Respiratory infection

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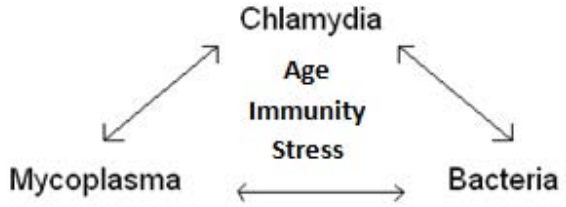
If you ask any experienced flier what health problem concerns him the most in his pigeons, then if it is the breeding season he will probably say canker, but if it is the racing season he will probably say respiratory infection. Respiratory diseases are common in pigeons. They are a major cause of poor performance and pigeon loss during the race season. Young birds under stress are most at risk of developing respiratory diseases, although healthy old birds can fall ill when exposed to respiratory diseases in the race basket. Race birds with a respiratory infection can be difficult to detect and yet, like a human athlete with flu, cannot compete to the best of their ability. When some fanciers talk about respiratory infection, they give the impression that they are discussing a single problem and, yet, several organisms can be involved and often simultaneously. Clinical respiratory infection in pigeons is the end result of the interplay of a number of factors but the type of infective organisms involved and the vulnerability of the birds to infection are particularly important.

The usual organisms involved are Mycoplasma, Chlamydia and a range of bacteria (most commonly, E. coli). Whether or not these organisms actually cause disease in a pigeon, if it is exposed, essentially depends on how well the pigeon is at the time of exposure and also its age and level of immunity. Any factors that cause physiological stress can weaken the bird and make it more vulnerable to developing a respiratory infection. As a general rule younger pigeons are more susceptible. Exposure to the agents that cause respiratory disease through growth and development stimulates immunity to form in a growing bird that is otherwise healthy.

The diagram below illustrates the interplay of these factors.



Predisposing stress factors can take the form of:-

1. Environmental triggers, e.g. dampness, overcrowding, low hygiene
2. Management triggers, e.g. poor feeding, excessive tossing, or
3. Concurrent disease, in particular parasitism. This includes wet canker. The combination of either worms or elevated trichomonad levels and respiratory disease is very common.

The fancier must establish a healthy loft environment; otherwise respiratory disease will continually recur, despite medication.

A good example here is a fancier who was recently in our clinic. He had a group of young birds that had dropped about 3 flights i.e.were about 10 weeks old. A few kept getting 'eye colds'. He would treat them and they would become well but within 2 weeks there would be more birds with the same problem. In a 2m x 2m section, he had 40 youngsters and the humidity reading (from a hygrometer placed on the wall of the loft overnight) was 85%. Reducing the number of birds to 25 per section and installing an additional vent high on the back wall improved ventilation and reduced humidity. The birds were again treated but this time the problem did not return.

Chlamydia

Chlamydia are an unusual group of organisms in that they are not bacteria but are antibiotic responsive. As a group, they can cause disease in a variety of animals. One species causes disease in koalas while another causes a venereal disease in humans. The specie that infects pigeons is called Chlamydia psittaci. It essentially has 2 life cycle stages – a reticulate body and an elementary body. The elementary body can survive in the environment. Pigeons become infected through contact with the elementary body. The elementary body attaches itself typically to the superficial lining cells of the eyelid, throat or upper respiratory tract. The elementary body then penetrates the cell membrane into the cell and becomes a reticulate body. The reticulate body then replicates itself until there are many reticulate bodies in the cell. As the reticulate bodies increase in number, they rupture into adjacent cells causing cell destruction and an advancing wall of inflammation . Alternatively they rupture back out onto the surface of the cell, once again becoming elementary bodies and further contaminating the environment. Infected birds with active disease shed large numbers of these infective elementary bodies in their saliva, tears, respiratory discharges and droppings.

It is thought that low grade exposure to these bodies may not cause disease but rather trigger the development of an immune response in a pigeon that enables it to form an immunity. The typical situation in most racing lofts is that Chlamydia tends to cycle through the birds. Growing youngsters are passively exposed to the organism from other birds in the loft and their parents. Often this doesn't cause disease. Most birds by the time they are 6 months old have had multiple low grade exposures and have developed a significant immunity. Disease occurs if the youngsters become ' run down' due to stress factors and are therefore unable to mount an immune response or alternatively their level of immunity is challenged by a particularly high exposure to the organism.

An antibiotic called doxycycline is very effective at treating Chlamydia. If a pigeon is given a 45 day course it has a 98% chance of clearing Chlamydia totally from its system. One would think that it would

make sense to treat all the birds for 45 days, eradicating the disease and then not worry about it in the future. The difficulty with this is that if we were to eradicate Chlamydia it is known that any immunity that the pigeons have, would disappear within 6 months. This would mean that if the birds were subsequently re-exposed they would be a very vulnerable population and potentially severe disease could occur. Once racing starts, exposure to Chlamydia in the race units is virtually guaranteed. Although drugs can be used to treat Chlamydia again and again if it keeps reappearing in returning race birds, the factor that principally protects the birds is their immunity that they have formed during development. Chlamydia is therefore managed by caring for the birds well (so that they can mount a good immune response), by allowing a controlled exposure to the disease (to build up a strong immunity) and by using medication if required during development in a way that keeps the birds healthy but still allows some exposure to the disease. How is this done?

Post weaning management

In the post weaning time Chlamydia cycles through the developing young birds. Some youngsters may have passive immunity acquired through the egg and from their parents in the crop milk. Further exposure in the young bird loft builds on this immunity. Some youngsters take longer to form a protective immunity than others and these can show symptoms of clinical Chlamydia infection. If the birds are well otherwise, these symptoms are often mild and may include a dirty cere, sneezing, nasal discharge, a partially closed light sensitive eye, inflamed red eyelids, and also tears overflowing the eyelids and becoming air dried on the feathers around the eye. If the number of birds affected is low and the symptoms are mild, often no treatment is provided. With ongoing good care it is likely that the birds will fix themselves and will develop a stronger natural immunity this way. If the symptoms in an individual bird become more severe, particularly if the birds' development is starting to be compromised, treatment should be provided. The usual treatment is doxycycline 10 – 25mg per pigeon once daily. If less than 5 – 10% of birds are affected it is best to just treat these birds individually. There is no need to separate them from the rest as all birds are likely to have the organism in them. Also young birds tend to recover better if left with the flock in a familiar loft. If more than 10% of birds develop symptoms then a flock treatment should be given. The usual treatment is doxycycline in the water. However, if 10% or more are developing symptoms this tells you that this group of young pigeons are having trouble developing their natural immunity. A review of their management, loft environment and a check for any other (particularly Circo virus and parasitic) disease should be done. In young birds the underlying stress is often overcrowding.

In Victoria, Australia, January to May are the respiratory months. Most lofts contain large numbers of young birds having just had the stress of weaning and now having the stress of moulting, coupled with young bird tossing and racing. It is a time of high humidity and fluctuating temperature, conditions that favour respiratory disease. Between 1 December and 1 March (the usual time that the last youngsters are weaned in many lofts in Australia), fanciers must monitor the youngsters, in particular, for signs of 'one-eye cold', dirty wattles or sneezing. However, green watery droppings, failure to thrive, shortness of breath and a reluctance to fly may also be indicative of the problem.

After 1 March in Australia, as the youngsters get older, fanciers look for signs of poor loft flying, excessive panting after training, and sneezing within the loft. Even in the most healthy lofts, there can be occasional outbreaks of respiratory diseases. It is important to recognize that more than three sneezes within 5 minutes from 100 birds is a significant indicator of early respiratory disease. One would expect two to three sneezing outbreaks between January and May, even in the best managed loft.

Pre-race management

As racing approaches, the birds have been given as long as possible to develop their natural immunity. It is important however that there is no active Chlamydial respiratory infection in the birds when racing starts. The can lead to poor race results and potentially disastrous returns. Chlamydia tests can be done by your veterinarian to see if the disease is still active and if the birds have formed a good immunity. The usual tests available are the Chlamydia immunocomb, PCR or AvianLabs QUICK test.

A team should be treated for Chlamydial respiratory infection before racing if it fits into one of the following categories :-

1) If testing shows that the disease is still active in the birds even if they look normal .
2) Chlamydial respiratory infection was a problem during the early part of the racing season the previous year and the loft parameters have not changed(ie same loft design, same genetics etc)
3) There was a significant amount of respiratory disease in the post- weaning time .
4) If the birds have a current clinical respiratory infection.

If required it is usual to treat the birds for 7 – 20 days with doxycycline, finishing 2 – 3 weeks before racing starts. Just how long an individual team is treated depends on the severity of the problem and the response to treatment.

If they do not fulfill one of these criteria then no treatment is required.

Management during racing

Ongoing exposure to Chlamydia occurs during the racing season. The natural immunity the birds have formed through development should be high enough to protect them however because of the stress associated with racing and potentially high exposure to the organism it may not be. Fanciers should monitor their birds closely for symptoms and have their birds regularly checked by an avian vet. If the birds become unwell or race performance is compromised due to Chlamydia then the team is treated as a single unit and a flock treatment of doxycycline is given. Birds return to health fairly quickly but not race form. Sometimes a race needs to be missed and then the level of work gradually increased as the birds regain their health and fitness.

If diagnosed through the racing season, what should the fancier do?

- A health profile, i.e. examination of the saliva and droppings and sometimes other tests as suggested by your veterinarian to assess any concurrent disease that may need treatment. Provide general on-going good care to ensure a good response to medication.
- A gradual return to exercise. Always with respiratory infection there is an extended convalescence of usually 1 - 3 weeks. The birds must be given time to recover their fitness once medication has cleared the infection. They should not be forced to fly around the loft and once it is apparent that their vigour for flying has returned, initially short tosses only should be given (less than 1/2 hour). Observe the birds closely for signs of breathlessness on landing from these tosses and only when they are handling these well should longer tosses be given. When managing tosses of 1 - 1 1/2 hours well, it is usually safe to resume racing. In well-managed lofts with no other health problems, response to treatment can, however, be dramatic and I have had an interesting experience where two flyers both diagnosed with respiratory infection in their teams succeeded in gaining 1st and 2nd Federation (3000 birds) in an all-day 800 km race 3 weeks after treatment.
- Good food, good care and an appropriate multivitamin supplement speed recovery.
- Medication – the choice of drug is often dependent on the involvement of secondary organisms but usually the antibiotics doxycycline and tylosin are given together or a blend of doxycycline, tylosin and spiramycin. An initial course of usually 5 – 10 days is given depending on the severity of the infection and response to treatment.

Pre-breeding management

Stress for a stock bird is breeding. Stressed stock birds will shed the organisms in their droppings, saliva and eggs. If the Chlamydia is in the egg, the developing embryo is weakened and can either die during incubation, during the hatching process or as a nestling . If the chick survives it can be a retarded youngster. In a nestbox heavily contaminated with Chlamydia, the developing youngsters become weakened and die. If these things have happened in earlier years , been diagnosed as due to Chlamydia, and breeding has commenced, it is too late to effectively treat the stock birds. However, medication (usually doxycycline) can be given before mating to decrease the level of Chlamydia in the stock birds' system. This means that they will then require more stress before they start to shed the organism in high numbers.

Doxycycline, like other antibiotics, causes disruption of the normal bowel bacteria, interfering with vitamin metabolism and calcium absorption. It is therefore important that preventative courses are completed several weeks before pairing. There is benefit in giving the birds probiotics, vitamins and calcium supplements following treatment.

Management during breeding

Treating Chlamydia in a stock loft once breeding has commenced is extremely difficult. To some extent the need to treat Chlamydia during breeding represents inadequate preparation for the breeding season. If an outbreak does occur, only birds with clinical disease should be treated. This usually means treating individual birds directly to the beak. This essentially 'band aids' the problem until the end of the

breeding season. Once breeding finishes, the breeders can then be given a course of doxycycline. Weaned youngsters are managed as described in the post-weaning section.

Symptoms

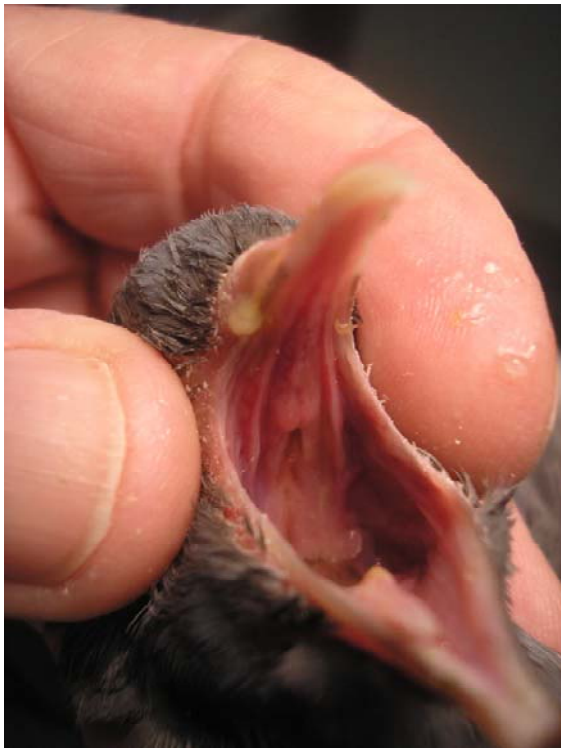
In young birds symptoms are usually confined to the upper respiratory tract and the most common signs observed are a dirty cere, nasal discharge and a red watery eye. In some birds, however, the organism can infect various internal organs including the liver and spleen and also deeper parts of the respiratory tract, particularly the air sacs. These birds may just be quiet, be reluctant to fly, lose weight and develop a green mucoid dropping. Birds with inflamed air sacs often become breathless after moderate exercise and are sometimes forced to land wherever they are and this may include buildings or trees near the loft. By the start of racing the birds are older, their natural immunity is higher and their response to disease is different. The signs observed are modified by these factors and are often very subtle. Older birds with respiratory infection have lost their zest for life and this is reflected in their race results.

A young pigeon with a mild Chlamydial conjunctivitis and sinusitis. Mild staining of the cere is apparent.

A young pigeon with a more advanced Chlamydial conjunctivitis and sinusitis. The conjunctiva and the sinus in front of the eye have become swollen. Tears are starting to overflow the eyelid margin. The cere is also stained and there is some discharge from the nostril.

INSERT Photo 33. A young racing pigeon with a Chlamydial sinusitis. The yellow discharge suggests that there may now be a secondary bacterial infection

Birds that are reluctant to fly, quiet in the loft and with dry feathers (no bloom) are suggestive of respiratory infection. Irritation to the upper airway usually shows itself as an increased rate of sneezing. Sneezing (more than three times in 5 minutes from 100 birds), scratching at the nose, yawning, repeated exaggerated swallowing, stretching the neck and wiping the nose on the wing butt all indicate irritation of the upper airways. On opening the beak, the tonsils may be inflamed, a thick white mucus may be extending into the throat from the windpipe or from the 'slot 'in the roof of the mouth, which may be closed due to swollen edges, the top of the windpipe may be red and inflamed, the beak at the nostril opening may be wet, the cere may be slightly discoloured or there may be a slightly mucous component to the birds' grunt while the lining of the throat or the muscles may be bluish. Chronically infected birds show delayed recovery after a race and will develop green droppings after stress because of damage to the liver. Sometimes the only symptoms in race birds, however, are poor performance and increased losses.



The edges of the 'slot' or choana can become swollen when the sinuses are infected. Note the discharge coming from the right nostril. Pigeons with a sinus infection will often sneeze and shake their head leading to jelly-like mucous becoming stuck to the perch, often at pigeon head height. Some of this mucous can be seen on the fanciers finger.

Birds with inflamed sinuses tend to cope particularly poorly in cold head- wind days. Presumably the cold winds buffeting the already inflamed sensitive sinuses across the face act a bit like an 'ice cream freeze' making the going hard.

Chlamydia can be carried throughout the body in the bloodstream and in birds of any age severe systemic disease can occur. Here birds become severely unwell and without prompt correct treatment some will die. In some birds the gonads will be damaged. This can lead to decreased fertility in both cocks and hens. Hens with a Chlamydial infection of the ovary often have late or irregular ovulations or no ovulations at all. If an egg is produced, sometimes Chlamydia can be incorporated in the egg where it can either kill the developing embryo or lead to the hatching of a weakened chick.

Signs of respiratory infection can be very subtle in mature race age birds. This bird is displaying very slight staining of the right cere and was noticed to be sneezing in the loft. As infectious material drains from the sinus under the cere, the cere is stained by this material. This bird has a respiratory infection and is unlikely to succeed if raced, particularly on a cold head-wind day.

Diagnosis

It is important not to confuse symptoms with a diagnosis. Many pigeon diseases have similar symptoms. The symptoms described earlier are all suggestive of the problem but an accurate diagnosis can only be reached through testing. The tests used today provide a speed and accuracy not available to vets or fanciers in the past. The tests in common use are:-

1. The Chlamydia immunocomb test – a serology test and therefore can only be done on whole blood. A drop of blood is collected. The veterinary technician then follows a series of steps. The test detects the presence of a particular immunoglobulin, IgG in the blood, formed in response to Chlamydia exposure. Results are available in 4 hours.
2. QUICK test – these rapid 10 minute tests detect the presence of Chlamydia protein. In race birds mucous from the throat, tears, blood or droppings can all be tested for Chlamydia. Samples however can be tested from any site where Chlamydia might be, including tissues collected at autopsy and even dead chicks in the shell.

3. Chlamydia PCR test – detects the presence of Chlamydial DNA. PCR tests are available for Chlamydia and also Mycoplasma. Similar samples to those for a QUICK test are used. Results are usually available in 2 to 4 days. A very accurate test.

These tests are described in more detail in the chapter 'The Diagnostic Pathway'. All of these tests are readily available and commonly used in an avian veterinary practice. Less commonly used tests include the microscopic examination of tissues and the use of special stains.

At the base of the cere are a series of bones called turbinate bones. These warm and clean inhaled air before it enters the sinuses as birds breathe in. In short-faced breeds like this Blondinette, these bones are compressed. This compromises their function and predisposes these birds to sinus infections. A similar process occurs in short-faced breeds of dogs and cats such as Pugs and Persians. When infection becomes established in the sinuses inflammatory material drains through ducts between the sinuses and ultimately either down the back of the throat or out through the nostrils. Sometimes this inflammatory fluid cannot drain away and dries into accumulations of inflammatory debris called rhinoliths. Antibiotics in this situation help with the infection but when treatment ceases infection re-establishes from the rhinoliths. For an infection to resolve and the bird to recover rhinoliths need to be removed surgically. This Blondinette was presented with some yellow nodular swellings near the eye which were rhinoliths in its sinuses.

A close up of the swollen sinuses containing the rhinoliths.

Using a scalpel the lower sinus is gently lanced

A small incision has been made. The rhinolith is expressed and then removed

The removed rhinolith. This rhinolith was extending into the lacrimal or tear sac and down the tear duct and is a cast of this area (the fine extension to the left of the photo is the extension into the tear duct).

The upper rhinolith is expressed after lancing.

The bird after the procedure. Continued antibiotic treatment should now resolve this infection.

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A rhinolith protruding into the choana or 'slot' from the frontal sinus in a young Modena. Chronic sinus infections can be difficult to resolve but surgical removal of the rhinolith followed by an appropriate antibiotic course should resolve this infection.

Medication

Worldwide the medication of choice for Chlamydia is doxycycline eg 'Doxyvet". Some other antibiotics do have an affect against Chlamydia, notably enrofloxacin ('Baytril') but are not as effective as doxycycline. 'Baytril' stops Chlamydia replicating but fails to clear it from the pigeons system. It therefore reduces clinical symptoms and treated birds appear to get better but relapses are common. Doxycycline actually stops the organism replicating and clears it from the pigeons system. In preparations made for racing pigeons, doxycycline is often combined with tylosin (commonly used to treat Mycoplasma) e.g 'Doxy-T' and sometimes also spiramycin (also called suanovil), e.g. 'Triple Vet' that treats many of the bacteria involved with respiratory infection. These combinations aim at providing a broader respiratory treatment targeting all of the likely organisms involved.

Doxycycline absorption from the bowel is compromised by concurrent use of calcium based supplements and so it is best to remove grit, pink minerals and picking stones during treatment. Also doxycycline is absorbed slightly better from the bowel in a weakly acidic environment. Adding citric acid (3g/6L water) during doxycycline administration is recommended by some vets. Drinkers made from non- glazed pottery or galvanized metal can also adversely affect doxycycline action. Drinkers should also be kept out of direct sunlight as UV light and heat can inactivate the antibiotic. Contamination with organic material such as droppings can also denature the doxycycline.

One Eye Cold

Pigeons have a number of sinuses in their head. When the lining of a sinus becomes inflamed, it secretes fluid into the sinus. Each sinus is drained by a series of very narrow tubes. Sometimes fluid forms more quickly than it can drain away. One of the main sinuses is doughnut-shaped and runs around the eye. Because of the effect of gravity, accumulated fluid moves to the base of this sinus causing a bulge to develop below the eye. Interestingly, this bulge is only visible because, unlike in mammals, where the outer sinus wall is bone, in birds it is soft tissue. Most sinus infections are due to either Chlamydia, Mycoplasma or bacteria. Chlamydia, in particular, also inflames the membrane lining the eyelids, called the conjunctiva, causing a conjunctivitis. The associated irritation causes excessive tears to be produced, which overflow the eyelid margin which then become air-dried and stuck to the feathers. The tears that form contain high protein inflammatory discharges that the blinking action of the eyelids can make into a froth. Fanciers often look at these small bubbles within the tears as an indication of infection. Discharge drains from the sinus through ducts under the cere staining it, before flowing through the 'slot' in the roof of the mouth or into the throat. This combination of a conjunctivitis and a sinusitis is what fanciers call a 'one eye cold'.

Mycoplasma

Mycoplasmas are a group of microorganisms that infect birds, animals and people. There are many different types, with the different types affecting different species of animals and causing different clinical problems. For example, Mycoplasma pneumoniae infects the lungs of humans, Mycoplasma synoviae can infect the joints and respiratory system of chickens, while Mycoplasma gallisepticum is associated with respiratory infection in chickens, pigeons, turkeys and other birds. Different types of Mycoplasma vary in their ability to cause disease. Some cause severe disease with significant mortality rates while others do not cause disease at all and are considered to be normal inhabitants of, for example, the respiratory system. A bird's response after exposure to Mycoplasma is very much modified by a number of factors, including the bird's age at exposure, nutritional status, general health and genetic make-up, etc. Pigeon fanciers often describe birds with clinical respiratory infection due to Mycoplasma as having 'airsac disease'.

In many species of birds, including pigeons and chickens, the upper respiratory tract is invaded and colonized by Mycoplasma in early life. Once they are there, they are essentially there forever. Antibiotic courses will reduce their number but not eliminate them. The significance of disease-causing Mycoplasma is that, if the birds become run down so that their ability to resist disease is reduced, the Mycoplasma will take advantage of this, increase in number and start to cause disease. Typically, in this situation, the Mycoplasmas inflame the membranes lining the respiratory tract, causing some primary interference with infected pigeons' racing performance but more importantly the inflamed membranes become vulnerable to infection with other secondary agents such as bacteria, Chlamydia and fungi. Mycoplasmas are called primary erosive agents. Pigeons infected with Chlamydia are almost invariably infected with Mycoplasma.

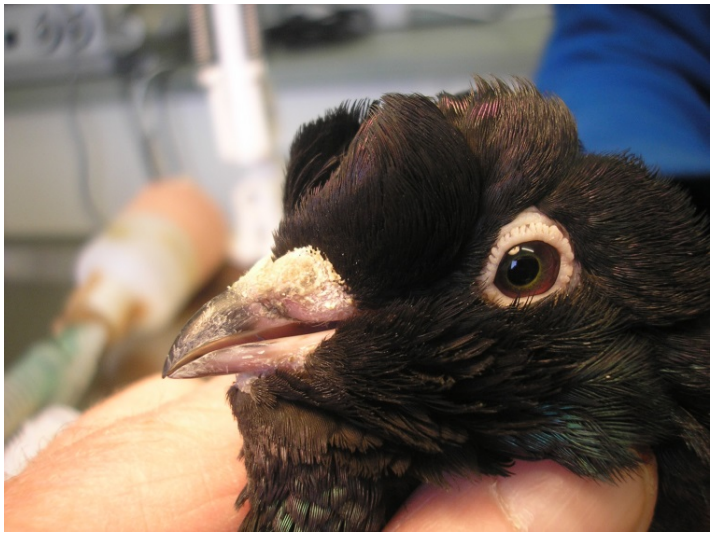
Mycoplasma for many lofts is essentially a problem of the race season. Many vets agree that Mycoplasma by themselves do not cause disease and, in fact, in experiments in which healthy pigeons have been deliberately infected, the birds have not become sick. However, the organisms do superficial injury to the lining of the respiratory system, enabling secondary organisms, notably Chlamydia, bacteria (such as *E. coli*) and fungi (such as *Aspergillus*), to become established. In this way, Mycoplasma, although not directly affecting health, has a big effect on race performance. Failure to control the problem in an affected team renders all attempts at success hopeless. Some Dutch vets state that as many as 90% of teams are affected and teams are presumed to be affected unless they have been recently treated. Pigeons harbouring Mycoplasma organisms cannot achieve super-health and are prevented from achieving top racing results.

In chickens, there is a serious and common disease called Chronic Respiratory Disease (CRD). CRD is a primary Mycoplasma infection with a secondary bacterial (usually E. coli) infection. A vaccine is available to prevent chickens from catching CRD. It is based on a live non- disease causing strain of Mycoplasma that competitively excludes harmful strains from colonizing the respiratory tract. The vaccines are made of live Mycoplasma strains that can colonize the respiratory tract but have been modified so that they cannot cause disease. Drops of vaccine are placed in young chickens eyes and the hope is that these non-harmful Mycoplasma strains will colonize the respiratory system before the chicken has been exposed to any disease-causing strains. Once the vaccine strains have colonized the

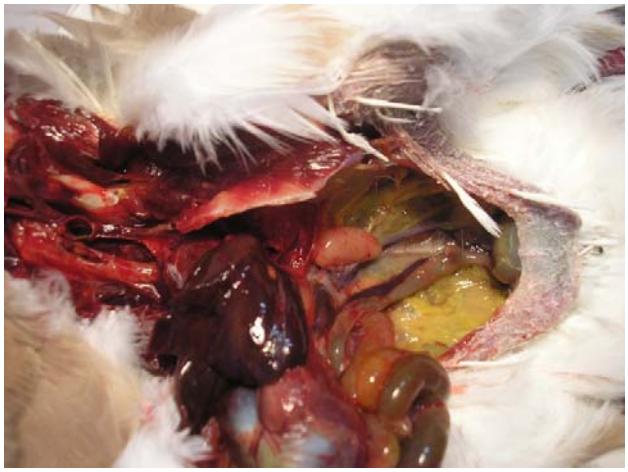
respiratory tract, they then exclude other strains, making it impossible for harmful strains to colonize. The Melbourne Bird Veterinary Clinic is involved in trialling a similar vaccine for pigeons.

In pigeons, usually at a young age, their respiratory systems are colonized by potentially harmful Mycoplasma. The Mycoplasmas then sit there and in many well-managed lofts don't cause clinical disease. If there are loft factors that interfere with the young maturing pigeon's ability to resist disease, such as overcrowding, poor hygiene, damp conditions, untreated parasitic disease or poor nutrition, the Mycoplasma will flare, causing signs associated with respiratory tract infection, such as watery ,partially closed, light sensitive eyes, dirty ceres, a croaking sound when breathing, general weight loss, lethargy, green mucoid droppings and sometimes death. Antibiotics given at these times will improve the birds' health but do not eliminate the Mycoplasma. Because of the inherent stresses of racing – time away from the loft, altered feeding and rest patterns, exertion, exposure to predation etc , Mycoplasma can flare in race birds. Although race birds can show symptoms similar to youngsters, signs are usually modified and more subtle because the birds are older and have a more mature and functional immune system. Racing pigeons with active Mycoplasma infection, with or without secondary Chlamydial or bacterial infections, are often described as having 'air sac disease'. In these older birds, the Mycoplasma inflame the lining of the respiratory tract, including the sinuses, windpipe, lungs and air sacs. This interferes with their breathing. Where the air-sacs are affected, the birds cannot properly breathe and so even moderate exercise is tiring and as with other respiratory infections sometimes forces the birds to land on the nearest available surface, which may be a tree or building near the loft. Because of the difficulty in breathing, the gums and muscles can turn blue and because of the inability to exercise, muscle tone and race fitness cannot come. The air-sacs also regulate fluid within the body by controlling evaporation of moisture from their surfaces. When diseased, excessive moisture is lost and the birds, therefore, need to drink more , even after moderate exercise, or run the risk of dehydration. Often however, in race-age birds, the only signs observed are increased panting or fatigue after moderate exercise or sometimes just poor results or heavier losses.

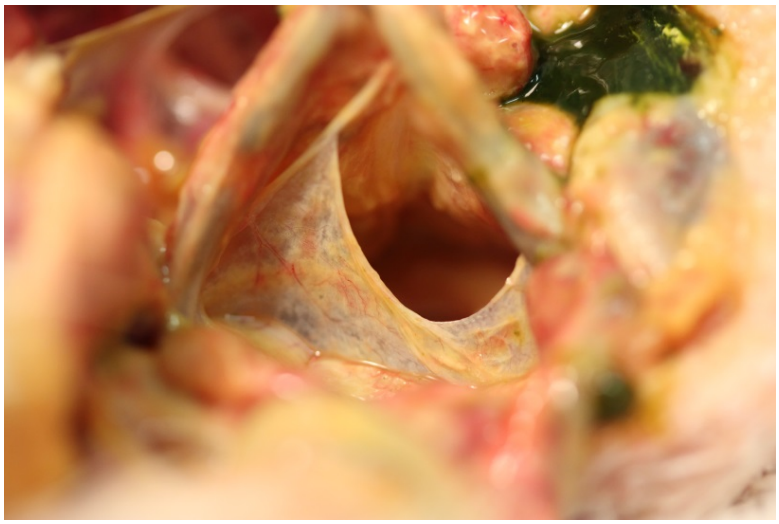
Obviously, any disease that saps energy can cause similar symptoms and so it is important for fanciers not to jump to conclusions and say that their birds have air sac disease. Such fanciers find themselves giving antibiotics to no effect. Birds with coccidia, worms and wet canker will naturally also prematurely fatigue.



An acute sinus infection in a Syrian Tarbesh; clear mucus is seen draining from each nostril and there is some staining of the cere on the left hand side. The open beak suggests an increased respiratory effort.



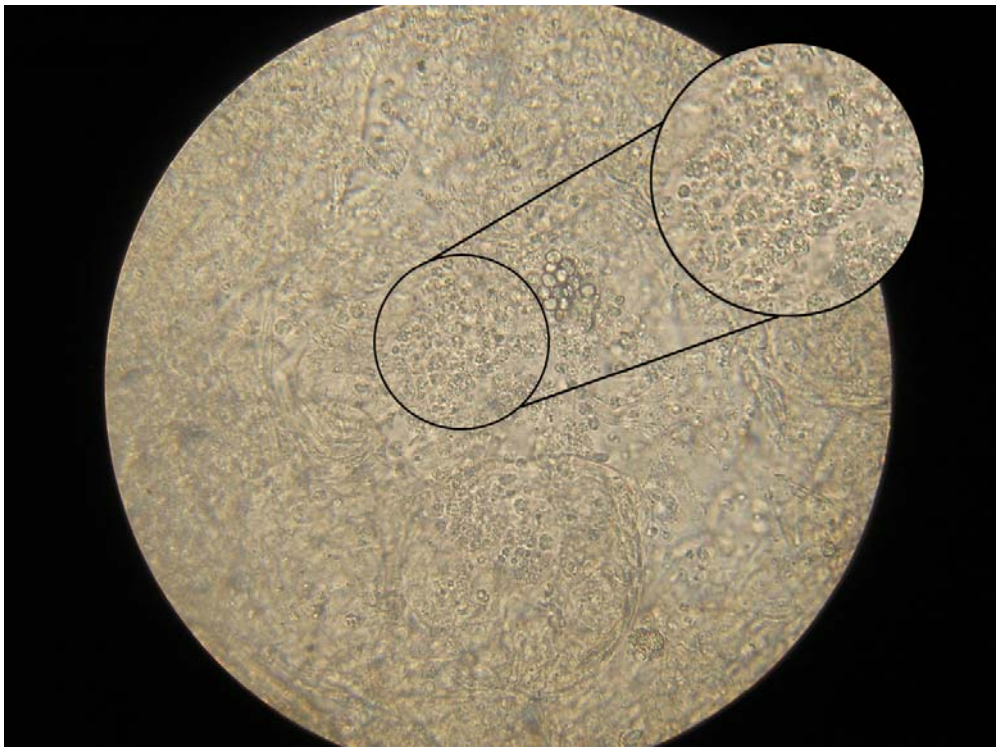
Autopsy specimen. A young racing pigeon had been found dead on the loft floor after being noticed by the fancier to be lethargic and having difficulty breathing for several days. An autopsy revealed an accumulation of yellow debris in an abdominal air sac. In health, air sacs are fine, translucent gossamer-like structures. With infection , initially grey beads of mucus form on the air-sac surface. As infection progresses the air-sacs develop an opaline appearance as inflammatory fluid moves into them. As infection continues to develop yellow inflammatory fluid forms that can eventually fill the air sac. This causes a 'shortness of breath' and general ill health.



The air sac, above, has been opened. The air sac is significantly scarred. The small blood vessels tracking across the air-sac's surface develop in a process called neo-vascularization. They are part of the body's attempt to heal itself

Diagnosis

And so, how does the racing fancier know if his birds have air sac disease? Unfortunately, there is no quick and easy test. Mucous can be taken from the throat and any Mycoplasma present cultured. There is no point in the lab just growing Mycoplasma unless they can actually identify the type (i.e. the species). The Mycoplasma may be a non-harmful variety that is not causing disease. Even if harmful ones are grown, the test takes several days and is quite expensive. Also, just because they are there, does not mean they are causing disease. Alternatively pigeons can be autopsied and tissue samples collected for histology (microscopic examination). If this identifies inflammation, particularly if harmful Mycoplasmas are also grown, this confirms the diagnosis. But again, this is time-consuming and expensive. Microscopically examining mucous from the throat will sometimes identify inflammatory cells and secondary bacterial infection, suggestive of a Mycoplasma infection. Microscopic examination of the droppings can identify altered bacterial populations associated with stress. These changes occur with any debilitating condition and are not specific for air sac disease but do at least indicate that the pigeons are run down and possibly sick. More recently a Mycoplasma PCR test that checks for Mycoplasma DNA in a sample of throat mucous is becoming more widely used.



Examination of respiratory mucus under the microscope. In this unstained micrograph of some throat mucus, heterophils, (inflammatory cells that are often the body's first line of defence and will 'weep' away from any inflamed membrane) are visible. Often described as 'little pizzas' by fanciers because of their granular multi-nuclear appearance, their presence is consistent with a respiratory infection of the upper airway.

Often during the racing season, when a diagnosis needs to be made and treatment initiated fairly promptly a tentative diagnosis is based on a combination of factors including the signs the birds are showing, inflammatory changes visible on microscopic examination of a throat swab, altered bacterial patterns on microscopic examination of fresh droppings, a failure to demonstrate other conditions like wet canker and coccidia that cause similar symptoms and sometimes a response to treatment.

It is always a matter of correlating the degree of diagnostic effort with the severity of the problem and if the loft is experiencing ongoing problems, swabs should be collected for Mycoplasma culture or PCR and ideally a bird, showing symptoms that are representative of the problems in the flock, be submitted for autopsy and histology.

In the longer term, it would be really great if vaccines similar to those available in chickens became available for pigeons. Nestlings could have vaccine drops containing non-harmful Mycoplasma strains placed in their eyes. These would then colonize their respiratory tracts, preventing infection with disease-causing strains.

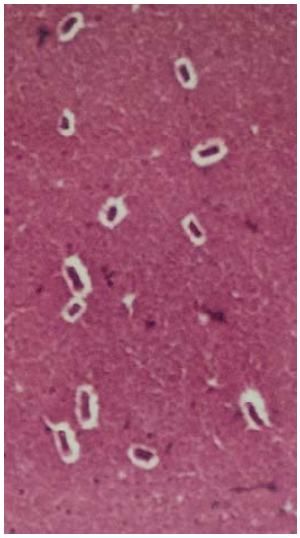
INSERT Photo 33. Autopsy specimen. At autopsy this bird was found to have an accumulation of white mucus in the 'slot' (choana) and throat. This can sometimes but not always be associated with Mycoplasma infection.

Control and treatment

Currently, control focuses on avoiding the factors that trigger Mycoplasma flare-ups. During racing, this includes maintaining a good loft environment and management practices but also matching the degree of training with the birds' level of fitness and ensuring the level of energy and protein in the diet are appropriate for the birds' level of work. Because of the inherent stresses associated with racing and potential high exposure to Mycoplasma in the race units, fanciers need to monitor their birds closely and be prepared to seek veterinary advice and medication if required. Many fanciers can expect flare ups of Mycoplasma -based respiratory infection during the season. Around the world, antibiotic blends containing tylosin (effective against Mycoplasma), doxycycline (the antibiotic of choice for Chlamydia) and sometimes spiramycin (also called suanovil, effective against a range of bacteria) are prescribed by veterinarians as required to manage these flare-ups

Bacteria

Many bacteria are capable of infecting the respiratory tract of pigeons. Primary bacterial infection is however uncommon and most pigeons with a bacterial respiratory infection are concurrently infected with Mycoplasma or Chlamydia. The most common bacterial isolate is E.coli however Klebsiella is a frequent isolate from the sinuses. Some bacteria such as Pseudomonas (often associated with



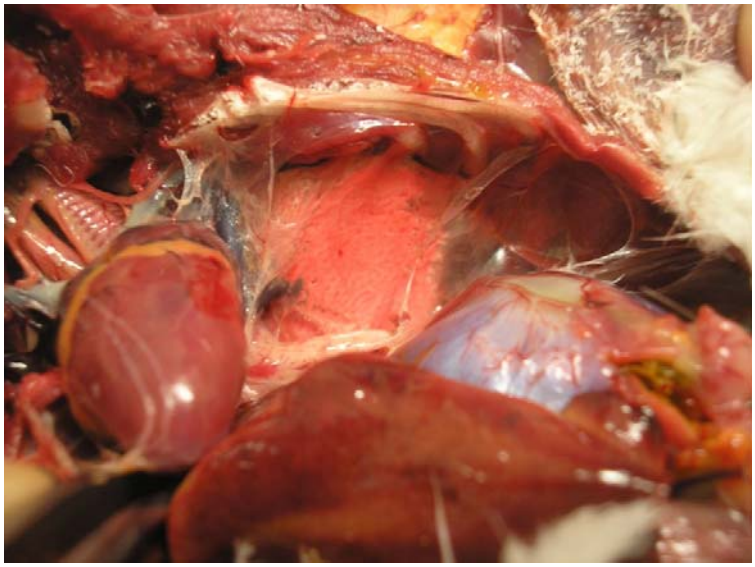
Klebsiella bacteria, stained and magnified 400x, are a common isolate from pigeons with a respiratory infection

Camphylobacter bacteria stained and magnified 400xx A cause of bacterial respiratory infection in pigeons and often associated with the droppings of wild birds contaminating the drinking water or food of pigeons

contaminated water sources) or Camphylobacter (often from wild bird dropping contamination of the loft, food or water) can sometimes infect the respiratory tract. Diagnosis is by microscopic examination, staining and other laboratory tests including culture of the bacteria from a swab collected from the site of infection. These tests are particularly indicated if a respiratory infection is not responding to a prescribed medication. Identification of the actual bacteria involved enables a more targeted choice of antibiotic and also an understanding of the biology of the organism to be developed including its likely source. This source can then be removed so that the infection does not return after the antibiotic course finishes. Often your veterinarian will want to take a swab from the site of the infection (eg the eye, throat or air-sac lining (during autopsy)). This can then be submitted to a laboratory for testing. Once the bacteria has been identified it can be tested against a range of antibiotics to see which is the most effective and steps put in place to prevent reinfection.

Autopsy specimen. A severe bacterial sinus infection in a young pigeon.

Autopsy specimen. A racing pigeon with a bacterial infection of the right lung. In this photo the heart has been elevated. The left lung looks comparatively normal.



A close up of the normal left lung

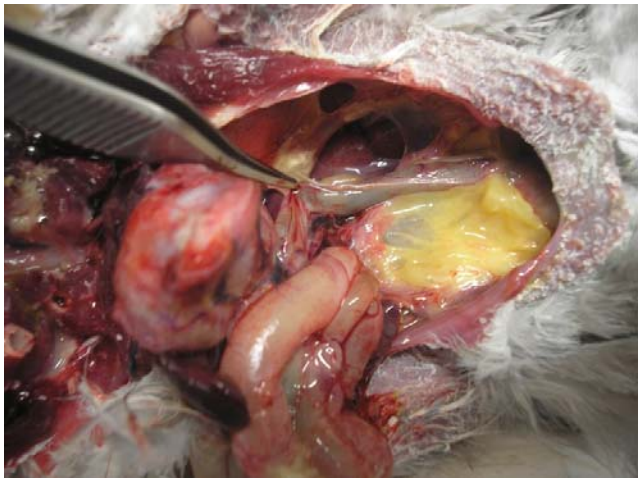
The lung of a racing pigeon with a bacterial infection. A close up of the infected right lung.

INSERT Photo 32. A young racing pigeon with a bacterial sinus infection

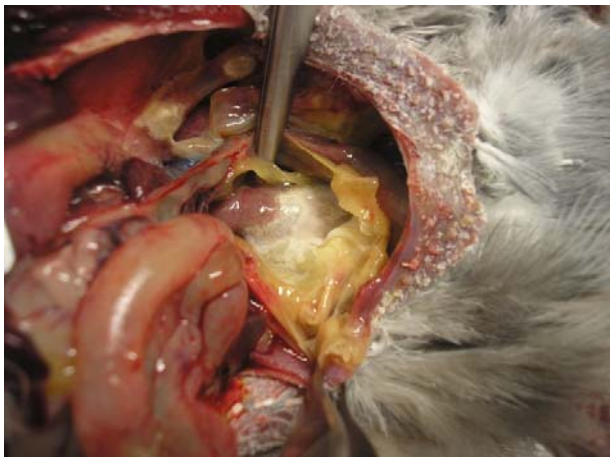
Fungi

Fungi growing in the environment release spores (the fungal equivalent of seeds). If these are inhaled by pigeons, they can cause respiratory problems. The most common fungus involved here is *Aspergillus,* which is widespread in nature. Under normal conditions it is a secondary agent, causing disease only when the birds' resistance has already been lowered by some other condition. However, it can cause an acute primary disease under conditions favouring its growth, when the birds are exposed to large numbers of infected spores from their immediate environment. In this acute form, due to irritation of the respiratory system, inflammatory fluid accumulates in the lungs and air-sacs. This form is most likely to affect youngsters soon after weaning. The birds appear sick, being fluffed up, are reluctant to eat and lose weight. Individual birds do get a chronic form of the disease, in which individual spores germinate and grow causing visible moulds (not unlike those seen on stale bread) to form in the air-sacs. These birds are profoundly unwell, with weight loss and a breathlessness progressing to death.

Ideal conditions for the presence of fungal growth are warmth and moisture, but particularly moisture. Straw, if used as a floor dressing or for race baskets, must be kept dry. Should the straw become wet, fungi can rapidly multiply and lead to massive presence of infected spores, increasing the risk of an outbreak. In damp lofts, fungi can germinate also within the loft itself, e.g. on walls and on droppings. If lofts with high humidity are infrequently cleaned, damp droppings accumulate, which are an ideal base for fungal germination. A particular risk here is associated with accumulated droppings below grid floors. A rapid formation of mould on droppings can therefore be associated with high humidity, keeping the droppings damp and giving environmental fungal spores a chance to germinate. However, quick growth can also occur if the droppings contain a lot of fungal spores when passed. This occurs if the birds swallow them, which in turn means that their seed may be contaminated with fungal spores. Seed that is free of fungal spores at harvest is unlikely to contain fungal toxins. Conversely, heavy contamination of seed with fungal spores can be associated with fungal toxin contamination of the



Autopsy specimen. Aspergillus infection of the air sac. Initially at autopsy the normally translucent right abdominal air sac was seen to be thickened and yellow.



The air-sac was incised to reveal a white plaque of material

Opening the air sac more fully enabled more detailed inspection and the opportunity to collect samples for testing

Examination of this material under the microscope showed fungal hyphae (branches) and confirmed the diagnosis of a fungal air sac infection

grain. These toxins weaken the bird generally, creating a vulnerability to secondary problems, in particular Mycoplasma, but also directly suppress the immune system further, making the bird

vulnerable to disease. Fungi in the seed, therefore, are doubly dangerous in regard to the respiratory system, in that they predispose the bird to respiratory infection but also contaminate the birds' environment via the droppings with spores that, if given the opportunity to germinate, can infect the respiratory system directly.

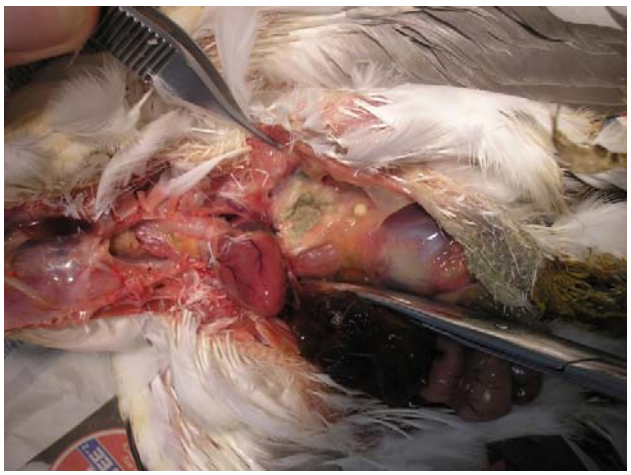
Management

The treatment of fungal respiratory infection is difficult in that only a few antifungal drugs are absorbed from the bowel, e.g. Itraconazole, and can act throughout the body. These are best used under the guidance of a veterinarian familiar with pigeons.

Essentially, it is best to ensure that the level of care of the birds is good so that they are more able to resist infection while at the same time minimizing their exposure. This means keeping the loft dry and clean, in particular with regard to substances readily colonized by fungi such as straw and damp droppings. Loft contamination can be decreased by checking seed quality. If necessary, the loft can be sprayed with antifungal disinfectants, e.g. 'F10' or 'Virkon'. This is quite safe and is a good practice to include in regular loft maintenance in high humidity areas.

In the face of an outbreak:

- Remove the source of infection, e.g. damp straw, damp droppings below a grid floor.
- Spray loft with 'Virkon'.
- Have a health profile done (i.e. a crop flush, faecal smear and other tests as indicated).
- Return to activity as for respiratory infection recovery.
- Supplement with multivitamins.
- Medicate with antifungal drugs under veterinary guidance.



A fungal air sac infection of the left thoracic air sac. A green fungal 'mould' is visible just above the heart.

MITES

Several different types of mite infect the respiratory system in pigeons. Some live in the nasal passages, causing superficial irritation, making the birds sneeze and scratch their nose. Others live deeper in the windpipe and airsacs, causing a range of respiratory signs depending on the severity of infection. The adult mites produce eggs that are coughed up and swallowed by the pigeons. The problem is diagnosed by finding their eggs in the birds' droppings microscopically, but at times this can be difficult as they are only shed intermittently. At autopsy, the adult mites are just visible to the naked eye as little white dots but are easy to overlook. Sometimes, one can be lucky enough when opening a bird's beak to see one run across the floor of the bird's mouth and dive down the windpipe or alternatively run up and disappear through the 'slot' in the roof of the mouth. They are effectively treated with Moxidectin (2 mg per ml, 5ml to 1 litre of water for 24 hours)

VIRUSES

Several viruses have the potential to cause respiratory infection in pigeons. Of note here are Herpes virus, Circo virus, PMV , Pox virus and to a lesser extent Adeno virus. Fanciers need to be aware of their existence, particularly when birds with respiratory infections are not responding to routine medication. Their diagnosis, management and treatment can be involved and if fliers are concerned, they should contact a pigeon veterinarian. (Refer to chapter Common Viral Infections.)

Ruptured airsacs

Often fliers ring my clinic saying that their birds seem to have filled up with air. This is usually due to one of two things, either a ruptured air-sac or inflammation within the air-sac system that interferes with air movement from one air-sac to another creating a valve type effect causing hyper-inflation of an air-sac. Like us, pigeons have a windpipe, which carries air down into the lungs, but, in addition, pigeons have air filled balloon - like structures, called air-sacs, which extend principally from their lungs. There are nine main air-sacs, one across the front of the chest, two either side of the chest and two either side of the abdomen. Oxygen cannot enter the bloodstream through these as it does from the lungs but they are important in temperature and moisture regulation and, as they are essentially pockets of air, they keep the body weight light, making flight easier. When inhaled, air goes down the windpipe into the lungs and out into the air-sacs.

If there is a tear in the air-sac, air can percolate out through this and accumulate under the skin. Air-sacs usually develop tears either as a result of injury, when the bird flies into something (this can even occur in stock birds that knock themselves on the corner of a perch, etc.) or secondary to a respiratory infection, when there is a perforating ulcer that erodes through the air-sac. Respiratory infection can also sometimes partially obstruct the fine tubes that connect air-sacs creating a one way valve and lead to over-inflation. If the bird has been unwell or has shown other signs of respiratory infection and then

develops an accumulation of air under the skin, it can be assumed that either a rupture has occurred secondary to this infection, or a connecting tube has become obstructed with inflammatory debris. Also but rarely, a rupture can occur secondary to internal disease, such as a tumour. If a bird was well and is then suddenly noticed to have ballooned up, then a tear associated with an injury is the most likely cause. The usual air-sac that is ruptured is the one that is across the front of the chest (called the interclavicular air-sac), because it is more vulnerable to injury. This leads to the neck becoming super-inflated with air. If the air-sacs on either side of the chest or abdomen are involved, air accumulates under the skin over these areas first before extending elsewhere.

To treat these birds, it is important to remove the air that has accumulated under the skin. If the air pressure continues to build up, this pressure can relay back onto the lungs and the birds can have trouble breathing and sometimes smother. To remove the air, a hypodermic needle and syringe are used. The tip of the needle is put just through the skin at the point where the skin is tightest with the air underneath it. While sucking with the syringe, air is drawn out through the needle. This usually needs to be done morning and night. This not only makes the bird more comfortable but allows the air-sac to collapse back into position and heal more readily. Most cases resolve in 3 days to 3 weeks. I have only ever had one or two birds that never healed. In addition to removing the air morning and night, it is important that the bird is confined. It is best if the affected bird does not do any exercise that would make it short of breath or pant as this tends to delay healing in the air-sac. I usually use an 18-gauge needle and a 20-ml syringe. These can be obtained from a pharmacy or a veterinarian. Where an associated respiratory infection is suspected, appropriate antibiotics are also given.

*Photo courtesy G Krahenbring