Fifteen sulfadiazine resistant and 8 sulfadiazine sensitive strains of *Neisseria meningitidis* of groups B, C, and Y[5] were tested. The assay was carried out on Mueller-Hinton agar as described by FRANK, WILCOX and FINLAND[6].

The minimal inhibitory concentration of the compound ranged from 0.156–1.25 µg/ml medium for both the sulfadiazine resistant and sensitive groups.

In addition to the *Neisseria meningitidis* strains, 4 Gram-negative and 9 Gram-positive microorganisms were tested. The Gram-negative organisms consisted of *Pseudomonas aeruginosa, Proteus vulgaris, Herellea vaginicola* and *Aerobacter aerogenes*. The following Gram-positive organisms were used: *Staphylococcus aureus* No. 198, 201, and 204[7], *Streptococcus sanguis* (SBE), *Streptococcus sp. HHT, Streptococcus FA-1.* ATCC No. 19645, *Lactobacillus casei*, and *Bacillus subtilis* ATCC No. 9372.

The organisms were grown on Todd-Hewitt agar supplemented with 1% dextrose. Filter paper disks (Schleicher-Schuell No. 740-E, diameter 12.7 mm) were impregnated with the compound (10 µg/ml) and placed on inoculated Petri dishes. The organisms were grown for 24 h at 37 °C and the extent of inhibition around each disk was noted. The Gram-negative organisms were not inhibited by the compound, but all of the Gram-positive organisms tested were inhibited. The inhibition noted at this concentration was found to be bacteriostatic. Using the tube dilution technique, the compound was found to be bacteriocidal in the range of 50–100 µg/ml.

Zusammenfassung. Eine neue organische Substanz, 3, 3'-*bis*(trifluoromethyl)tetranitrodiphenylamine ist synthetisch hergestellt worden. Die antibakteriellen Eigenschaften gegen Gram-positive Bakterien und gegen Sulfadiazin resistente und empfindliche Arten von *Neisseria meningitidis* werden beschrieben.

A. J. FRITSCH, C. E. MOORE, T. S. MEYER, I. L. SHKLAIR and L. F. DEVINE

Department of Chemistry Loyola University, Chicago (Illinois 60626, USA), U.S. Naval Dental Research Institute, and U.S. Naval Medical Research Unit No. 4, Great Lakes (Illinois 60088, USA).

[5] D. G. HOLLIS, G. L. WIGGINS and J. H. SCHUBERT, J. Bact. *95*, 1 (1968).
[6] P. F. FRANK, C. WILCOX and M. FINLAND, J. Lab. clin. Med. *35*, 188 (1950).
[7] NDRI strains.

Cardiac Ganglia in Spiders (Arachnida: Araneae)

It has long been known that neurogenic hearts occur in some of the arthropods, notably the decapod crustaceans and *Limulus*, but it has been only recently that the nature of the heartbeat has been investigated in any detail in any spider[1–3]. In each of the 3 species of spiders that have been studied thus far there is a cardiac ganglion. Since the presence of a cardiac ganglion is one indication of a neurogenic heart, it would be of interest to know if cardiac ganglia are of general occurrence in the Araneae. In order to determine this, we have made a histological study of the hearts of 28 species of spiders representing 11 families.

In everyone of the 28 species there is a cardiac nerve running the length of the heart on its mid-dorsal external

Spiders investigated for the presence of a cardiac ganglion[5]

Agelenidae
- *Agelenopsis naevia* (Walckenaer)
- *Agelenopsis pennsylvanica* (C. L. Koch)
- *Coras medicinalis* (Hentz)

Amaurobiidae
- *Amaurobius bennetti* (Blackwell)

Clubionidae
- *Chiracanthium inclusum* (Hentz)
- **Clubiona tibialis* Emerton

Epeiridae
- *Araneus cornutus* Clerck
- *Araneus trifolium* (Hentz)
- *Argiope aurantia* Lucas
- *Argiope trifasciata* (Forskal)
- **Mangora gibberosa* (Hentz)
- *Neoscona domiciliorum* (Hentz)

Linyphiidae
- *Pityohyphantes phrygianus* (C. L. Koch)

Pholcidae
- *Pholcus phalangioides* (Fuesslin)

Pisauridae
- *Dolomedes tenebrosus* Hentz
- *Pisaurina mira* (Walckenaer)

Salticidae
- *Evarcha hoyi* (Peckham)
- *Habronattus borealis* (Banks)
- **Zygoballus bettini* (Peckham)

Tetragnathidae
- *Tetragnatha* (Eugnatha) *straminae* Emerton
- *Tetragnatha versicolor* Walckenaer

Theridiidae
- *Steatoda borealis* (Hentz)
- *Theridion* (Parasteatoda) *tepidariorum* (C. L. Koch)

Thomisidae
- *Misumena vatia* (Clerck)
- *Misumenoides formosipes* (Walckenaer)
- *Misumenops asperatus* (Hentz)
- **Xysticus elegans* Keyserling
- **Xysticus funestus* Keyserling

surface. In 23 of the 28 species nerve cell bodies were found in this cardiac nerve. In the 5 in which nerve cells were not located, the failure was probably due to inadequate sampling rather than to the absence of such cells. The Table lists the spiders in which we have found a cardiac nerve. An asterisk indicates those species in which cell bodies were not found. To this list should be added the other 3 species of spiders which have been shown previously to have a cardiac ganglion. These are: *Geolycosa missouriensis* Banks (Lycosidae)[2], *Heteropoda venatoria* Linnaeus (Sparassidae)[1], and *Scodra calceata* Fabr. (Theraphosidae)[4].

The spiders examined thus far for the presence of a cardiac ganglion are very few when compared to the total number of spider species. However, the species which have been examined represent nearly $^1/_3$ of the total number of families of spiders. The universal occurrence of a cardiac ganglion in the families which have been studied indicates that cardiac ganglia must be of widespread occurrence in the Araneae[6].

Résumé. La présence d'un ganglion cardiaque a été recherchée chez des araignées par une étude histologique. Dans 11 familles, un ganglion cardiaque a été mis en évidence dans la région dorsale moyenne de la surface externe du cœur. La présence régulière d'un ganglion dans les familles étudiées indique qu'il existe très probablement chez toutes les araignées.

R. G. SHERMAN, C. R. BURSEY, C. R. FOURTNER and R. A. PAX

Department of Zoology, Michigan State University, East Lansing (Michigan 48823, USA),
25 November 1968.

1 R. S. WILSON, J. Insect Physiol. *13*, 1309 (1967).
2 R. G. SHERMAN and R. A. PAX, Comp. Biochem. Physiol. *26*, 529 (1968).
3 R. G. SHERMAN and R. A. PAX, Comp. Biochem. Physiol., in press.
4 R. LEGENDRE, C. r. hebd. Séanc. Acad. Sci., Paris *267*, 84 (1968).
5 After the scheme of B. J. KASTON, State Geological and Natural History Survey, Conn., USA, Bull. No. 70 (1948).
6 This work was supported in part by a grant from the National Heart Institute.

PRO EXPERIMENTIS

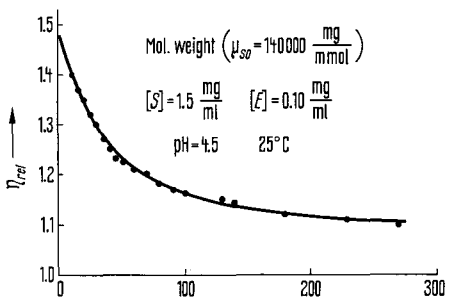
A New Method for Determining the Michaelis-Menten Constant Viscometrically for Enzyme Reactions of High-Molecular Substrates

The viscometric method has been successfully applied by many authors for the determination of the catalytic activity of a number of enzymes (amylases, nucleases, proteases, pectinases, hyaluronidases, Cx-cellulases etc.), degrading high-molecular substrates.

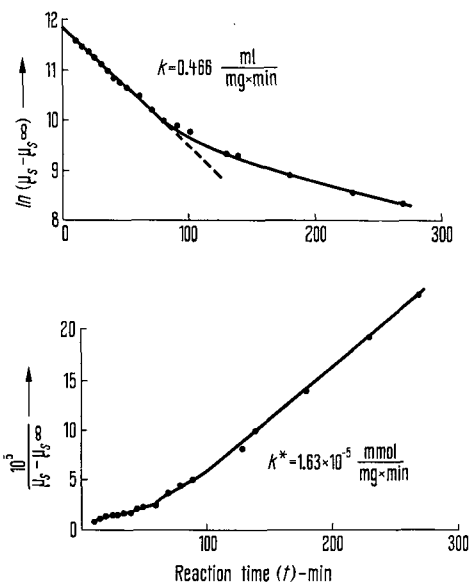
In the literature there is a lack of prerequisites and inferences sufficiently backed by arguments for the determination of the kinetic constants of enzyme-substrate reactions in a viscometric way.

In several successive works[1–4] a theory has been evolved which permits us to trace viscometrically the kinetics of enzyme reactions for high-molecular substrates. The equations thus obtained are applied in the tracing of the degradation kinetics of Sodium carboxymethylcellulose substrate (Na-CMC) under catalytic effect of the Cx-cellulase enzyme (EC 3.2.1.4, β-1,4-glucan-4-glucanohydrolase), which is obtained according to the type of

$$n_E + n_s \underset{k_{-1}}{\overset{k_{+1}}{\rightleftharpoons}} (n_E\, n_s) \xrightarrow{k_{+2}} n_E + n_{s\infty} \qquad (1)$$



1 M. L. TSCHETKAROV and D. N. KOLEFF, Mh. Chem. *98*, 1908 (1967).
2 M. L. TSCHETKAROV, D. N. KOLEFF and S. BANIKOVA, Mh. Chem. *98*, 1916 (1967).
3 M. L. TSCHETKAROV and D. N. KOLEFF, unpublished.
4 M. L. TSCHETKAROV and D. N. KOLEFF, unpublished.



Change of η_{rel}, $\ln(\mu_s - \mu_{s\infty})$ and $(\mu_s - \mu_{s\infty})^{-1}$ by the reaction time t for a hydrolytic reaction of Na-CMC and enzyme Cx-cellulase.