

PATHOLOGY

Chronic Aortitis in the California Sea-lion, *Zalophus californianus*

DURING a long-term study on the general biology of the California sea-lion, *Zalophus californianus* (Lesson), it became evident that degenerative diseases associated with ageing are very common in this species. Therefore, a study of the heart and aorta was undertaken.

Circulatory disease in captive pinnipeds has been extensively studied by Fox¹ over a number of years. His findings included arteriosclerosis with typical medial involvement as well as myocarditis. Of the ten pathological specimens he found during this work, no indication was given of the genus and species involved; all animals were grouped under the order Pinnipedia.

The present study deals with lesions in the aorta of three mature bull sea-lions and is the first report of such pathology in this species to be found in a wild population. The hearts of seventy animals of both sexes were taken at random for study from a total collection of some two hundred specimens; these were obtained over the past two and a half years from islands off the coast of Baja California, Mexico. The collection area ranged from Los Coronados Islands (lat., 32° 26' N.; long., 117° 16' W.) to Cabo San Lucas, the extreme southern tip of Baja California (lat. 22° 45' N.; long. 110° 00' W.). All three of the abnormal individuals were secured on Los Coronados Islands, where most of the males were collected.

As soon as possible after killing, the hearts were removed leaving several inches of aorta attached: after rinsing in water, the tissue was preserved in 10 per cent formalin for later examination. The aortas were screened for visible lesions. Of the three specimens exhibiting gross pathology, two were sent to two separate laboratories for section and independent histopathological study; the third was retained and examined by us. The three diagnoses were identical. The sections were stained with hæmatoxylin and eosin. No gross myocardial disease was evident in any case.

Using the Lieberman-Burchard reaction on ether extracts of the finely ground material, samples from the pathological areas revealed a considerably higher cholesterol content than samples of the tissue from apparently normal adjacent regions.

Grossly, the intimal surface of the arteries contained numerous punctate elevations which, in the most extreme case, resembled tree bark. Approximately 10 per cent of the intimal surface was involved and the affected areas ranged in width from 0.1 to 1.5 cm.

Microscopically, the sections of aorta revealed extensive active aortitis, while other areas showed healing. The intima itself was not involved; rather there was, in the foci of the active areas, an extensive inflammatory reaction in the media, extending from the subintima to the adventitia. The disease process involved destruction of elastic tissue about the blood vessels and an infiltration of plasma cells, macrophages and lymphocytes. A secondary fibrosis in the subintimal areas overlaid the zones of aortitis. The healed areas contained abnormally large blood vessels surrounded by small amounts of scar tissue.

In many respects the condition found in these sea-lions resembles the aortic lesions found in chronic human syphilis, although the etiology of the disease in these animals is unknown.

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¹ Fox, H., *Amer. J. Med. Sci.*, **159**, 821 (1920); *Trans. Coll. Phys., Philadelphia*, 3rd Ser., **43**, 130 (1921); "Diseases in Captive Wild Animals and Birds", 70 (J. B. Lippincott Co., Philadelphia, 1923).

BIOLOGY

Inactivation by Visible Light of Yeast sensitized by a Nucleic Acid Fluorochrome

PRECISE and reproducible survival curves have previously been obtained for haploid and diploid yeast irradiated with X-rays and with ultra-violet light^{1,2}. Similar curves have now been obtained for the inactivation by visible light of yeast cells sensitized with the fluorescent diaminoacridine dye, acridine orange (3,6-bis-dimethylaminoacridine).

Cells of a haploid (SC-7) and a diploid (SC-6) strain of the yeast, *Saccharomyces cerevisiae*, were used in resting condition following seven days growth on potato dextrose agar at room temperature. Survival was measured by colony count on agar plates after three days incubation at 30° C. in the dark. The light source was a General Electric R-52 750-watt flood-lamp filtered to remove wave-lengths greater than 6000 Å. and less than 4100 Å.; the incident flux at the level of the samples was approximately 10⁵ erg/cm.²/sec. 20 min. before irradiation, highly purified acridine orange was added to a suspension of 10⁶ cells/ml. in pH 7 phosphate buffer to make a final dye concentration of 1:200,000 or 1.8 × 10⁻⁵ M. Details of the dye purification process and of experimental technique will be given elsewhere. All operations were performed under red light. Neither visible irradiation in the absence of dye nor the presence of dye without irradiation produced inactivation.

Typical visible light inactivation curves for haploid and diploid yeast are shown in Fig. 1. These curves exhibit high reproducibility except for the resistant 'tail' appearing at low diploid survival. (Such variable tails are also found for X-ray and ultra-violet inactivation.) These curves are similar to those obtained for ultra-violet inactivation² in that they are multi-component types of low 'hitness' and that the diploid is more resistant than the haploid.

These similarities between the visible and the ultra-violet inactivation curves tempt one to conclude that visible light inactivates some of the same