

IDENTIFICATION OF THE RETZIUS NEURON  
IN THE SEVENTH GANGLION OF SOUTH AMERICAN LEECH,  
**SEMISCOLEX SIMILIS** (ANNELIDA, SEMISCOLECIDAE)

IDENTIFICAÇÃO DO NEURÔNIO RETZIUS  
NO SÉTIMO GÂNGLIO DA SANGUESSUGA SUL AMERICANA,  
**SEMISCOLEX SIMILIS** (ANNELIDA, SEMISCOLECIDAE)

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The neuronal circuits of the behavior pattern generator for both swimming and blood ingestion of **Hirudo medicinalis** (see MULLER, NICHOLLS & STENT, 1981) and **Haementeria ghilianii** (see KRAMER, 1981; KRAMER & GOLDMAN, 1981), are well known. The authors of this work intend to study a possibly different circuit of the South American leech, **Semiscolex similis**, which predate by swallowing small living animals in fresh water. The first step in this work is to test the applicability of the simultaneous recording and identification me-

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thod (STEWART, 1981) used for *Hirudo medicinalis* and *Haementeria ghilianii* to this species. The kz neuron of Retzius was chosen for the first experiment because it is the only neuron recognizable by its counterpart in the 7th ganglion of the above species of leeches (KRAMER, 1981; MULLER, NICHOLLS & STENT, 1981).

#### METHODS

The animals were collected from a stream beds before the experiment. The sample, comprised of a single species, *Semiscollex similis* (Weynbergh, 1879), identified by the keys (RINGUELET, 1944; SAWYER, 1986). Its 7th ganglion was dissected and pinned to the Sylgard (Dow-Jone) floor of a plastic dish, viewed by transmitted light through a Leitz dark field condenser. A single glass tubing (A-M systems with Omega Dot) microelectrode, filled with 7 % Lucifer Yellow-CH (Sigma), of 20-50 megaohm resistance was used for both recording and injecting the dye through a Dagan 8500 high impedance amplifiers bridge system. The potential discharges were photographed from the screen of a Tektronix 5113 oscilloscope. As soon as the potential discharges were recorded, dye was injected by hyperpolarizing square pulses of 1.0 nA, 500 ms and 1.0 Hz from a CURITIBA-1 stimulator for 10-15 minutes. The injected neuron was photographed under a Leitz Dialux fluorescent microscope and drawn by camara lucida.

#### RESULTS

Many giant neurons of more than 10  $\mu$ m diameter could be seen in the 7th ganglion under dissection microscope or microscope (Fig. 3). Only the two Retzius neurons in a pentagon, instead of a triangle, could be recognized by the neuron map for *Hirudo medicinalis* and *Haementeria ghilianii* (MULLER, NI-

CHOLLS & STENT, 1981; KRAMER, 1981). The contours of the Retzius neuron somata in the other ganglia were also similar and recognizable by visual examination. At microelectrode penetration, a resting potential of 40-50 mV and a discharge of 5 Hz with hyperpolarization could be recorded (Fig. 1). Action potential was evoked by the injection pulse (not shown). The Retzius neuron injected by Lucifer Yellow-CH has a soma of about 20-30  $\mu\text{m}$  diameter (Fig. 2) and four processes extending towards the anterior and posterior connectives and to the two ipsilateral nerves in the 7th ganglion (Fig. 3) as described for the 7th ganglion counterparts in *Hirudo medicinalis* (JELLIES, LOER & KRISTAN, 1987).

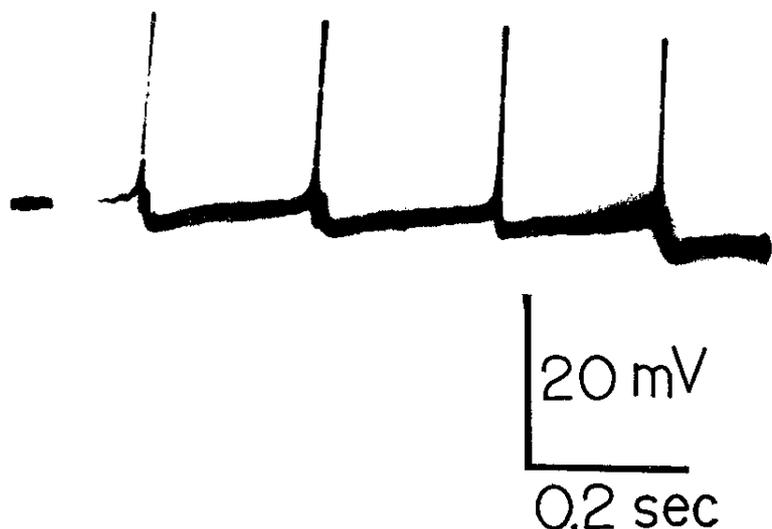


Fig. 1. Retzius neuron of *Semiscollex similis*: discharges recorded by microelectrode.

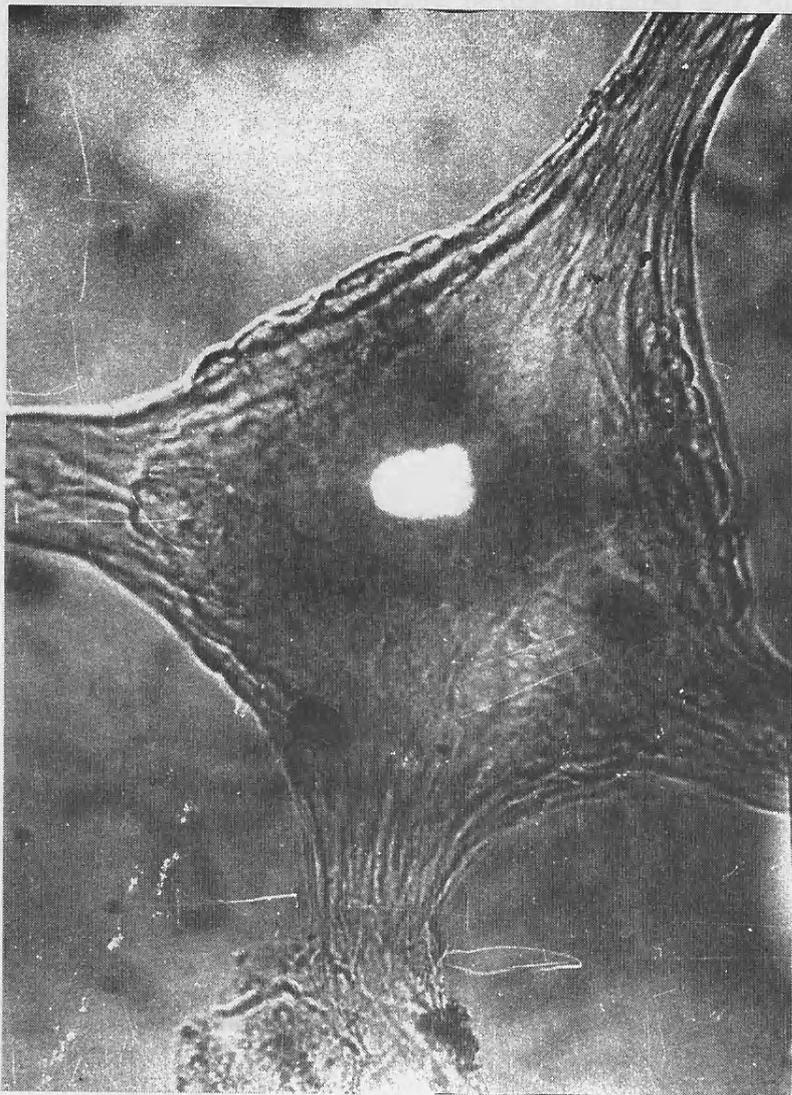


Fig. 2. Retzius neuron of **Semiscollex similis**.  
Photography (neuron with injected Lucifer  
Yellow-CH) focussed only on its soma;

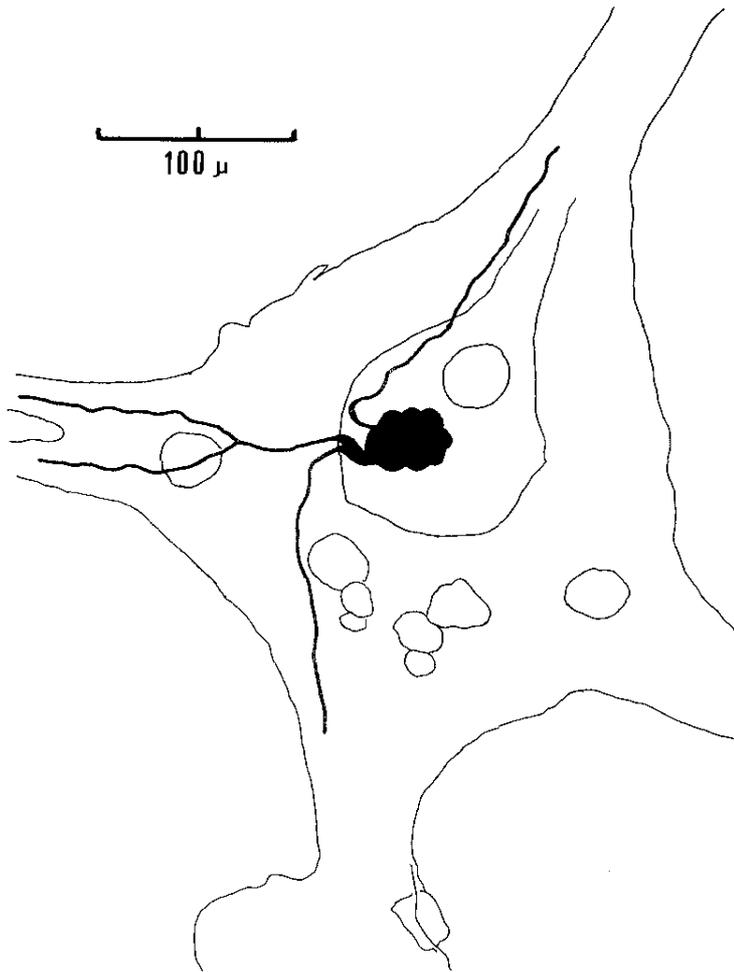


Fig. 3, Retzius neuron of ***Semiscollex similis***. Camara lucida drawing of the same Retzius neuron (in black) of Fig. 2, but with its processes drawn from different focal planes. Open circles are some other visible giant neurons not studied in this work.

## DISCUSSION

In this study, we demonstrated that the Retzius neuron in this leech can also be identified by the simultaneous recording and Lucifer Yellow-CH injection method used for the leeches **Hirudo medicinalis** and **Haementeria ghilianii**. It is highly probable that we may proceed to identify the other neurons in its swimming and predation pattern generators by this method. As the Retzius neuron is known to supply serotonin to these pattern generators in **Hirudo medicinalis** (LENT & DICKINSON, 1984), we do not assume that **Semiscolex similis** has a similar pattern generator circuit because the swimming and predation behaviors they generate are basically different from those of **Hirudo medicinalis**. Although no difference in potential discharge and morphology of Retzius neurons was noticed in this work, the presence of so many visibly unknown neurons in its 7th ganglion suggests a different neuron circuit in this leech.

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RESUMO

Neste trabalho demonstrou-se ser possível o uso do método de registro e identificação simultânea para o estudo do neurônio Retzius da sanguessuga sul americana **Semiscollex similis**. A descarga, o potencial de ação evocado e a morfologia deste neurônio são semelhantes aos das espécies **Hirudo medicinalis** e **Haementeria ghilianii**.

PALAVRAS CHAVE: **Semiscollex-similis**, neurônio Retzius, identificação.

SUMMARY

In this work, it is demonstrated that it is possible to study the Retzius neuron of the South American leech, **Semiscollex similis**, by simultaneous recording and identification method. The potential discharges, action potential evoked and the morphology of this neuron are similar to those of **Hirudo medicinalis** and **Haementeria ghilianii**.

KEY WORDS: **Semiscollex-similis**, Retzius neuron, identification.

RÉSUMÉ

Dans cet étude nous avons démontré que c'est possible l'usage de la méthode de registres et identification simultanées pour l'étude du neurone Retzius de la sangsue sud-américaine **Semiscollex similis**. La décharge, le potentiel d'action évoqué et la morphologie de cet neurone sont semblables à celles de les espèces **Hirudo medicinalis** et **Haementeria ghilianii**.

MOTS CLÉS: **Semiscollex-similis**, neurone Retzius, identification.

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