Bemerkungen. Die wesentlichste Wirkung der Digitalisglykoside beruht nach heutigen Vorstellungen auf einer Änderung des intrazellulären Ca^{++}-, K^+- und Na^+-Gehaltes. Wie Untersuchungen von HOLLAND et al.[8] sowie KLAUS et al.[9] ergaben, wird die ionisierte, austauschbare Calciumfraktion unter der Einwirkung der Digitalisglykoside erhöht; der Mechanismus ist aber bis heute unbekannt. Andererseits beeinflussen die Digitalisglykoside den aktiven K^+- und Na^+-Transport an der Zellmembran durch eine Hemmung der hierfür notwendigen Transport-ATPase; hierdurch wird der intrazelluläre K^+-Gehalt vermindert und der Na^+-Gehalt erhöht[10–12]. Für die Annahme, dass diese Transport-ATPase der primäre Angriffspunkt der Digitalisglykoside ist, sprechen 2 wesentliche Befunde: (1) ist die Membran-ATPase des Herzmuskels um mehrere Zehnerpotenzen empfindlicher als die des Skelettmuskels, so dass die seit langem bekannte Selektivität der Digitalisglykoside für das Herz eine Grundlage findet[7] und (2) ist die Empfindlichkeit der Membran-ATPase des Herzmuskels verschiedener Tierarten der jeweiligen therapeutischen bzw. toxischen Wirkung des betreffenden Glykosids korreliert[13,14].

Die vorliegenden Untersuchungen haben ergeben, dass die Ca^{++}-Aufnahme isolierter Mitochondrien des Herzmuskels durch k-Strophanthin nicht beeinflusst wird, wohl aber durch eine Änderung der Na^+- und K^+-Konzentration im Inkubationsmedium. Aufgrund dieser Befunde lässt sich die positiv inotrope Wirkung der Digitalisglykoside vielleicht folgendermassen erklären: primär wird in der Zelle durch eine Hemmung der Membran- bzw. Transport-ATPase der K^+-Gehalt vermindert und der Na^+-Gehalt erhöht oder die Restitution des K^+/Na^+-Quotienten während der Diastole verzögert. Sekundär wird mit der Abnahme des K^+/Na^+-Quotienten die Bindungsfähigkeit der Mitochondrien für Ca^{++} vermindert und damit die ionisierte, austauschbare Ca^{++}-Fraktion im Cytoplasma erhöht, so dass die Einwirkung der Calciumionen auf die kontraktilen Eiweisselemente oder andere Enzymsysteme verstärkt oder verlängert ist.

Summary. In isolated mitochondria of heart muscle from rabbits and oxen there is, under suitable conditions, an accumulation of Ca^{++}, which is significantly enhanced by elevating the K^+/Na^+ quotient of the incubation medium. K-strophanthine (10^{-5}–10^{-7}) does not influence the accumulation of Ca^{++} by the mitochondria of heart muscle. Therefore the intracellular increase in exchangeable Ca^{++} observed after digitalis-glycosides could be explained by a decrease of the intracellular K^+/Na^+ quotient, which is caused by inhibition of the membrane ATPase and diminishes the capacity for Ca^{++} accumulation in mitochondria.

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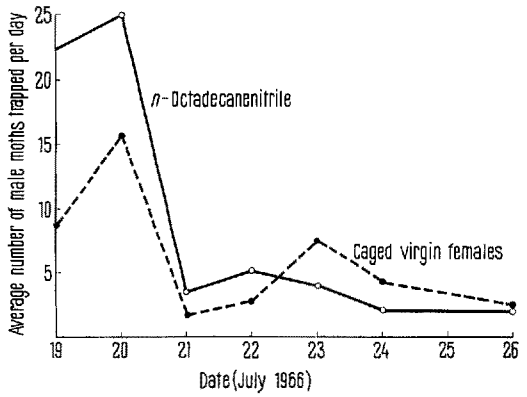
A Synthetic Attractant for the Male Spruce Budworm Moth *Choristoneura fumiferana* (Clem.)

In July of 1965 we found that technical grade palmitic acid was slightly attractive to the male spruce budworm moth *Choristoneura fumiferana* (Clem.). Material separated by vapour phase fractionation of a steam distillate from the crude acid proved to have superior luring ability. One such fraction was competitive in attractiveness with single caged virgin female insects in the field.

We have recently isolated 2 mg of a crystalline aliphatic nitrile from 1.5 kg of commercial palmitic acid[1]. The mass spectrum of this trace impurity displayed a molecular ion of mass 265 and a fission pattern indicative of *n*-octadecanenitrile. The identity was confirmed by comparison of the compound with an authentic synthetic sample of *n*-octadecanenitrile.

The Figure shows the results of preliminary field bioassays[2] on this compound carried out at Rocky Brook, New Brunswick, in late July 1966. 2 moth traps baited with 1 mg pure crystalline *n*-octadecanenitrile were exposed on July 19 and 20. 6 additional traps baited with 1 mg of the synthetic nitrile were exposed from July 21 till July 26, when moth activity became minimal. 3 other



Comparison of the average number of male spruce budworm moths lured by *n*-octadecanenitrile and by single caged virgin female moths. Field test results (Rocky Brook, N.B., Canada).

[1] Palmitic acid (90%) obtained from Aldrich Chemical Co. Ltd., Milwaukee (Wisconsin, USA).
[2] The methods of field bioassay and collection of virgin female moth exudants have been described in an article by J. A. FINDLAY and D. R. MACDONALD, Chemy Can. *18*, 47 (1966).

traps in the same locality were baited with single caged virgin female budworm moths for the duration of the test period. An unbaited control trap captured only 2 male budworm moths during the 9-day field test. It is evident from these data that *n*-octadecanenitrile can compete successfully with single caged virgin female insects in luring male spruce budworm moths. We have also ascertained in field tests that this nitrile and some homologues are comparable in potency with crude exudant material collected from several hundred virgin female moths[2].

These results leave little doubt that *n*-octadecanenitrile holds a pronounced attraction for the male spruce budworm moth. We plan to carry out more exhaustive bioassays including dilution studies during the next budworm mating season[3].

Zusammenfassung. Die besondere Eigenschaft des *n*-Octadekanitrils als Lockstoff für die männliche Motte *Choristoneura fumiferana* (Clem.) wurde festgestellt.

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Department of Chemistry, University of New Brunswick, and Forest Research Laboratory, Department of Forestry and Rural Development, Fredericton (New Brunswick, Canada), 2nd December 1966.

[3] This paper is based on results of research supported in part by a grant from the Department of Forestry and Rural Development of Canada.

The Assessment of the Rate of Digestion of Serum Proteins in Mosquito by Gel-Diffusion and Immunoelectrophoresis

The rate of digestion of blood in mosquitoes has been previously assessed by various workers using the ring or the interfacial precipitin reaction (CLEMENTS[1]). However, the disadvantage in using the ring test is that it cannot differentiate between various components of the serum, unless antisera especially prepared against these components are used. The ring test, therefore, as it is normally performed, can only indicate the rate of digestion of the whole serum and not of individual fractions. It is possible to overcome this difficulty by the use of relatively newer techniques such as gel-diffusion and immunoelectrophoresis. The aim of this work was, therefore, to find out if different components of the serum are digested by mosquito at the same rate, or whether their rate of breakdown is different using the above 2 techniques. WILLIAMS[2] had previously used immunoelectrophoresis to analyse the blood meal of *Aedes aegypti* for the same purpose, and had found that the rate of digestion of serum proteins in that of mosquitoes is not uniform.

We have conducted our studies on *Armigeres subalbatus* as this mosquito was readily available in our insectory. The strain was first established in this laboratory by BARR and CHELLAPPAH[3], who also describe the rearing techniques. The temperature in the insectory ranged from 28–30 °C. The unfed female mosquitoes were fed on a human subject under constant observation, when they had fed to repletion, each of them was carefully transferred to a separate container. They were then removed after varying time intervals and the antigens were prepared. For the preparation of antigens, the fed mosquitoes were dissected and the gut contents were laid on small filter paper strips which were then allowed to dry in a dessicator at 5 °C. Before conducting the test, the strips were cut into smaller parts and transferred to a tuberculin syringe containing 0.2 ml of physiological saline. The saline was repeatedly sucked and ejected until the filter paper became almost colourless. This saline extract was used as an antigen. The double diffusion in Agar and immunoelectrophoresis was done on slides using LKB immunoelectrophoresis equipment[4,6]. The antisera used were obtained commercially[5] and consisted of Anti-human rabbit serum.

Results of the study showed that in the early stages of digestion at least 2 precipitin bands are seen in the gel-diffusion set-up. The outer band disappears relatively early while the inner band persists for a much longer period. Figure 1 shows that the outer band has started

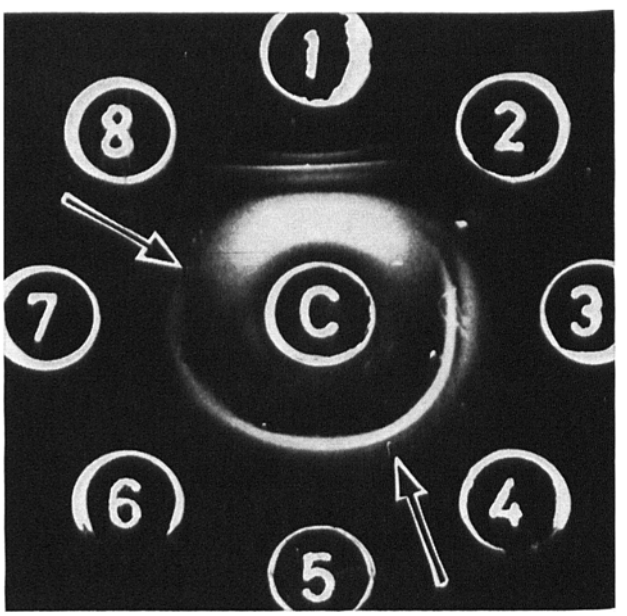

Fig. 1. (C) Rabbit Antihuman serum; (1) Human serum; (2) Antigen, 3 h, (3) 6 h, (4) 12 h, (5) 18 h, (6) 24 h, (7) 48 h, (8) 56 h after intake of blood meal. Arrow between 4 and 5 marks the complete disappearance of the outer band. Arrow between 7 and 8 marks the complete disappearance of the inner band.

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[6] The LKB immunoelectrophoresis equipment was bought through a grant from the Wellcome Trust to whom we extend our thanks.