**Epidemiology and Infection**

**Extension of the known distribution of a novel clade C betacoronavirus in a wildlife host**

I. F. SALDANHA1, B. LAWSON2, H. GOHARRIZ3, J. Rodriguez-Ramos Fernandez4, S. JOHN2, A. R. FOOKS3,5, A. A. CUNNINGHAM2, N. JOHNSON3, D. L. HORTON1

Supplementary Table S1:

Primers and oligonucleotide sequences used in the study

|  |  |
| --- | --- |
| Name | Sequence (5’-3’) |
| EriCoVF | TAATCGCCAATACCATCA |
| EriCoVR | CAACCACCATAGAACTTAG |
| EriCoV ultramer oligonucleotide | ATCGATCGTATGACTAATCGCCAATACCATCAAAAGATGCTCAAGTCTATGGCTGCCTACTTGTGTCATAGGAACTACTAAGTTCTATGGTGGTTGGGATTTTATGTTAA |

Supplementary Table S2:

Microscopic abnormalities for subset of hedgehogs that tested PCR-positive for Erinaceus coronavirus

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Case number** | **Carcass preservation** | **Signalment,**  **body condition & body weight (g)** | **Microbiology**  **& Parasitology** | **Macroscopic abnormalities** | **Significant microscopic abnormalities/ Cause of death** |
| 432-15 | Fresh, advanced decomposition | Subadult/ adult male; normal body condition weight not available | Liver: confluent mixed *Clostridium* sp.  SI contents, skin: NSF  SI contents: negative | Polytraumatism: multiple fractures, internal haemorrhage and ruptured viscera | All tissues: Autolysis, diffuse, moderate  **Respiratory and gastro-intestinal tract**  Lung: Bronchopneumonia, eosinophilic and lymphocytic, multifocal, moderate with intrabronchiolar nematodes (morphology consistent with *Crenosoma* sp.)  Stomach: Mucosal infiltrates, eosinophilic, multifocal, mild  with focal glandular distention and mild, focal submucosal lymphocytic infiltrate  Other significant findings:  Brain: Haemorrhage, parenchymal, multifocal, acute moderate  COD: Trauma |
| 606-15 | Fresh, moderate decomposition | Adult female; normal body condition 600 g | Skin: mixed *Staphylococcus aureus* sp. (aurex +ve)  Liver, SI contents: NSF  SI contents: numerous Strongyle-type ova with scanty helminth larval forms observed.  Lung: negative | Molar teeth: Dental plaque, multifocal, moderate  Ventrum: Wound, focal | All tissues: Autolysis, diffuse, moderate  **Respiratory and gastro-intestinal tract**  Trachea: Tracheitis, proliferative, ulcerative and erosive, lymphoplasmacytic and eosinophilic, multifocal to coalescing, chronic, severe with intralesional and intraluminal nematodes (morphology consistent with *Capillaria* sp.)  Lung: Bronchopneumonia, eosinophilic and lymphoplasmacytic, multifocal, chronic with intrabronchiolar nematodes (morphology consistent with *Crenosoma* sp)  Stomach and large intestine: Eosinophilic infiltrates, multifocal, moderate  COD: Undetermined |
| 675-15 | Frozen, advanced decomposition | Adult male; thin body condition 402g | Liver, SI contents, skin: NSF  SI: Moderate number of *Capillaria* sp. ova.  Lung: negative | NSF, other than thin body condition | All tissues: Autolysis, diffuse, severe - interpretation not possible of heart, liver, lung, kidney, spleen, 8 sections GIT, muscle.  COD: Undetermined |
| 731-15 | Frozen, moderate decomposition | Juvenile female; emaciated body condition  264g | Liver, SI contents, Skin: NSF Skin: Confluent *Staphylococcus aureus* (aurex +ve)  SI: Adult trematodes observed. | NA | Autolysis, diffuse, severe - interpretation not possible of liver, spleen, intestine, stomach  **Respiratory and gastro-intestinal tract**  Lung: Bronchopneumonia, eosinophilic, multifocal, mild.  COD: Undetermined |
| 1175-15 | Fresh, mild autolysis | Adult female; normal body condition 949g | Liver, SI contents, lung, pleura, skin: NSF  SI contents: Numerous number of *Capillaria* sp. ova.  Lung: negative | Lung/pleura: Pleuropneumonia, bilateral, suppurative, multifocal to coalescing, severe, chronic with adhesions to pericardium and diaphragm  Pericardium: Pericarditis, suppurative, diffuse, severe  Chest (subcutis and skeletal muscle): Abscessation, multifocal, moderate | **Respiratory and gastro-intestinal tract**  Lung: Pleuropneumonia, suppurative, locally extensive, severe, subacute with intralesional Gram negative bacteria and focal intravascular metazoan parasite  Diaphragm: Myositis, suppurative, locally extensive, severe, subacute with intralesional Gram negative bacteria  Chest wall: Myositis, steatitis and mammary gland adenitis, locally extensive, severe with fibrosis and possible necrosis  Stomach: Gastritis, lymphoplasmacytic, multifocal, mild  Intestine: Enterocolitis, eosinophilic and lymphoplasmacytic, multifocal, moderate with luminal metazoan parasites  COD: Pleuropneumonia, pericarditis, suppurative |
| 1353-15 | Frozen, mild autolysis | Adult male; normal body condition 715g | Liver: confluent nearly pure isolate *Staphylococcus* sp..  SI contents, throat, skin: NSF  SI contents: Numerous number of *Capillaria* sp. adult nematodes. | Skin: Dermatitis, exudative, multifocal, chronic, moderate  Right tibia: Callus, focal chronic with suppurative osteomyelitis  Right kidney: Atrophy, diffuse, severe with mineralisation | All tissues: Moderate to severe autolysis and freeze-thaw artefact - interpretation not possible of the gall bladder, kidney, stomach, lung, trachea, lymph nodes, adrenal gland/  **Gastro-intestinal tract**  Small intestine: Luminal metazoan parasites, moderate numbers  Other significant findings:  Haired skin: Dermatitis, mild to moderate with basketweave orthokeratotic hyperkeratosis, serocellular crusting with bacteria and focal mild granulomatous dermatitis with foreign material  Heart: Intravascular bacteria, Gram positive cocci  Right kidney: Renal atrophy/degeneration  COD: Trauma + suspect bacteraemia |
| 1358-15 | Frozen, mild autolysis | Juvenile male; emaciated body condition 240g | Skin: *Staphylococcus aureus* sp. (aurex +ve)  Liver, SI contents: NSF  SI contents: Small number of *Capillaria* sp. ova.  Lung: negative | NSF, other than emaciated | All tissues: Moderate to severe autolysis and freeze-thaw artefact - unable to assess inflammatory cell response and no interpretation possible of the gall bladder, spleen, kidney, small intestine, stomach, lymph node, bladder, adrenal gland, pancreas, brain.  **Respiratory and gastro-intestinal tract**  Lung: Intrabronchial adult nematodes, multifocal, moderate (morphology consistent with *Crenosoma* spp.)  Small intestine: Luminal adult metazoan parasites, numerous (*Capillaria* spp. and a possible trematode).  COD: Suspect starvation + endoparasitism |
| 1359-15 | Frozen, mild autolysis | Juvenile male; thin body condition 253g | Skin: *Staphylococcus aureus* sp. (aurex +ve)  Liver, SI contents: NSF  SI: Acanthocephalans on SI and stomach  SI contents: cestodes  Lung: *Crenosoma* sp. adults, larvae and ova | Verminous pneumonia, GIT endoparasites, thin | Moderate to severe autolysis and freeze-thaw artefact - unable to assess inflammatory cell response and no interpretation possible of the kidney, liver, spleen, heart, testis, lung, adrenal gland, GIT.  **Respiratory and gastro-intestinal tract**  Lung: Intrabronchial/ bronchiolar parasites, multifocal (morphology suggestive of *Crenosoma* spp).  COD: Suspect verminous pneumonia + starvation |
| 1425-15 | Fresh, moderate decomposition | Subadult female; thin body condition 260g | Liver, spleen, SI contents, tracheal mucus, mesenteric lymph node: Confluent mixed predominance *Yersinia pseudotuberculosis*  Skin: *Staphylococcus aureus* sp. (aurex +ve)  Numerous ectoparasites fleas and ticks  LI contents: negative  Lung: numerous *Crenosoma* sp. larvae and *Capillaria* sp.adults and ova | Liver: Hepatomegaly and multifocal hepatitis  Lung: Verminous pneumonia  Mesenteric lymph node: moderate lymphadenomegaly (30.1 x 14.0 x 11.5cm, 2.8g) | All tissues: Moderate to severe autolysis  **Respiratory and gastro-intestinal tract**  Trachea: Tracheitis, diffuse, severe, chronic with intralesional nematode adults and eggs (Capillaria spp suspected)  Lung: Bronchiolitis and pneumonia, lymphohistiocytic and eosinophilic, multifocal, moderate, chronic with intralesional nematode adults, larvae and eggs (consistent with Crenosoma spp)  Intestine: Intraluminal nematodes, many (adults and eggs; Capillaria spp possible)  Other significant findings:  Liver: Hepatitis, random multifocal, moderate, acute with Gram negative coccobacilli bacteria and multifocal necrosis  COD: Yersiniosis |

NAD: No abnormalities detected, NA: Not available, COD: Cause of death, SI: small intestine, NSF: no significant findings, GIT: Gastrointestinal Tract