

Brief Communication

ISOLATION OF BOVINE ADENOVIRUS TYPE 1
FROM A CALF WITH PNEUMO-ENTERITIS

(Preliminary report)

During the last decade, an increasing number of bovine adenoviruses have been isolated from calves suffering from more, or less, well-defined syndromes. These have consisted of respiratory disorders of varying severity, enteritis, or a combination of both, which in typical cases has been termed "pneumo-enteritis". These investigations have been reviewed by *Darbyshire* (1968). *Wilcox* (1969) isolated adenoviruses from kerato-conjunctivitis (KC) in cattle. Furthermore, strains have been isolated from apparently healthy animals (*Darbyshire* 1968), and from tissue cultures prepared from various organs from calves such as kidneys (*Schopov et al.* 1968), and testes (*Rondhuis* 1968, *Bartha & Csontos* 1969). At the present time 9 serotypes of bovine adenoviruses exist, as determined by neutralization tests, and these have recently been reviewed by *Guenov et al.* (1970). However, several strains, some from cases of pneumonia (*Cole* 1970, *Lupini et al.* 1970) and others from KC (*Wilcox* 1969) remain to be typed and compared with the known prototypes, thereby enabling possible new serotypes to be identified. So far, serotypes 1 and 2 (*Darbyshire et al.* 1969), serotype 3 (*Darbyshire et al.* 1966) and serotypes 4 and 5 (*Aldasy et al.* 1965) have been shown to cause pneumo-enteritis, and serotype 6 (*Rondhuis* 1970) a mild respiratory disease in experimentally infected calves. Similarly, KC has been produced experimentally by *Wilcox* (1970), while the pathogenicity for experimental animals of the other typed and untyped strains remains to be investigated.

A case of pneumo-enteritis in a calf from which an adenovirus was isolated, is described in the following.

The 5 months old calf showed initial symptoms of anorexia, nasal discharges and diarrhoea. A few days later pyrexia and respiratory embarrassment were noted, the faeces became mucoid and haemorrhagic and the calf was killed in an exhausted

condition, treatment with antibiotics not having had any effect. Altogether there were 19 calves aged 4 to 5 months in the herd and 4 calves had shown the same symptoms as described 3 weeks earlier. These calves were also treated without success, and 1 of them died. Three were slaughtered, and of these 2 were discarded at meat inspection.

At necropsy, the calf that was examined was severely dehydrated. There were erosions in oesophageal mucosa. The mucous membranes of the upper respiratory tract, the abomasum and the intestines were hyperaemic. Pseudomembranes were seen in the colon, and the mesenteric lymph glands were markedly enlarged. Histologic examination of the lungs showed thickening of the alveolar walls with infiltrating mononuclear cells. Bacteriological examinations of the liver and spleen were negative, while *Pseudomonas aeruginosa*, coliform and proteus bacteria were isolated from the intestine. Using primary calf kidney cell cultures virological examination of the above organs resulted in the isolation of a cytopathogenic agent. It produced a characteristic cytopathogenic effect which consisted of shrinkage and rounding of affected cells which aggregated into grapelike clusters. In haematoxylin-eosin stained coverslip cultures, basophilic intranuclear inclusions were seen. Filtration experiments indicated a size between 50 and 100 m μ and electron microscopy a morphology typical of adenoviruses. Physico-chemically, the agent contained DNA, was resistant to ether, acid, heat and not stabilized by divalent cations. Gel-diffusion precipitation tests showed that the agent contained the common group-specific soluble adenovirus antigen. Cross-neutralization tests with the agent, its homologous antiserum, type strains of bovine adenovirus types 1, 2 and 3 and their homologous antisera indicated that the agent was serologically related to bovine adenovirus type 1.

These findings allow the agent, provisionally termed Oslo-5/70, to be tentatively classified as bovine adenovirus type 1. This represents the first isolation of a bovine adenovirus reported in Norway.

ACKNOWLEDGEMENTS

The authors are grateful to Dr. *P. R. Rondhuis*, Central Veterinary Institute, Rotterdam, Netherlands, for supplying type strains of, and sera against, bovine adenoviruses.

F. Saxegaard and B. Bratberg

The Department of Microbiology and Immunology
and the Department of Pathology,
Veterinary College of Norway, Oslo, Norway.

REFERENCES

- Aldasy, P., L. Csontos & A. Bartha*: Pneumo-enteritis in calves caused by adenoviruses. *Acta vet. Acad. Sci. hung.* 1965, *15*, 167—175.
- Bartha, A. & L. Csontos*: Isolation of bovine adenoviruses from tissue cultures of calf testicles. *Acta vet. Acad. Sci. hung.* 1969, *19*, 323—325.
- Cole, A. M.*: The isolation of adenoviruses from calves with pneumonia. *Aust. vet. J.* 1970, *46*, 569—575.
- Darbyshire, J. H.*: Bovine adenoviruses. *J. Amer. vet. med. Ass.* 1968, *152*, 786—792.
- Darbyshire, J. H., A. R. Jennings, P. S. Dawson, P. H. Lamont & A. R. Omar*: The pathogenesis and pathology of infection in calves with a strain of bovine adenovirus type 3. *Res. Vet. Sci.* 1966, *7*, 81—93.
- Darbyshire, J. H., D. A. Kinch & A. R. Jennings*: Experimental infection of calves with bovine adenovirus types 1 and 2. *Res. Vet. Sci.* 1969, *10*, 39—45.
- Guenov, Iv., Kr. Sartmadshiev, Iv. Schopov, Z. Shljabinkov & W. Fjodorov*: Neuer Serotyp 9 der Adenovirus des Rindes. (Type 9: a new serotype of bovine adenoviruses). *Zbl. Vet.-Med.* 1970, *17B*, 1064—1066.
- Lupini, P. M., A. L. Stammati, A. Ioppolo, G. Avellini & Z. Orfei*: Isolamento a caratterizzazione di alcuni ceppi di adenovirus del bovino. (Isolation and characterization of some strains of bovine adenovirus). *Vet. ital.* 1970, *21*, 527—553.
- Rondhuis, P. R.*: A new bovine adenovirus. *Arch. ges. Virusforsch.* 1968, *25*, 235—236.
- Rondhuis, P. R.*: Bovine Adenovirussen. Een vergelijkend, serologisch en experimenteel onderzoek. (Bovine adenoviruses. A comparative, serological and experimental study). Central Veterinary Institute, Rotterdam, Netherlands 1970, 218 pp.
- Schopov, Iv., Iv. Guenov & W. Fjodorov*: Isolierung von Adenovirus aus Nierengewebekulturen gesund geschlachteter Kälber. (Isolation of adenovirus from the cultured kidney cells of a healthy, slaughtered calf). *Arch. exp. Vet.-Med.* 1968, *22*, 487—489.
- Wilcox, G. E.*: Isolation of adenoviruses from cattle with conjunctivitis and kerato-conjunctivitis. *Aust. vet. J.* 1969, *45*, 265—270.
- Wilcox, G. E.*: The aetiology of infectious bovine kerato-conjunctivitis in Queensland. 2. Adenovirus. *Aust. vet. J.* 1970, *46*, 415—420.

(Received August 23, 1971).

