

of boron trifluoride etherate in the ketalization step is expected to favor the *exo*-isomer<sup>34</sup>; indeed, hydrogenation of the synthetic material yielded a product identical in mass spectrum and GC retention time with known *exo*-brevicomin<sup>32</sup>. No attempt at resolution of the enantiomers of the synthetic material has been made.

The mass spectra and IR spectra of the purified final product and the urinary constituent show excellent agreement. Importantly, the synthetic compound co-elutes with the urinary constituent in capillary gas chromatograms; with the high resolving power of capillary columns it is nearly impossible that some related isomer with an identical spectrum would appear with precisely the same retention time.

Synthesis on a larger scale is currently being pursued to prepare *exo*-3,4-dehydrobrevicomin in the amounts sufficient for testing the primer pheromone activity as well as various behavioral effects in mice. These biological evaluations could be a long-term undertaking due to the frequently acknowledged complexities of mammalian olfactory communication. It is, however, of some interest that 2 additional ketals (multistriatin and frontalin), structurally related to *exo*-brevicomin, were previously identified<sup>31</sup> as insect pheromones. The structural similarity of *exo*-3,4-dehydrobrevicomin to compounds of demonstrated pheromonal activity has encouraged our efforts to pursue the biological testing of this compound. Our recent results of behavioral testing indicate that the compound is one of the aggression-promoting principles of male mice.

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## Identification of the nerve bundle in the tractus olfactorius of the tench, *Tinca tinca* L., which conducts the nervous excitation elicited by the alarm substance

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**Summary.** In a total of 29 tench (*Tinca tinca* L., Cyprinidae, Ostariophysi, Pisces) we operatively impaired either 1 or 2 of the 3 nerve bundles of both tractus olfactorii. Through behavioral experiments, using the fright reaction as a test, we found out which nerve bundle of the tractus olfactorius conducts the excitation elicited by the alarm substance. According to the results the conducting bundles are exclusively the lateral bundles in both tractus olfactorii.

Each of the 2 tractus olfactorii in the tench (*Tinca tinca* L.) consists of several nerve bundles, as it does in many species of fish studied<sup>1</sup>. In the tench each tractus olfactorius

consists of 3 bundles, one lying laterally, one centrally, and one medially<sup>2</sup>. The action potentials of each tractus olfactorius are in accordance with this structure<sup>3-5</sup>. By means of

behavioral experiments with the tench the nervous excitation elicited by the alarm substance<sup>6-9</sup> was explored. The goal was to discover by which bundle this excitation was conducted from the bulbus olfactorius to the telencephalon. **Material and methods.** The tench, *Tinca tinca* L., studied were approximately 30 cm in total length. Each individual lived in a 60-l tank. The water was changed twice a week. In total we operated on 29 fish under urethane narcosis. A dentist's drill and scalpel were used while the fish were artificially respired. The wounds were closed with a tissue adhesive, Histoacryl®. We always performed the corresponding operation on the right and left tractus olfactorius. To prevent regeneration, which would otherwise be fast, we not only cut through each nervous bundle but in every case cut out a 5-mm piece. The following bundles were operated upon bilaterally: a) the lateral bundle alone (8 fish), b) both the lateral and central bundles (6 fish), c) the central bundle alone (4 fish), d) both the central and medial bundles (4 fish), e) the medial bundle alone (7 fish). In addition, 8 fish with intact tractus olfactorii served as controls. All operated fish fed normally a few days after the operation.

The behavioral experiments were performed approximately 3 weeks after the operation. In these experiments skin extract containing the alarm substance from a conspecific was poured into the tank. The behavior of the tench was then observed. The technically difficult micro-operations were first carried out by U. Mangold-Wernado in 1980 and they were continued by P. Neustetter. All behavioral results or reactions by the fish to the alarm substance were evaluated by the senior author without prior knowledge of the kind of operation performed.

**Results.** Out of the 8 control fish with intact tractus olfactorii, 7 responded to the alarm substance with a fright reaction. Of the 8 tench in which only the lateral bundle was separated, none reacted. The same was true for the 6 fish in which both the lateral and central bundles were operated upon. Of the 4 specimens in which only the central bundle was impaired, 2 responded. Of the 4 individuals in which both the central and medial bundles were cut, 1 responded. Of the 7 fish in which only the medial bundle was cut, 5 demonstrated a fright reaction. To summarize; out of the 14 fish, in which either the lateral or the lateral and central bundles were cut, we found that none responded

to the alarm substance. However, 8 out of 15 individuals with intact lateral bundles showed a fright reaction, although either the medial or the central or both bundles had been operated upon. The difference between the operated individuals with intact lateral bundles and those with impaired lateral bundles is significant. The fright reaction of the fish may indicate that the nervous excitation elicited by the alarm substance is conducted exclusively by the lateral nervous bundles of the tractus olfactorii from the bulbi olfactorii to the telencephalon.

**Discussion.** Since the tractus olfactorius in other species of Cyprinidae has not been studied histologically and electrophysiologically as thoroughly as that in the tench, it cannot be decided at this time whether our observation is specific for *Tinca tinca* or also valid for the other Ostariophysi. The operation on single nerve bundles in specimens of certain small species such as the European minnow *Phoxinus phoxinus* (L.) would be technically very difficult if not impossible. However, since the alarm substance is identical in the Ostariophysi studied it seems also probable that the organs of perception are accordingly similar, though minor differences might occur. Further work must be performed with a number of other species. The fishes should be large enough to ensure successful operations upon single nerve bundles, and their tractus olfactorii should be studied histologically and electrophysiologically in advance, as they have been in the tench.

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## Mating competitiveness and fertility of thiotepa-sterilized flies

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**Summary.** In the present investigation, an attempt has been made to study the mating competitiveness and fertility of males as well as females of *Dacus dorsalis* Hendel (Diptera: Tephritidae) treated topically with thiotepa. In the mixed population, treated flies of either sex were found to be sexually more vigorous than untreated flies. However when the mating competitiveness of either sex was determined separately using various methods, treated males were found not to differ significantly in sexual competitiveness from untreated flies. Receptivity of treated and untreated females to males was also studied by the single choice method. Thiotepa-treated and untreated females were found to be equally receptive to males.

One important consideration, while evaluating sterile male release technique, is to make sure that there are no adverse effects on sexual behaviour of insects treated with chemicals. The chemosterilized insects should not lose their ability to find their mates and the competence to mate successfully with untreated insects in the field. LaChance and Leverich<sup>3</sup>

considered the induction of aspermia, inactivation of sperms or gametic aberrations in the sperm as sterilization effects. However, in *Dacus oleae* (Hendel) only aberrations in gametic material were considered as sterilization effects<sup>4</sup>. It was suggested by laBrecque et al.<sup>5</sup> that chemically sterilized males were more vigorous sexually than