

PATHOLOGY

Cerebellar and Midbrain Lesions in Scrapie

ATAXIA, inco-ordination of movement and to a limited extent disturbances in muscular tonus appear to be the main neurological symptoms in scrapie disease of sheep. Such symptoms suggested cerebellar lesions and indeed lesions have been demonstrated in the cerebellum¹⁻³, but only occasionally. Recently, an alteration has been made in our technique of taking material from the cerebellum for the routine histological examinations. Dorsal-ventral sections have been taken through the middle of the cerebellum, parallel to the long axis of the brain, instead of the usual slice from a sagittal section through the vermis. Examination of such sections from nine brains of sheep affected with natural scrapie showed in each case degeneration and vacuolation of the Purkinje cells in a number of the folia of the paraflocculus (Fig. 1), while occasionally the neurones of the dentate nucleus were also affected. In the midbrains of these animals, in addition to vacuolation of the pigmented cells of the raphe, chromatolysis of the neurones of the red nucleus was a constant finding, while vacuolation was also often present. In the pons the neurones of the nucleus of the abducens nerve were always degenerated and vacuolated, but in the cells of the reticular formation changes were present in seven cases out of nine. In the medulla, lesions were found in the nuclei of the raphe, arcuate and formatio reticularis alba. Lesions of the above nuclei of the medulla have previously been shown to be constantly present in both natural and experimental scrapie^{3,4}.

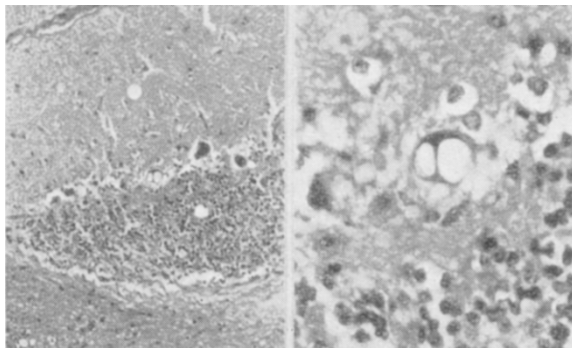


Fig. 1. Left, degeneration and vacuolation of the Purkinje cells ($\times 90$); right, high-power magnification of a vacuolated Purkinje cell ($\times 360$)

In the experimentally induced disease, although the clinical symptoms are identical with those of natural scrapie, lesions in the medulla and pons are not always very obvious⁴ and although the distribution of such lesions as there are is similar to that seen in the naturally occurring disease the neurones undergoing degeneration are occasionally so few in number that it is difficult to relate the symptoms to the lesions. In the majority of experimental scrapie cases so far examined the neurones of the red nucleus of the mesencephalon were often affected as also were cells in the medulla and pons, but on occasion no lesions could be found in the midbrain even when 18 consecutive serial sections were examined. Recently, however, transverse sections of the mesencephalon from three such brains have been

examined by cutting serial sections along the whole of the red nucleus. A total of 1,000 sections 7μ thick were cut but only every fourth section was examined, and in each of the three midbrains a varying number of the large neurones of the red nucleus was found undergoing either chromatolysis, pyknosis or necrosis. It would seem, therefore, that in all cases of scrapie the neurones of the red nucleus are affected. It is known that in lower mammals including the sheep the red nucleus serves as a centre through which the cerebellum can influence the motor functions of the spinal cord and medulla oblongata⁵. Lesions in the red nucleus and cerebellum will therefore cause lack of co-ordination of muscular activity as well as disturbances in tonus and synergy.

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³ Zlotnik, I., *J. Comp. Path.*, **68**, 148 (1958).

⁴ Zlotnik, I., *J. Comp. Path.*, **68**, 428 (1958).

⁵ Ranson, S. W., "The Anatomy of the Nervous System" (W. B. Saunders Co., 1953).

Effect of Injection of a Hepatotxin directly into the Gall-Bladder of Rabbits

AN inflammatory condition of the bile ducts is generally recognized to be the essential feature of 'facial eczema' liver damage in sheep¹. This condition has recently been shown to be caused by a toxic principle elaborated by the fungus *Sporidesmium bakeri* Syd., a common species inhabiting many pastures in New Zealand (ref. 2 and Percival, J. C., unpublished work). Guinea pigs and rabbits have also been shown to be susceptible to the disease, liver damage of a generally similar nature having been produced by feeding toxic grass and crude fungal culture, and ether-extracts of these (Clare, N. T., unpublished work), and also by injection of extracts (Worker, N. A., unpublished work).

Recently, in a series of experiments on rabbits, in which the relative effectiveness of various routes of administration was compared, ether extracts of fungus, dispersed in 5 per cent aqueous 'Tween 40', were injected into: (1) the duodenum, proximal to the sphincter of Oddi; (2) the portal vein; (3) the gall-bladder.

Twenty New Zealand white rabbits of mixed sex, weighing 1,000–1,500 gm., were allotted to each group at random. Each rabbit was dosed with the equivalent of 1 litre of fungal culture dispersed in 0.4 ml. 'Tween'. The animals were killed at periods varying from four to seven days. Examination of the morbid anatomy and histology of the livers was carried out by D. C. Dodd, veterinary diagnostic officer of this Station.

From the results summarized in Table 1, it can be seen that after injection of extracts into the duodenum and into the portal vein, the majority of animals in both treatment groups exhibited mild to moderate liver damage, the lesions being similar both macroscopically and histologically to those commonly found after administration of toxic material by mouth (Dodd, D. C., unpublished work). In contrast to these results, however, injection of toxic extract into the gall-bladder produced, in every animal, lesions of the most severe form. The end result of this direct injection procedure was inevitably functional obliteration of the gall-bladder, with very severe generalized