is directly proportional to the concentration of stimulant (odorant). The relationship between a cell's response (R) and the concentration of odorant (C) is given by the following equation (*2*):

$$R = \frac{R_{max}}{1 + (K/C)^n}$$

where R_{max} is the maximum response frequency, n is the Hill coefficient (a cooperativity factor between receptors), and K is a constant. For the most simple case, assuming identical receptors where $n = 1$, the equation reduces to the more familiar Michaelis–Menten equation for enzyme kinetics. The dose–response relationship between frequency and stimulant concentration (*14*) can be used to obtain analytical data from the receptrode system.

The neuronal biosensor

The dissected antennule is mounted in a specially designed flow cell consisting of several chambers, as shown in Figure 4. The chemosensing tip of the antennule is inserted into a tubular chamber through which artificial seawater (ASW) can be pumped (*15*). Adjacent to this seawater chamber and connected by a small mounting hole is another chamber in which the exposed antennular neurons are bathed in an artificial isotonic intercellular fluid (Panulirus saline solution) (*16*). This chamber also provides holes through which ground and reference wires can be inserted.

As shown in Figure 5, the flow cell is mounted on the stage of a binocular dissecting microscope, allowing the exposed neurons to be viewed during the experimental procedures. A four-port, two-way sample injection valve is used to introduce an analyte into the ASW carrier stream. A sample injection loop is used to provide a constant stimulant concentration for approximately 10 s.

Responses to these stimulants are received by a glass suction pickup electrode with an internal tip diameter of ~50 μm. The leads from this electrode as well as the leads from the ground and reference wires are fed into a neurological preamplifier, and the output of this amplifier is then divided and fed to several devices. One lead provides viewing of the amplified action potentials on a storage oscilloscope, while another feeds the signal to a window discriminator, the output of which is sent to a digital event counter. Adjustment of the window discriminator enables spikes of a particular amplitude to be selectively counted from a group of spikes of varying amplitudes. Signals are also fed into one channel of a stereo cassette tape recorder for data storage. Outputs from the cassette recorder are fed into the same devices that receive input from the preamplifier, enabling the stored data to be analyzed at a later time. A microphone allows an oral account of each experiment to be record-

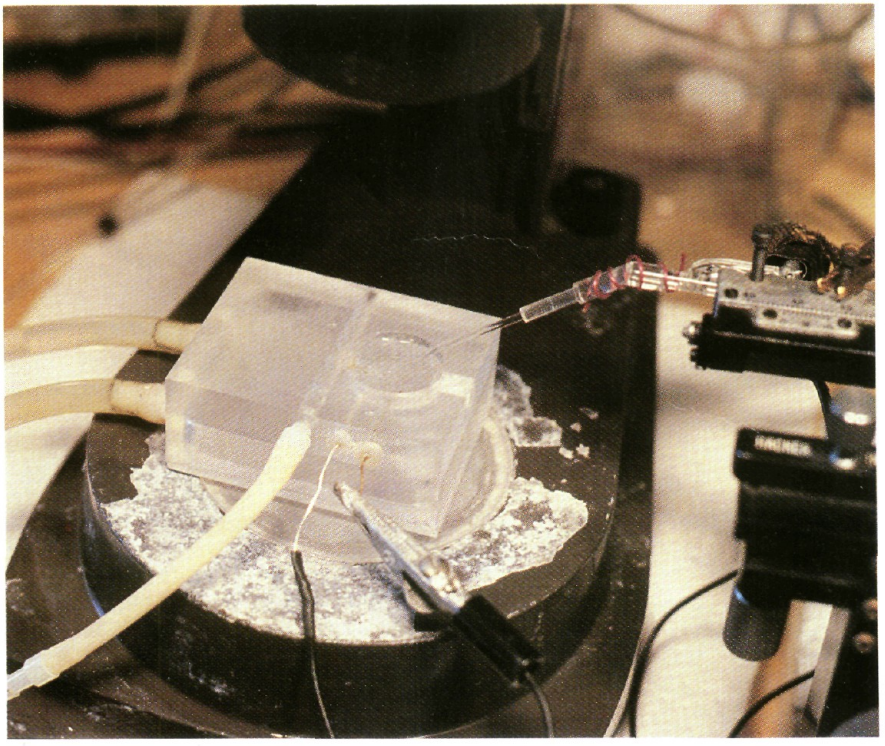

Figure 5. The antennular receptrode mounted on the microscope stage.

Make THE SOURCE Your Source for STABLE ISOTOPES

Isotec Inc. offers the scientific community one of the world's largest selections of stable isotopes and labelled compounds

^{18}O ^{15}N ^{13}CD

- NMR Solvents
- Reagents
- Organics
- Inorganics
- Biologicals

You Get More From THE SOURCE

- > 99% chemical purity
- High isotopic enrichment
- Competitive prices
- Fast delivery

Plus . . .

metal stable isotopes, helium-3 and other noble gas isotopes, other enriched stable isotopes, multiply-labelled compounds and custom synthesis

Call or write for your NEW complete price list today!

ISOTEC INC.
A Matheson, USA Company
3858 Benner Road, Miamisburg, OH 45342
(513) 859-1808 (800) 448-9760
Telex: 288278 Fax: (513) 859-4878

CIRCLE 75 ON READER SERVICE CARD