevention of exposure to cats but must prevent exposure to oocysts (particularly sporulated oocysts). Therefore, pregnant women and immunocompromised individuals should not change cat litter boxes, should wear gloves when gardening and should maintain extra hygiene when working with food products, particularly raw meat. Only sporulated oocysts are infective; therefore, litter must be changed daily and, given cats' fastidious grooming habits, they are unlikely to be a risk since they do not have sporulated oocysts on their fur.
e No. Most seropositive cats have completed the oocyst shedding period and are unlikely to repeat shedding (for up to six years).

34 a The clinical signs, signalment and cytological observations are most consistent with perianal adenoma. This tumour is most common in older, sexually intact dogs (>8 years of age). Multiple tumours in the area around the anus are common, as are bleeding and ulcerative lesions. These tumours are rarely malignant in males.
b Surgical excision is recommended. Castration will arrest tumour growth and should be done at the same time, as this tumour is testosterone dependent. Oestrogen therapy is recommended in cases in which the tumour cannot be completely removed, and it may also be used following surgery as adjunct therapy. Antibiotic therapy may be needed if concomitant infection is suspected.
Note: The cytological features of perianal adenoma are classic in this case. The cells are typically large and resemble hepatocytes and are referred to as 'hepatoid'. They typically have round, central nuclei with single, distinct nucleoli and moderate to abundant, oval to angular cytoplasm. They usually occur in cohesive groups. In some cases, small 'reserve' cells also may be apparent mixed with the larger hepatoid cells. There may be concurrent inflammation and/or haemorrhage. Perianal adenocarcinoma is less common and exhibits more bizarre and/or variable features compatible with malignancy. It may present as a relatively undifferentiated malignancy cytologically and require surgical biopsy and histological evaluation to confirm cell type of origin.



35 A 12-year-old mare is referred because of a history of chronic infertility over a two-year period. She has a history of having a foal each year since she was six years old, but has failed to produce a foal following breeding for the last two years. The mare has been cultured and treated for bacterial infection with infusion of antibiotics on multiple cycles prior to referral. A uterine washing is collected as part of the reproductive work up.
a What cellular and noncellular features are apparent in this smear of sediment from the uterine washing (**35**) (Papanicolaou, ×20)?
b What is your interpretation of the smear?





36 An eight-year-old crossbred dog has a history of crusting, flaky skin lesions, weight loss, lethargy and polyarthropathy. There is generalized, moderate lymphadenopathy. The dog was imported from Spain 18 months previously. Smears from FNAs from two lymph nodes are shown (**36a, b**) (both Giemsa, ×100 oil).
a What cell(s) are increased in number in **36a**?
b What does this indicate?
c What is the cell next to the arrowhead in **36b**?
d Given the history and clinical signs, can you speculate on a possible cause for the generalized lymphadenopathy?