Die Aktivität[a] der Cholesterin-7α-Hydroxylase der Rattenleber nach Hypophysektomie und nach Substitution mit Hypophysenhormonen

	Normaltiere[b]	Hypophysektomierte Tiere[c]						
		Vehikel	HHE	PRL	GH	ACTH	TSH	PMS	CG
Männlich	5,5 ± 1,1	0[d]	6,5 ± 1,5	4,2 ± 1,4	0	0	0	0	0
Weiblich	5,3 ± 1,0	0	7,1 ± 1,3	5,1 ± 1,8					

[a] Hydroxylierungsrate[5] r bezogen auf 100 mg Leber, Mittelwerte ± Standardabweichung, 3 Inkubationen je Tier. [b] 8 Tiere für jedes Geschlecht. [c] 4 Tiere für jedes Geschlecht. [d] $r < 1{,}0$.

Reaktion durch Eingabe der Mikrosomensuspension, Beendigung nach 60 min (37 °C) durch Zusatz von 0,6 ml Äthanol-Aceton (1:1, v/v). Der Eindampfrückstand von 0,2 ml des nach Zentrifugation erhaltenen Überstandes wurde auf Kieselgel-G-Platten (Schichtdicke 250 µm) aufgetrennt (System Benzol-Äthylacetat 7:13, v/v). Aus den Ergebnissen der Scintillationszählung von eluiertem Substrat und eluiertem Reaktionsprodukt wurde die Hydroxylierungsrate r (s. Ref.[5]) berechnet.

Ergebnisse und Diskussion. Nach Hypophysektomie sinkt die Aktivität der Cholesterin-7α-Hydroxylase bei männlichen wie bei weiblichen Tieren auf Werte unterhalb der Nachweisgrenze ($r < 1{,}0$) ab. Auf eine Behandlung sprechen nur die Tiere an, die entweder HHE oder PRL erhielten (völlige Normalisierung der Aktivität). Im übrigen hatten die Hormonbehandlungen in allen Fällen die erwarteten biologischen Effekte (Details hierzu s. Ref.[6]).

Mit dieser Arbeit ist erstmalig eine Wirkung von PRL auf die Aktivität der Cholesterin-7α-Hydroxylase konstatiert. Nimmt man den kürzlich erhobenen Befund[7] einer Beteiligung von PRL an der Regulation der Aktivität von Enzymen des Steroidhormonstoffwechsels hinzu, so könnte in diesen Fakten eine Antwort auf die in letzter Zeit wiederholt gestellte Frage[8,9] nach der Funktion der hepatischen Rezeptoren für PRL liegen, deren Synthese unter hormonaler Kontrolle steht, so unter der von PRL selbst[10], so auch unter der von Thyroxin[9]. Besondere Beachtung verdient vor allem der letztere Befund, seit man weiss, dass die Schilddrüse in die hormonale Regulation der Cholesterin-7α-Hydroxylase-Aktivität eingreift[11]. Ob und wie sich in diesen Zusammenhang die Rolle der Glucocorticoide[2,4] einordnen lässt, ist völlig offen. Künftige Untersuchungen werden möglicherweise zwischen einer hormonalen Regulation der Basisaktivität und einer hormonalen Regulation ihres circadianen Rhythmus zu differenzieren haben.

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The Role of Zinc in the Activation of the Enzyme Cellulase in Termites

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Summary. Chemical analysis had revealed an exceptionally high amount of zinc in the worker bodies of termites. Further investigation of the digestion of cellulose in vitro demonstrated that zinc functions as activator of the enzyme cellulase.

Analysis of the inorganic constituents of the worker bodies of the termite *Microtermes tragardhi* (Sjostedt), using a quartz-prism spectrograph type NCII-28 and a binocular projector type DCII-1, revealed an exceptionally high amount of zinc: This reached 3% of the ashed weight and 0.01% of the dry weight of each worker. However, the concentration of zinc in the termite nest soil and in the sugar cane dry stems, on which the termites were feeding proved to be much lower. It was 0.003% of the ashed nest soil and 0.002% of the dry nest soil by weight. The sugar cane stems only contained traces of zinc. This indicated that worker termites actively accumulated zinc in their bodies.

Such a phenomenon and its functional significance has not been reported in insects. In higher animals, however, the role of zinc in the activation of enzymes was demonstrated on several occasions: The amount of zinc in the prostate gland of the rat was shown to increase during infancy to reach 10 times the amount found in any other tissue of the rat. This was related to the increase in the activity of the enzyme carbonic anhydrase[2–4]. The presence of high concentration of zinc was also reported in the prostate gland of the ox and man[5]. Yeast-alcohol

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dehydrogenase was shown to be activated by zinc[6], and experiments carried out on the uptake of zinc by avian eggs suggested that zinc might be a specific activator of several enzymes[7]. The enzyme uricase was also reported to contain 0.13% of zinc[8].

In termites which basically live on cellulose material, the enzyme cellulase is of major importance in digestion. This enzyme is synthesized by higher termites, like *M. tragardhi*, but is produced by microorganismic symbionts living in the alimentary system in primitive termites.

The role of zinc in the digestion of cellulose was thus investigated, testing the effect of zinc on the activity of cellulase in vitro.

Material and methods. The cellulase solution was prepared by dissolving 100 mg (2 E.U.) of the enzyme in 100 ml of phosphate buffer (pH 6). Cellulose (Whatman pure grade powder) was used as the substrate. 100 mg of the substrate were placed in each of 9 digestion tubes and 9 ml of the enzyme preparation were added to each of the tubes. The digestion mixture in one tube was made up to 10 ml by adding distilled water, while 1 ml of zinc sulphate solution, of different concentration was added, respectively, to each of the other 8 tubes.

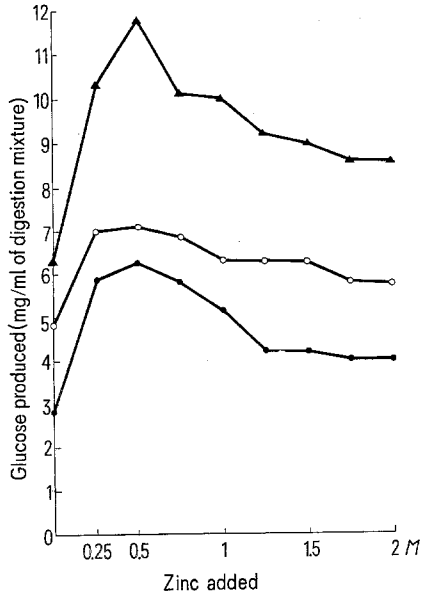
The digestion mixtures were incubated at 37 °C (C.T.) for 48 h and then centrifuged for 15 min to sediment undigested cellulose. The supernatants were pipetted into separate test tubes. Aliquotes (1 ml) of these solutions were used for the quantitative determination of the glucose resulting from the enzymatic hydrolysis of the cellulose. The method adopted was based on that of CLARK[9]. The amount of glucose produced has been taken as a measure of the rate of the activity of the enzyme.

The above experiment was repeated using higher concentrations of cellulase: 0.2 and 0.3% (w/v) in phosphate buffer.

Results and discussion. The mean results of 8 replicates are summarized in the Figure. These demonstrate that the amount of glucose produced at different concentrations of the enzyme was nearly doubled when 0.25 *M* zinc sulphate (= 1.6345 mg of zinc per ml of the digestion mixture) was added.

The peak of the activation of the enzyme was reached after the addition of 0.5 *M* zinc sulphate. Higher concentrations of zinc sulphate, however, resulted in a gradual drop in the amount of glucose produced. This reached a level where the activity of the enzyme was no longer affected by the addition of more zinc ions.

In conclusion, it seems most probable that zinc, which occurs at an appreciable amount in the termite body, functions as activator of the enzyme cellulase.



Activation of cellulase at 3 different concentrations, by zinc ions, in vitro. ●, 0.1% cellulase; ○, 0.2% cellulase; ▲, 0.3% cellulase.

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Cytogenetic Observations in *Ceratitis capitata*[1]

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Summary. The $2n = 10 + XX/XY$ complement of *C. capitata* includes 3 pairs of metacentric and 2 pairs of submetacentric autosomes; the *X* and *Y* chromosomes are acrocentrics. The sex chromosomes do not pair somatically during mitotic prophase, and, using the C-banding technique, band more extensively than the autosomes. Male meiosis may be achiasmate; there is no leptotene, zygotene or diplotene.

The Mediterranean fruit fly, *Ceratitis capitata* (Family Tephritidae), is a pest of particular economic importance to commercial growers of soft fruits, in many parts of the world. Females habitually deposit their eggs in healthy fruit, and, when the larvae emerge about 8 days later, they begin to feed and burrow into the pulp of the host causing considerable damage. Different eradication measures are constantly being explored to alleviate the problem but as yet relatively little research has been conducted on genetical control methods which involve various forms of chromosome translocation, inversion hybridity and systems of meiotic drive. An essential prerequisite in this type of work is a thorough understanding of the normal chromosome complement and how the various components behave during mitosis and meiosis. This paper presents a brief outline of these aspects.

[1] Material kindly supplied by Dr. D. A. LINDQUIST, I.A.E.A./FAO Vienna, Austria.