

with W-7 at moderate concentrations was shown to prohibit cell growth, arresting the cells in late G<sub>1</sub> phase. Using <sup>3</sup>H-labelled W-7, its distribution *in vivo* was shown to be similar to that of calmodulin under

conditions where growth arrest was obtained — suggesting that calmodulin may provide Ca<sup>2+</sup>-dependent regulation of functions required for the cells' commitment to replication and division. □

carcinogenicity is, in general, independent of metabolic action.

Much good work done in detecting environmental nitrosamines comes from the German Cancer Centre (Preussmann, Heidelberg). Nitrosamines in beer were first detected in Germany. They are formed by the reaction of amines in barley with nitrous fumes from the fuel used to heat barley during the malting process, and can be dramatically reduced by changing the source of the heat. The nature of the amines involved is being elucidated (Wainwright, Brewing Research Foundation, Nutfield). Nitrosamines have been detected in rubber, including the rubber used in the manufacture of babies' dummies (Spiegelhalter and Preussmann, German Cancer Centre, Heidelberg). The use of alternative retarders, or of 'safe' amines, should reduce this hazard. Relatively high concentrations of nitrosamines have been found also in cutting oils (Keefer, NIH), and it is again possible to suggest methods for their elimination. Cosmetics are known to contain nitrosamines, and here the situation is less clear. The fact that female facial skin is not a high cancer incidence area is not necessarily a reassurance; *N*-nitroso compounds can be absorbed through the skin and cause cancer elsewhere. On the whole, however, the meeting was

## Environmental nitrosamines and cancer

from Valda M. Craddock

It is now twenty-five years since dimethylnitrosamine was shown to cause liver cancer in rats in the historic experiments of Barnes and Magee. Tumours have now been shown to be induced by a wide variety of *N*-nitroso compounds in many species of animal and there is no reason to believe that man will prove to be an exception. There is also no doubt that man is exposed to these potent carcinogens. They frequently occur in industry and are widespread in the environment. Clearly, it is important to find out where the nitroso compounds come from, whether the levels found represent a hazard for man, what can be done about them and what the cellular and molecular mechanisms are by which they cause cancer. Progress in these areas was

discussed at a recent conference\* in Japan.

At previous meetings, emphasis had been on methods for the detection and estimation of nitrosamines when present in complex biological material. In the past, several reports of nitrosamines in the environment have proved to be false alarms when more specific analysis showed the presence of related chemicals. The situation at present is that volatile nitrosamines can be analysed by gas chromatography/thermal energy analysis. With non-volatile nitrosamines, preliminary formation of volatile derivatives is necessary.

*N*-nitrosoamines are likely to be formed wherever amines, secondary or tertiary, encounter nitrite. *N*-nitrosamides result from similar reactions with amides. Both types of compound are potent carcinogens. Nitrosamines are relatively stable and require metabolic activation to form the ultimate carcinogen; nitrosamides on the other hand are unstable, and the site of

\*Seventh International Meeting on *N*-Nitroso Compounds: Occurrence and Biological Effects, held in Tokyo, 28 September–1 October 1981, under the sponsorship of the International Agency for Research on Cancer, France, and the Japanese Cancer Association, Tokyo.

Valda M. Craddock is at the MRC Toxicology Unit, Carshalton, Surrey, SM5 4EF.



100 years ago

### THE VOYAGE OF THE "VEGA" AROUND ASIA AND EUROPE

By A.E. Nordenskjöld (Macmillan & Co., 1881)

THE voyage of the *Vega* will be in many respects one of the most memorable events in the history of navigation. For the first time a continent has been circumnavigated, so far as authentic record goes, and at last the North-East Passage has been won, after heroic efforts begun nearly three and a half centuries ago. But the voyage will be still more memorable by the two rich volumes in which it finds copious record, volumes which have scarcely a parallel in the whole literature of geographical exploration.

In one chapter, Baron Nordenskjöld has collected all the information attainable on Steller's sea-cow (*Rhytina Stelleri*), which on Steller's visit to Behring Island in 1741 was found pasturing in large herds on the abundant sea-weed on the shores of the island. Twenty-seven years after, not a specimen was to be found, and it was believed to be then

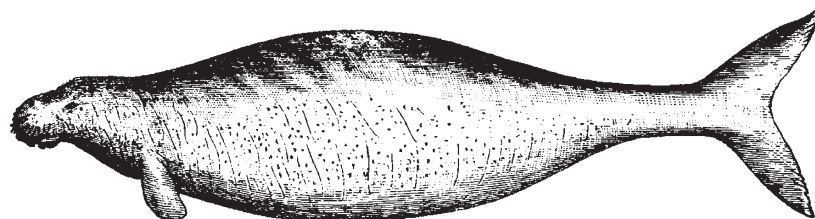


FIG. 10.—Reconstructed form of the sea-cow.

extinct. But Baron Nordenskjöld adduces evidence to prove that a specimen was seen twenty-seven years ago, though there can be little doubt that it has really gone the way of the mammoth. The Baron does not believe that its extinction is due to the destruction by hunters, but that it was a survival from a past age doomed to extinction, which overtook it when driven from its pastures on the shores of Behring Island.

"Steller's sea-cow (*Rhytina Stelleri*, Cuvier) in a way took the place of the cloven-footed animals among the marine mammalia. The sea-cow was of a dark-brown colour, sometimes varied with white spots or streaks. The thick leathery skin was covered with hair which grew together so as to form an exterior skin, which was full of vermin and resembled the bark of an old oak. The full grown animal was from twenty-eight to thirty-five English feet in length and weighed about sixty-seven cwt. The head was small in proportion to the large thick body, the neck short, the body diminishing rapidly behind. The short fore-leg

terminated abruptly without fingers or nails, but was overgrown with a number of short thickly placed brush-hairs; the hind-leg was replaced by a tail-fin resembling a whale's. The animal wanted teeth, but was instead provided with two masticating plates, one in the gum the other in the under jaw. The udders of the female, which abounded in milk, were placed between the fore-limbs. The flesh and milk resembled those of horned cattle, indeed in Steller's opinion surpassed them. The sea-cows were almost constantly employed in pasturing on the sea-weed which grew luxuriantly on the coast, moving the head and neck while so doing much in the same way as an ox. While they pastured they showed great voracity, and did not allow themselves to be disturbed in the least by the presence of man. One might even touch them without their being frightened or disturbed. They entertained great attachment to each other, and when one was harpooned the others made incredible attempts to rescue it." From *Nature* 25, 22 & 29 December, 1881.