Zusammenfassung. Die Blätter der Kokospalme (*Cocos nucifera* L.) sind in links- oder rechtsdrehenden Spiralen angeordnet. Zählungen an einem grossen Material indischer und nichtindischer Palmen (3028 bzw. 13842 Bäume) ergab ein geringfügiges Überwiegen der linksdrehenden Blattspiralen (52,05% bzw. 52,90%). Der Drehsinn der Spiralen erwies sich, wie Kreuzungsversuche zeigten, als genetisch nicht fixiert. In fünfjährigem Feldversuch (1955–1960) lieferten Palmen mit linksdrehenden Blattspiralen einen signifikant grösseren Ertrag an Kokosnüssen.

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Histoenzymologic Behaviour of the Giant Cell of Foreign Body Granuloma as Compared with the Osteoclast

Earlier publications have shown that osteoclasts and chondroclasts possess great enzymatic activity. Large quantities of acid phosphatase[1,2], succinic-dehydrogenase[3,4], cytochrome oxidase[4] and β-glucuronidase[5] have been found in these cells.

From these findings it can be assumed that some relationship may exist between these enzymes and bone and cartilage absorption processes. The morphological similarity of the osteoclast and foreign body giant cell induced us to make a comparative study of these two elements. Only isolated data are available on the histoenzymologic behaviour of foreign body granuloma multinucleated cells[6].

We studied the histoenzymologic pattern of: (1) Osteoclasts and chondroclasts under normal conditions in C3H mice, Wistar rats, Hamster and man, using enchondral and membranous growth zones (areas of enchondral growth of femur and tibia and membranous growth of maxilla). (2) The same material in Wistar rats that received 1000 U. of parathyroid hormone subcutaneously and killed 60 h later[7]. (3) A series of pathologic processes characterized by abundant multinucleated giant-cells (osteoclastoma, solitary and aneurysmal) bone cysts and giant cell of foreign body granuloma. (4) Giant cells of foreign body granuloma induced by the introduction of a cellulose sponge into Wistar rats and C3H mice killed one month later and by the presence of detritus in experimentally provoked wounds in tongue of Wistar rats.

Fragments of tissue were fixed in neutral formalin in order to demonstrate acid phosphatase (GOMORI's method[8], RUTENBURG and SELIGMAN's method[9]), phosphamidase (MEYER and WEINMAN's method[10]); in chloral-hydrate formalin to show β-glucuronidase (FISHMAN and BAKER's method[11]). In all techniques frozen sections were used. Other fragment was kept at −20°C; sections being prepared with the cryostate to determine the presence of succinic-dehydrogenase (PEARSON and DEFENDI's method[12], NACHLAS et al.[13]). The calcified material was treated for the demonstration of acid phosphatase with our pro-

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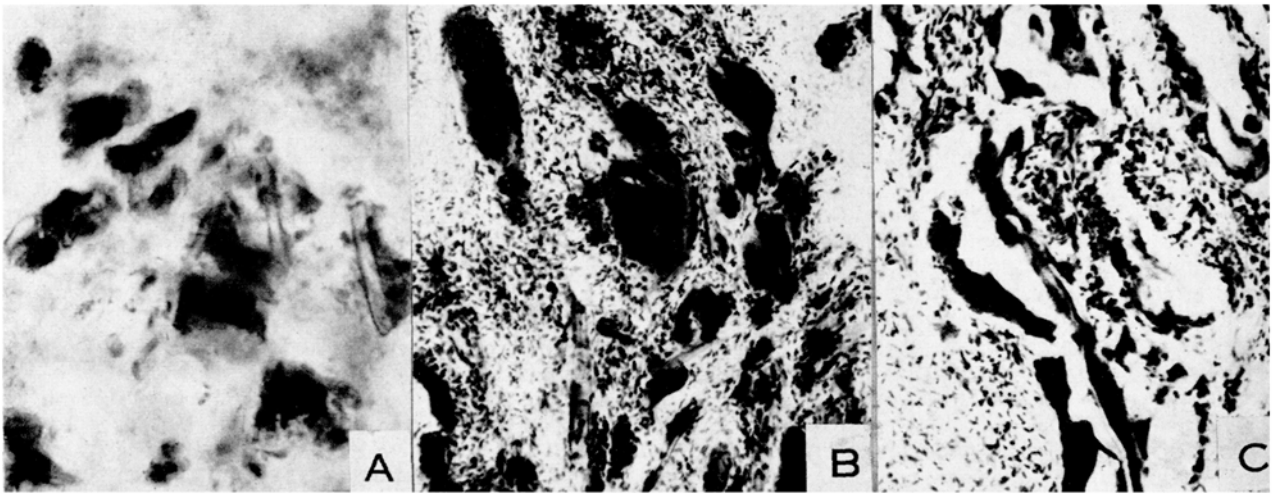

Foreign body granuloms produce bay cellulose sponge. The giant cells appears intensely stained. A = succinic-dehydrogenase demonstration (NACHLAS et al.[13]). B = phosphamidase demonstration (MEYER and WEINMAN[10]). C = acid phosphatase demonstration (GOMORI[8]). In B and C the stromal fibroblastic cells react moderately.

cedure[14]. Variable times of incubation were used with all the techniques to evaluate the relative enzymatic activity.

There was a similar and very high enzymatic response for all enzymes in all types of multinucleated giants cells studied. Succinic-dehydrogenase and phosphamidase reacted more specifically, i.e. the giant cells gave a frank response against the neighbouring cells that showed weak reaction only. Acid phosphatase reacted with greater intensity in the giant cells and, though to a lesser degree, there was also activity of the osteoblastic elements in the bone tissue and neighbouring histiocytic cells of the granuloma. β-Glucuronidase appeared in high proportion in the giant cells, though it was also seen in the osteoblastic elements and to a lesser degree in the histiocytic reticular cells. In the experiments carried out with parathyroid hormone, an increase of these enzymes was found in bone tissue, related to the increase of the osteoclastic type of giant cell. There was also a marked reaction of acid phosphatase in the fibroblastic near the trabeculae.

Our results show that foreign body giant cells are rich in enzymes. This would indicate a very intense metabolic activity probably related to the absorption mechanism. The fact that the response in this group of enzymes for osteoclasts, chondroclasts and foreign body giant cells was alike, induced us to assume a similar enzymatic pattern for the absorption mechanism of different substances.

Zusammenfassung. Intensive enzymatische Aktivität (saure Phosphatase, Succinodehydrogenase, Phosphamidase und Glukuronidase) wurde in Osteoklasten-Fremdkörperriesenzellen und vielkernigen Riesenzellen in einer grossen Zahl von pathologischen Knochenprozessen festgestellt. Die Bedeutung dieser Befunde für den Mechanismus der Absorption wird diskutiert.

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Hyperoxia and Formation of Chromolipoid Pigments

Chromolipoid pigments (also called lipofuscin, wear and tear pigment, ceroid, hemofuscin) occur widely in various cells of mammals. Their amount is known to increase with age and also in various situations in which oxidation of unsaturated lipids is enhanced locally or in the whole body[1]. It is known that the amount of these pigments is increased in animals suffering from avitaminosis E[2] (i.e. in the absence of the anti-oxidant activity of this vitamin), in iron overload[3] and in hemorrhages in lipid-containing tissue[4] (i.e. in the presence of iron compounds which catalyze oxidation); the pigmentation also occurs in cirrhotic livers[5]. These data indicate, as has been previously stated[1], that the formation of these pigments depends: (a) on the local presence of unsaturated lipids, and (b) on the presence of conditions favouring oxidation. Chemical studies[6–9], as well as histochemical studies and experiments of producing similar pigments *in vitro*[6,10–13], have shown that the pigments are the products of peroxidation and polymerization of unsaturated lipids.

It appeared reasonable to assume that repeated exposures of animals to high O_2 tension might also cause the formation of lipid peroxides and of chromolipoid pigmentation. The present report deals with experiments performed to test this notion.

White rats were exposed 6 days a week to high O_2 tensions. The container in which the rats were exposed to O_2 was rinsed three times with pure oxygen by raising the pressure to 3.5 atm and then letting the gas flow out. The gas mixture in the container was calculated to contain 98% O_2. The animals were exposed for 20–30 min to O_2 at 3.5 atm during the first week. As from the second week the pressure was raised to 4 atm and as from the middle of the third week the time of exposure was raised to 40 min.

Two exposed animals and two controls fed a similar diet were sacrificed weekly with ether. The last animals were killed 60 days after the first exposure to O_2. Pieces of brain, cerebellum, heart, liver, spleen, kidney and ileum were fixed in formalin and embedded in paraffin. Seven microns thick sections were stained with hematoxylin, Sudan black B, Ziehl-Nielsen and the P.A.S. procedures. Another section was mounted unstained in glycerin for examination with ultra-violet light for auto-fluorescence.

Pieces of the brains of animals killed in the last two weeks were homogenized and examined by the thiobarbituric acid method for the amount of lipid peroxides in them.

Study of sections stained with Sudan black, Ziehl-Nielsen and the P.A.S. procedures indicated a slightly higher content of stainable material in the O_2 exposed groups than in the non-exposed as from about the fourth week of O_2 exposure. The stainable material was found mainly in adventitial histiocytes in the various organs, but also in histiocytes of the spleen and liver and in neurones. The results were however erratic with marked individual variations.

Less equivocal changes were found in sections examined for autofluorescence with ultra-violet light. More material which emitted bright yellow fluorescence was found in the O_2-treated than in the non-treated animals as from about the fourth week. The yellow fluorescence was mainly concentrated in the capillary walls and, although it was present in all animals, there were marked differences in intensity between groups.

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